FINAL
REVISION 1
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA) REPORT

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP
ISLAND OF OAHU, HAWAII

Prepared for:

US Army Engineering and Support Center, Huntsville

Contract: DACA87-00-D-0034
Task Order: 0005
Project No. H09HI011900

Geographical District:
Honolulu

Prepared By:

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TRUST · INTEGRITY · QUALITY
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June 2008

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1.0 EXECUTIVE SUMMARY

1.0.1 In 2001, Zapata Incorporated (ZAPATA) was contracted by the US Army Engineering Support Center, Huntsville (USAESCH) supported by the US Army Corps of Engineers, Honolulu District, Pacific Ocean Division (CEPOH) to conduct an Engineering Evaluation/Cost Analysis (EE/CA) for the He'eia Combat Training Area and Pali Training Camp. The purpose of the EE/CA is to evaluate potential ordnance-related risk, develop and evaluate Munitions Response (MR) alternatives, and recommend alternatives to reduce munitions-related risk at the project site.

1.0.2 The He'eia Combat Training Area and Pali Training Camp are located on the eastern shore of the Island of Oahu, Hawaii. The He'eia Combat Training Area is composed of two parcels (He'eia Kea and Kahalu'u), totaling 2,458 acres under the scope of work. He'eia Kea was used for support and short range training (Figure 1, Appendix B1), while Kahalu'u was used as maneuver and impact areas for jungle and assault training (Figure 1, Appendix B2). At the time fieldwork was executed, right-of-entry could not be obtained for part of the Kahalu'u parcel (Ka'alaea Valley). As such, EE/CA field investigations were not conducted in Ka'alaea Valley; however, sufficient data exist from past site visits to evaluate Ka'alaea Valley as part of this EE/CA. The Pali Training Camp is composed of four non-contiguous parcels (Maunawili Valley Impact Area, Maunawili Stream Area, Maunawili site, and Ulumawao – Figure 1, Appendix B3) totaling 4,378 acres and was used as an encampment and an artillery impact area. The He'eia Combat Training Area and Pali Training Camp are former military training areas and are considered eligible under DERP-FUDS.

2.0 SOURCE, NATURE AND EXTENT OF MEC

Field investigations at the He'eia Training Camp were conducted from March to July 2003. Because of right-of-entry issues, the EE/CA field investigation for the Pali Training Camp did not commence until July 2006 and was completed in November 2006. Using data collected during the EE/CA and prior field investigations, a qualitative risk evaluation was performed to determine the most appropriate MR actions for the site. The characterization approach for the He'eia Combat Training Area and Pali Training Camp consisted of the following:

- Instrument Assisted Visual Reconnaissance;
- Surface Clearance;
- Geophysical Mapping;
- Mag-and-Flag; and
- Intrusive Investigation.

2.1 SOURCE OF MEC

2.1.1 He'eia Combat Training Area

The source of munitions and explosives of concern (MEC) is attributed to an encampment and two nearby valleys that supported approximately 4,500 personnel. Facilities included barracks, a mess hall, an open-air theater, a motor pool, and an ammunition storage shed. The encampment was constructed in October 1943 and was dismantled by 1945. Training facilities included several small arms ranges, a hand-grenade range, an infiltration course, two bayonet courses, two

obstacle courses, a shipside platform (He'eia Kea parcel), and maneuver and impact areas for jungle and assault training (Kahalu'u parcel) (INRP, 1993).

2.1.2 Pali Training Camp

In 1943, Pali was established as a regimental combat team training center, emphasizing the use of and familiarity with modern arms and field weapons. In addition, the camp provided rugged terrain for jungle and Ranger training. Several military structures were erected for use but by 1946, all were dismantled and removed from the property. Valley residents report that artillery rounds were fired into Maunawili Valley (Maunawili Valley Impact Area) from firing points at the mouth of the valley (Maunawili Stream Area) or from other locations within Kailua. An ordnance clearance was issued in 1945. A public warning was issued by the Army Ordnance Services in June 1948 to exercise caution when entering former training areas (Maunawili Valley Impact Area). A ranch manager reported a "155mm round" in the Maunawili Valley (USACE, 1995). It was also reported by local residents that mortar rounds and machine gun bullets were frequently turned over in plowed fields (USACE, 1995). In March 2002 (while conducting the Geophysical Prove-Out), it was reported by a worker on a movie set within the Pali parcel that a 20mm projectile was recently found. During the technical project planning (TPP) process, a nearby resident stated that there were impact craters within the Maunawili site. The Ulumawao parcel was used as an encampment and was not scheduled for field investigation per the TPP process.

2.2 NATURE OF MEC

2.2.1 He'eia Combat Training Area

2.2.1.1 He'eia Kea

No MEC has been recovered at the He'eia Kea parcel; however, munitions debris (MD) indicates that practice and live ordnance were used at the site. Fragmentation grenade parts, historical documentation indicating live grenade ranges, and previous site investigations (M9A1 high explosive antitank rifle grenade) indicates the use of high explosives. Several 2.36-inch rocket parts were recovered, which may have been from HE versions.

2.2.1.2 Kahalu'u

Only MD from practice munitions (an M74 37mm projectile and an M7A1 2.36-inch practice rocket) were found within the Waihe'e Valley of the Kahalu'u parcel; however, an impact area is located in the adjacent valley (Ka'alaea Valley). The impact area received fire from of field artillery pieces, mortar, bazooka, and other assault weapons using live and practice rounds. Previous investigations within the Ka'alaea Valley found MD potentially from 75mm shrapnel rounds and M9A1 rifle grenades (USACE, 1993).

2.2.2 Pali Training Camp

2.2.2.1 Maunawili Valley Impact Area

Historical anecdotal information indicates the presence of mortars and projectiles including 20mm and 155mm rounds (USACE, 1993). During field investigations, MD from 81mm mortars, 75mm high explosive, 75mm shrapnel, and 37mm projectiles were found within the Maunawili Valley Impact Area.

2.2.2.2 Maunawili Stream Area, Maunawili Site, and Ulumawao

No MEC or MD has been found within the Maunawili Stream Area or Maunawili site. There are no records of MEC or MD discoveries in the historical documentation pertaining to the Ulumawao parcel.

2.3 EXTENT OF MEC

2.3.1 He'eia Combat Training Area

In an effort to characterize and determine the extent of MEC at the He'eia Combat Training, ZAPATA conducted digital geophysical mapping (DGM) over transects, super-transects, and grids. Within the He'eia Kea parcel, DGM was conducted on a total of 10 acres (14 grids, and three transects). Subsequent intrusive operations found MD items near the base of the Pu'u Ma'eli'eli Mountain near where the slope changes to less than 33 percent. Within the Kahalu'u parcel, DGM was conducted on 3.3 acres (18 grids and four super-transects). An instrument-assisted visual reconnaissance was also conducted in the Kahalu'u parcel covering approximately 5.1 acres. All MD items found during the EE/CA field investigation at Kahalu'u were at the northeastern section of Waihe'e Valley near the valley's entrance. The items were down slope of the impact area as defined in historical documentation. During previous investigations, MD items were found within the impact area.

2.3.2 Pali Training Camp

DGM was conducted within grids in the Maunawili Valley Impact Area of the Pali Training Camp over six areas totaling 5.7 acres. A reconnaissance was conducted within the Maunawili Valley Impact Area, the Maunawili site, and the Maunawili Stream area. Approximately 26.3 acres were covered during reconnaissance, which included hiking trails and meandering paths. At the Pali Maunawili Valley Impact Area, 103 MD items were found. A new impact area was defined based on the results of the reconnaissance and the intrusive investigation (Figure 6, Appendix B3). Nearly all of the MD was found in a bowl-shaped section of the Maunawili Valley that backs up to the Ko'olau Mountain Range on the west and is topographically open to the east. The northern and southern extents of the impact area are defined by finger ridges that extend eastward from the Ko'olau Range.

3.0 SITE CONDITIONS

3.1 HE'EIA COMBAT TRAINING AREA

3.1.1 He'eia Kea

The He'eia Kea parcel covers approximately 204 acres located on the coastal plain adjacent to and on the slopes of Pu'u Maelieli, near the He'eia small boat harbor. The site is bordered to the east and *makai* (toward the ocean) by the Kamehameha Highway and to the west and *mauka* (toward the mountain) by Kahekili Highway and the Temple Valley residential areas. The parcel's northern boundary follows the crest of the ridge down slope to the sewage disposal plant and the southern boundary follows an unnamed drainage to the Kamehameha Highway. Most of this parcel is covered with dense vegetation including the densely forested coastal plain and thick grasses and shrubs in the higher elevations. There are several gulches throughout the parcel as well as areas with steep slopes. Elevations within the He'eia Kea parcel range from approximately 20 feet above mean sea level (MSL) to over 700 feet above MSL.

3.1.2 Kahalu'u

The Kahalu'u parcel covers approximately 2,254 acres, mostly consisting of densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys. Both valleys consist of a mix of residential and agricultural lots (USACE, 1993). The western boundary is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet above MSL. The eastern portion of the site overlaps with residential and agricultural plots along the edge of the Waiahole Forest Reserve (AMEC, 2001). Pu'u Kuolani and Kalahaku Ridge bound the parcel to the north and south, respectively. Portions of the site within both valleys contain permanent streams that are subject to flash flooding during storms (AMEC, 2001).

3.2 PALI TRAINING CAMP

The Pali Training Camp is comprised of four non-contiguous parcels located near the base of Ko'olau Range in portions of the Maunawili and Makali'i Valleys. The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* portion of Maunawili Valley and includes the suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. This parcel ranges in elevation from approximately 200 feet MSL near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second, much smaller parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet MSL (AMEC, 2001). The third parcel is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana. It ranges in elevation from approximately 50 to 200 feet MSL. The fourth and second largest parcel (500 acres), called the Ulumawao site, is located outside the Maunawili Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

3.3 PAST, PRESENT AND FUTURE LAND USE

3.3.1 He'eia Combat Training Area

The He'eia Combat Training Area consisted of two parcels which were acquired in 1943 by lease, license, or owner permission of the Bernice Pauahi Bishop Estate, Sing Chong Company, Ltd., and numerous other private landowners. The camp was dismantled in 1945 and the impact area was cleared of ordnance by the Army. Per the DERP-FUDS Inventory Project Report, "Documents could not be located evidencing acquisition of the two parcels for use by the U.S. Armed Forces" (USACE, 1993) nor during historical research conducted during development of this EE/CA. Currently, the He'eia Kea parcel is undeveloped forest and coastal plain. However, the City & County of Honolulu recently acquired He'eia Kea to keep the land as a nature preserve. The city is developing a master plan for botanical gardens, picnic grounds, open spaces and hiking trails. The Kahalu'u parcel is currently used for a variety of purposes, including residential, ranching, and agriculture. The city has a long-term goal of developing of Waihe'e Nature Park in the southeast portion of the parcel. There are also large undeveloped areas within the project area. Commercial filming has been conducted within both parcels.

3.3.2 Pali Training Camp

The training camp was opened in 1943 on property owned by Harold K. Castle (doing business as Kane'ohe Ranch). The municipal Pali Golf Course, privately owned Ko'olau Golf Course, and Hawaii Pacific University presently occupy the parcel previously supporting the primary troop encampment at the base of Nu'uanu Pali. Other portions of the former artillery impact area at Maunawili and Makali'i Valleys are presently owned by the Luana Hills Country Club, the Hawaii Agricultural Research Center (formerly Hawaii Sugar Growers Association) and multiple private landowners. The Pali Training Camp parcels are mostly undeveloped. However, there are pockets of residential, recreational, and agricultural uses throughout the four parcels. Recreational activities include golfing, hiking, mountain biking and horseback riding. The Luana Hills Country Club operates on approximately 40 acres of the Maunawili Valley Impact Area. There are also approximately 15 miles of public trails that pass through the Pali Training Camp's four areas. Extensive agricultural activities are conducted in the Maunawili Valley Impact Area by the Hawaii Agriculture Research Center and Luluku Banana Farmers. Commercial filming has taken place along the trails and within the Luluku Banana Farmers area.

3.4 PUBLIC ACCESS

3.4.1 He'eia Combat Training Area

Public access to the He'eia Kea parcel is restricted by live-in caretakers. The parcel is bordered by ridges to the north, south and west and is fenced along the Kamehameha Highway to the east. The single point of entry from the highway is gated and locked. Portions of the Kahalu'u parcel are restricted by fences and gates; however, the site can be accessed on foot by trails. Terrain and vegetation limit access to either site from the north, south and west. The Kahalu'u parcel is composed of two valleys, the Waihe'e and Ka'alaea Valleys. The majority of the Ka'alaea Valley operated as Senator Fong's Plantation and Gardens and is open to the public for guided tours and weddings. The Waihe'e Valley Nature Park is in the Waihe'e Valley and is also open to the public. A mix of farming and residential property and occupy parcels near the mouth of each valley (as seen on Figure 4, Appendix B2).

3.4.2 Pali Training Camp

The Maunawili site is bordered to the east by the Maunawili neighborhood and to the north and west by the Pali Highway. From the west the site can be accessed by foot through the St. Stephens Seminary property, and from the east through the Maunawili neighborhood. A public hiking trail passes through the southern portion of the area. The Maunawili Valley Impact Area can be accessed by car through the Luana Hills Country Club and through the Maunawili Neighborhood. The Luana Hills Country Club guard building controls vehicular traffic along Luana Hills Road, and a locked gate at the end of Maunawili Road restricts vehicular access from the neighborhood. The only means of site access for the general public is by foot, bicycle or horse. There are numerous public hiking trails that pass through the Maunawili Valley Impact Area. The Maunawili Stream Area is also accessed by Luana Hills Road. The road cuts through the western boundary of the area just south of the Country Club's guard building. A public hiking trailhead is off Luana Hills Road; the trail runs up to and then along a ridge that approximately defines the area's eastern boundary.

4.0 RESPONSE ACTION ALTERNATIVES

ZAPATA evaluated four alternatives to reduce the risk of public exposure to MEC:
Alternative 1 - No DoD Action Indicated (NDAI);
Alternative 2 - Institutional Controls;
Alternative 3 - Surface Clearance with Institutional Controls; and
Alternative 4 - Clearance to Detectable Depth with Institutional Controls.

4.1 NO DEPARTMENT OF DEFENSE ACTION INDICATED (NDAI)

This alternative means that no removal action will be performed and no measure to restrict site access or modify behavior will be implemented.

4.2 INSTITUTIONAL CONTROLS

This alternative may include restricting site access with fencing, providing warnings by posting signs, instituting land use controls, and/or imposing administrative requirements for future property development. Institutional controls may also include educating property owners, construction personnel and the public through media such as newspaper articles, notices and informational brochures.

4.3 SURFACE CLEARANCE

This alternative involves removing all MEC visible on the ground surface. Surface clearance includes items that may be partially buried but are protruding through the surface.

4.4 CLEARANCE TO DETECTABLE DEPTH

This alternative involves the physical removal of MEC to detectable depths. This depth is in accordance with Department of Defense Explosives Safety Board (DDESB) guidelines and varies based on the type of planned activity or construction at the site.

5.0 RECOMMENDED ALTERNATIVES

5.1 HE'EIA COMBAT TRAINING AREA

5.1.1 He'eia Kea

Clearance to Detectable Depth with Institutional Controls is recommended within He'eia Kea based on current and future land use. The city is developing a master plan for botanical gardens, picnic grounds, open spaces and hiking trails within the He'eia Kea parcel. The removal should be focused in areas where the park is to be constructed, which is likely to include the 127 acres where slopes are less than 33 percent (Figure 3, Appendix B1). An additional four acres should be allotted for current/future hiking trails in areas where the slope is greater than 33 percent. Recommended Institutional Controls include warning signs and literature as established and directed by CEPOH.

5.1.2 Kahalu'u

Clearance to Detectable Depth with Institutional Controls is recommended within the Kahalu'u parcel. Clearance to Detectable Depth is recommended within an approximately 100-ft buffer at the base of where the slope changes to less than 33 percent, and a 30-ft buffer around the Ka'alaea Stream bed within the impact area as shown on Figure 3, Appendix B2. This covers approximately 66 acres. In conjunction with Clearance to Depth, it is recommended that

Institutional Controls including warning signs and literature be established as directed by CEPOH.

5.2 PALI TRAINING CAMP

5.2.1 Maunawili Valley Impact Area

Clearance to Detectable Depth with Institutional Controls is recommended within portions of the Maunawili Valley Impact Area based on current and future land use. Clearance to Detectable Depth should be conducted on public hiking trails that pass through the impact area, within an approximately 100-ft buffer at the base of where the slope changes to less than 33 percent, and along stream beds as shown on Figure 10, Appendix B3. This covers approximately 113 acres. In conjunction with Clearance to Depth, it is recommended that Institutional Controls be established including warning signs and literature as directed by CEPOH.

5.2.2 Maunawili Site, Maunawili Stream Area, and Ulumawao

NDAI (No DOD Action Indicated) is recommended for the Maunawili site, and Maunawili Stream area of the Pali Training Camp as no MEC, MD, and/or evidence of HE usage was discovered in this area. NDAI is recommended for Ulumawao of the Pali Training Camp based on historical documentation.

6.0 SUMMARY OF RECURRING REVIEW PLAN

The USACE, Honolulu District will maintain its responsibilities for managing residual risk by performing recurring reviews after the recommended MR actions have been implemented. Based on specific site conditions, this involves returning to the areas every year to assess and report on the continued effectiveness of MEC cleanup activities and/or Institutional Controls, and preparing a full scale Recurring Review every five years. The need for recurring reviews will be coordinated with regulators and stakeholders, and justified in each recurring review report. The primary objective of the recurring review is to ensure the MR actions implemented as a result of this EE/CA remain effective and continue to provide protection against MEC.

7.0 COSTS

With less than 2% of the site investigated, the costs provided in this EE/CA represent rough order of magnitude estimates. These estimates were prepared using information from site visits conducted within the areas, results of DGM and subsequent sampling, reconnaissance, historical research, best professional judgment, and experience with similar projects. Both removal action alternatives assume complete accessibility throughout the entire project area.

7.1 SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

7.1.1 He'eia Kea

The total estimated cost to implement Alternative 3, Surface Clearance with Institutional Controls for He'eia Kea is $689,775. The total cost increases to $1,589,775 when considering the cost of Recurring and Annual Reviews. Surface Clearance, including brush clearing, is estimated to require approximately six weeks for completion.

7.1.1.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $661,314. The cost of the surface clearance is based on removing 100% of the assumed 10,200 surface anomalies at a rate of 30 acres per day, five ten-hour days a week for six weeks. These figures are based on an assumed 75 anomalies per acre over a 131-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities. The estimated costs are outlined in Appendix F, Table 4-1.

7.1.1.2 Long Term Costs

Institutional control costs are $28,461. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

7.1.2 Kahalu'u

The total estimated cost to implement Alternative 3, Surface Clearance with Institutional Controls for Kahalu'u is $226,380. The total cost increases to $1,126,380 when considering the cost of Recurring and Annual Reviews. Surface Clearance, including brush clearing, is estimated to require approximately three days for completion.

7.1.2.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $212,150. The cost of the surface clearance is based on removing 100% of the assumed 782 surface anomalies at a rate of 22 acres per day, five ten-hour days a week for three days. These figures are based on an assumed 12 anomalies per acre over a 66-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities in similar areas. The estimated costs are outlined in Appendix F, Table 4-2.

7.1.2.2 Long Term Costs

Institutional control costs are $14,230. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

7.1.3 Maunawili Valley Impact Area

The total estimated cost to implement Alternative 3, Surface Clearance with Institutional Controls for the Maunawili Valley Impact Area is $331,521. The total cost increases to $1,231,521 when considering the cost of Recurring and Annual Reviews. Surface Clearance, including brush clearing, is estimated to require approximately four days for completion.

7.1.3.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $293,573. The cost of the surface clearance is based on removing 100% of the assumed 1,356 surface anomalies at a rate of 30 acres per day, five ten-hour days a week for four days. These figures are based on an assumed 12 anomalies per acre over a 113-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities in similar areas. The estimated costs are outlined in Appendix F, Table 4-3.

7.1.3.2 Long Term Costs

Institutional control costs are $37,948. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

7.2 CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

7.2.1 He'eia Kea

The total estimated cost to implement Alternative 4, Clearance to Detectable Depth with Institutional Controls for He'eia Kea is $2,580,185. The total cost increases to $3,480,185 when considering the cost of Recurring and Annual Reviews. Clearance to Detectable Depth is estimated to require approximately 22 weeks for completion.

7.2.1.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $2,551,724. The cost of the surface and subsurface clearance is based on conducting DGM at a rate of three acres per day and removing 100% of the assumed 35,501 anomalies at a rate of two acres per day, five ten-hour days a week totaling 22 weeks. These figures are based on an assumed 271 anomalies per acre over a 131-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities. The estimated costs are outlined in Appendix F, Table 5-1.

7.2.1.2 Long Term Costs

Institutional control costs are $28,461. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

7.2.2 Kahalu'u

The total estimated cost to implement Alternative 4, Clearance to Detectable Depth with Institutional Controls for Kahalu'u is $525,687. The total cost increases to $1,425,687 when considering the cost of Recurring and Annual Reviews. Clearance to Detectable Depth is estimated to require approximately six days for completion.

7.2.2.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $511,457. The cost of the surface and subsurface clearance is based on removing 100% of the assumed 2,574 anomalies at a rate of 11 acres per day, five ten-hour days a week totaling six days. These figures are based on an assumed 39 anomalies per acre over a 66-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities in similar areas. The estimated costs are outlined in Appendix F, Table 5-2.

7.2.2.2 Long Term Costs

Institutional control costs are $14,230. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

7.2.3 Maunawili Valley Impact Area

The total estimated cost to implement Alternative 4, Clearance to Detectable Depth with Institutional Controls for the Maunawili Valley Impact Area is $819,645. The total cost increases to $1,719,645 when considering the cost of Recurring and Annual Reviews. The Clearance to Detectable Depth is estimated to require approximately ten days for completion.

7.2.3.1 Removal Action (RA) Costs

The estimated cost to implement the RA component of this alternative is $871,697. The cost of the surface and subsurface clearance is based on removing 100% of the assumed 4,407 anomalies at a rate of 11 acres per day, five ten-hour days a week totaling ten days. These figures are based on an assumed 39 anomalies per acre over a 113-acre area. Anomaly concentrations are based on actual anomaly concentrations encountered during EE/CA field activities. The estimated costs are outlined in Appendix F, Table 5-3.

7.2.3.2 Long Term Costs

Institutional control costs are $37,948. The total present value cost of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is $300,000. A line item is included representing the present value of 24 smaller-scale annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls.

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1.0 INTRODUCTION

1.0.1 The US Army Engineering and Support Center, Huntsville (USAESCH) and the US Army Corps of Engineers, Honolulu District, Pacific Ocean Division (CEPOH) have teamed to produce this Engineering Evaluation/Cost Analysis (EE/CA) for the He'eia Combat Training Area and Pali Training Camp, Island of Oahu, Hawaii. This EE/CA report documents the decision process to determine the most appropriate munitions response actions for the He'eia Combat Training Area and Pali Training Camp.

1.0.2 The results of the investigation conducted under the EE/CA were examined using the Ordnance and Explosives Risk Impact Assessment (OERIA) guidance. The OERIA provides a stakeholder-friendly method of risk assessment for use during an EE/CA. OERIA uses direct analysis of site conditions and human issues that evaluate munitions and explosives of concern (MEC) risk for a qualitative assessment at the sites. The qualitative risk assessment follows a very conservative approach and evaluates the level of MEC risk to the public in terms of the likelihood of exposure and the severity of exposure to MEC. It is important to note that exposure to MEC does not indicate that an incident or injury will occur. A person would have to perform some deliberate act, such as digging for the item, picking it up, or striking it, to be exposed to actual risk. An evaluation of the risk of MEC exposure has been performed for the He'eia Combat Training Area and Pali Training Camp (Chapter 4.0), even if no evidence of MEC was recovered during the EE/CA field investigation, because a statistical sample can never prove the absence of MEC at a site. A residual risk (no matter how small) will always be present based on past military use of the area.

1.1 PROJECT AUTHORIZATION

The work required under the Scope of Work (SOW), provided in Appendix A, falls under the Defense Environmental Restoration Program (DERP) – Formerly Used Defense Sites (FUDS) Program. This action was performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; and the National Oil and Hazardous Substance Contingency Plan (NCP), Section 300.400. All activities involving work in areas potentially containing unexploded ordnance hazards were conducted in full compliance with USAESCH, CEPOH, and Department of Defense (DOD) requirements regarding personnel, equipment, and procedures.

1.2 BACKGROUND

1.2.1 In 2001, Zapata Incorporated (ZAPATA) was contracted by the USAESCH to conduct an EE/CA for the He'eia Combat Training Area and Pali Training Camp. The He'eia Combat Training Area, Island of Oahu, Hawaii consists of two parcels totaling approximately 2,458 acres - one approximately 204-acre parcel situated in He'eia Kea and the other parcel in Kahalu'u covers approximately 2,254 acres (Figure 1, Appendix B1 and Figure 1, Appendix B2, respectively). The He'eia Kea parcel supported the US Army's 98th Regimental Combat Team where in October 1943, barracks, a mess hall, an open-air theater, a motor pool, and an ammunition storage shed were constructed. Training facilities constructed at the site included a Class A rifle range, a dummy hand grenade court, a live hand grenade court, an infiltration course, two bayonet courses, two obstacle courses, a shipside platform, and a maneuver area. The (larger) Kahalu'u tract was reported in the Inventory Project Report (INPR) as a maneuver

and impact areas for jungle and assault training. An impact area was established for the firing of field artillery pieces, mortars, bazookas, and other assault weapons using live and practice rounds. By the end of 1945, structures and training facilities at both parcels were dismantled (US Army Corps of Engineers [USACE], 1993).

1.2.2 The Pali Training Camp area is comprised of four non-contiguous properties that total approximately 4,396 acres at the base of the Ko'olau mountain range on the windward side of Oahu, Hawaii near Kailua (Figure 1, Appendix B3). The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* (toward the mountain) portion of Maunawili Valley and includes the suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. The impact area was identified in the INPR as consisting of approximately 900 acres of the Maunawili Valley (USACE, 1995). This parcel ranges in elevation from approximately 200 feet above mean sea level (MSL) near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second (much smaller) parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet. MSL (AMEC, 2001). The third parcel (Maunawili Stream), formerly known as Makali'i Valley, is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana; it ranges in elevation from approximately 50 to 200 feet. MSL. It has been reported that sections of the Makali'i Valley were utilized as firing points (USACE, 1995). The slope below both sides of Mount Olomana are also suspected of being an impact area (AMEC, 2001). The fourth and second largest parcel (500 acres) called the Ulumawao site is located outside Maunawili Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at the Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

1.3 PURPOSE AND SCOPE

1.3.1 The purpose of the EE/CA is to evaluate potential ordnance risk and develop munitions response action alternatives that reduce the risk associated with materials possible presenting an explosive hazard (MPPEH) at the He'eia Combat Training Area and Pali Training Camp. The scope of the EE/CA is limited to the evaluation of risk to human safety associated only with the explosive hazards of MPPEH.

1.3.2 The future development and use of the He'eia Combat Training Area and Pali Training Camp has a direct influence on the life and livelihood of several stakeholders including the public; landowners or those with a financial or business interest; and many Federal, State, and local agencies. This EE/CA report includes consideration of the concerns of the stakeholders involved. Once the EE/CA has been completed, new information and discoveries will be evaluated by CEPOH by means of recurring reviews (as outlined in Appendix H).

1.3.3 For this process to be successful, close coordination and cooperation between the stakeholders, community, regulators, and technical support personnel must occur. In serving as a cornerstone for the risk management effort, this EE/CA report identifies and evaluates

reasonable alternatives and makes recommendations for munitions response actions, where appropriate.

1.3.4 This EE/CA report documents the background, approach, and evaluation process for determining the potential risk that MPPEH poses to the public at the He'eia Combat Training Area and Pali Training Camp. It also summarizes field activities and outlines recommendations for future munitions response actions based on the methodology described in this document.

1.3.5 Four munitions response action alternatives are identified and evaluated in this EE/CA report. These include No DOD Action Indicated (NDAI) and varying levels of risk reduction actions:

- Alternative 1: No DOD Action Indicated;
- Alternative 2: Institutional Controls;
- Alternative 3: Surface Clearance; and
- Alternative 4: Clearance to Detectable Depth.

1.4 PROJECT TEAM

1.4.1 US Army Engineering and Support Center, Huntsville

The US Army Engineering and Support Center, Huntsville (USAESCH) is the implementing agency for this project and has approval authority for project execution. The USAESCH provided expertise for MPPEH-related activities. Additionally, USAESCH responsibilities included the procurement of Architect/Engineer (A/E) services, direction of the A/E contractor, control of the budget and schedule, and coordination of document reviews.

1.4.2 US Army Corps of Engineers, Honolulu District, Pacific Ocean Division

The US Army Corps of Engineers, Honolulu District, Pacific Ocean Division (CEPOH) and USAESCH are the sponsors of the EE/CA. CEPOH responsibilities included coordination for site access, review of project work plans and documents, communication with the news media and public, and coordination with state and local regulatory agencies.

1.4.3 Zapata Incorporated

ZAPATA is the prime contractor to USAESCH and provided all engineering support and services for the site investigation. ZAPATA was responsible for performance of the activities detailed in the SOW, Appendix A, and monitoring of the project budget and schedule.

1.4.4 Blackhawk GeoServices, Inc.

1.4.4.1 Geophysical Data

Blackhawk GeoServices, Inc. (Blackhawk) collected and processed geophysical data from surveys of the He'eia Combat Training Area (as a subcontractor to ZAPATA) and Pali Training Camp (as a division of ZAPATA). During March 2002, Blackhawk conducted a geophysical prove-out in direct coordination with the USAESCH. ZAPATA's Project Geophysicist oversaw the prove-out and data collection.

1.4.4.2 Anomaly Relocation

At the He'eia sites, Blackhawk marked the locations of targets identified from the analyzed geophysical data on the ground with labeled pin flags. In open areas of the two sites, Blackhawk personnel, using global positioning system (GPS) techniques, located the targets. The coordinates of the targets were recorded in Hawaii State Plane. Once the location of a target was marked on the ground, Blackhawk personnel used a hand-held Electromagnetic Detector (EM-61) to verify the position of the target and adjusted the location of the pin flag, if necessary for subsequent intrusive sampling.

1.4.4.3 Surveying

Blackhawk located corner points of all sampling grids for the Pali sites using GPS techniques. Survey data were incorporated into the base map, including control monuments and grid plots.

1.4.5 Human Factors Applications, Inc. and Donaldson Enterprises, Inc.

At the He'eia sites, Human Factors Applications, Inc. (HFA), a subcontractor to ZAPATA, performed intrusive sampling of the grids and transects, after completion of the geophysical investigation by Blackhawk. HFA assisted ZAPATA in documenting and accounting for all discovered items in the Weekly Reports and was responsible for scrap management. Donaldson Enterprises, Inc. (DEI), a subcontractor to HFA, was subcontracted to perform demolition operations.

1.4.6 Wil Chee Planning, Inc.

Wil Chee Planning, a subcontractor to ZAPATA, provided assistance to ensure that quantitative data generated during the project were translated and disseminated to the public in understandable terminology. Through its community relations expertise and site knowledge, Wil Chee assisted ZAPATA to effectively communicate to the public risks and proposed actions to reduce residual risks.

1.4.7 R. M. Towill Corporation

R. M. Towill Corporation, a subcontractor to ZAPATA, surveyed corner points of all sampling grids and the centerline of meandering paths for the He'eia sites. Survey data were incorporated into the base map, including control monuments, and grid plots.

1.5 PROJECT OBJECTIVES

1.5.1 The objective of the EE/CA is to support an informed decision for determining the most appropriate munitions response action(s) for the sites. The following points effectively summarize the objectives of this project, as stated in the SOW:

- Characterize MPPEH nature, location, and concentration;
- Describe munitions-related limitations on use of the site(s);
- Evaluate reasonable risk-management alternatives; and
- Provide for the Administrative Record.

1.5.2 The objective of the EE/CA for the He'eia Combat Training Area and Pali Training Camp has been accomplished by:

- Conducting geophysical surveys to detect and map anomaly sources and intrusively investigating these anomaly sources to identify the type and depth of any MPPEH present;
- Determining the amount and depth to which MPPEH may be removed to reduce the risk associated with MPPEH at the He'eia Combat Training Area and Pali Training Camp, while taking into consideration current and future land use of the property;
- Involving the local communities and stakeholders concerning the progress and findings of the EE/CA investigation;
- Providing the public and local agencies the opportunity to review and comment on the EE/CA; and
- Performing an Institutional Analysis (Appendix E) to identify and analyze the institutional framework necessary to support the development of institutional controls as an effective munitions response action alternative for the He'eia Combat Training Area and Pali Training Camp.

1.5.3 The level of MEC risk associated with the He'eia Combat Training Area and Pali Training Camp was evaluated using a qualitative risk assessment. Munitions response action alternatives were developed and evaluated based on the results of the qualitative risk assessment in Chapter 4.0. Chapter 5.0 contains the decision criteria and the evaluation of the four munitions response action alternatives.

1.6 REPORT FORMAT

This report is organized as follows:

- **Chapter 1.0 - Introduction:** Discusses the purpose and objective of the EE/CA, outlines the EE/CA project team, and presents the organization of the EE/CA report.
- **Chapter 2.0 - Site Description and History:** Provides the following information concerning the He'eia Combat Training Area and Pali Training Camp:
  - History and the types of ordnance reported to have been used at the site;
  - Overview of all potential MPPEH sites;
  - General discussion of the current status and existing facilities; and
  - Description of the natural features of the site.
- **Chapter 3.0 - Site Characterization:** Provides a detailed description of EE/CA field activities including: visual reconnaissance, surface clearance, geophysical investigation and mapping, and MPPEH sampling. This chapter presents the results of the EE/CA field investigation.
- **Chapter 4.0 - Ordnance and Explosives Risk Impact Assessment (OERIA):** Includes a discussion of the risk analysis process, including the qualitative risk evaluation approach and the results of the OERIA conducted for the He'eia Combat Training Area and Pali Training Camp.
- **Chapter 5.0 - Identification of EE/CA Response Action Alternatives:** Presents the process used to identify munitions response action alternatives evaluated. Presents the munitions response action alternatives considered and a discussion of the evaluation criteria for each alternative. Discusses the applicability of the various alternatives in terms of their effectiveness, implementability, and cost.

- **Chapter 6.0 - Institutional Control Plan:** Documents government and local agencies that have jurisdiction over lands within the project area and assesses their capability and willingness to assert controls that would protect the public from explosive hazards.
- **Chapter 7.0 - Recommended MEC Response Action:** Presents the recommended munitions response actions (including estimated costs) for the He'eia Combat Training Area and Pali Training Camp.
- **Chapter 8.0 - Quality Control:** Contains Quality Control practices and procedures.
- **Chapter 9.0 - References:** Provides an inventory of the reference material used in the preparation of this EE/CA report.
- **Chapter 10.0 - Glossary of Terms and Acronyms/Abbreviations:** Provides a detailed list of terms used throughout this EE/CA report. A definition is provided for each term. A list of acronyms and abbreviations is also included.
- **Appendix A – EE/CA Contractor Scope of Work**: Includes the SOW for ZAPATA.
- **Appendix B – Figures:** Contains maps and figures referenced within the EE/CA Report.
- **Appendix C – Scrap Disposition Documentation:** Provides documentation of the turn-in of all munitions debris recovered during the EE/CA field investigation.
- **Appendix D – Demolition Activity Summation Tables**: Provides a record of demolition activities occurring during the site investigation.
- **Appendix E – Institutional Analysis Report:** Includes interviews conducted in support of the Institutional Analysis.
- **Appendix F – Cost Breakdowns and Assumptions:** Provides the costs associated with the munitions response action alternatives evaluated and recommended in this EE/CA report.
- **Appendix G – Responsiveness Summary**: Responses to the Draft-Final EE/CA Report to be included in the Final EE/CA Report.
- **Appendix H – Draft Recurring Review Plan:** Presents the recommendations for residual risk management activities and EE/CA follow-on activities for the He'eia Combat Training Area and Pali Training Camp.
- **Appendix I – Intrusive Results (Electronic Only):** Provides a detailed list of the types of ordnance recovered in each sector and grid during the EE/CA field investigation.
- **Appendix J – Geophysical Data (Electronic Only):** Provides the geophysical data collected during the geophysical operations.
- **Appendix K – GPO Documentation (Electronic Only):** Provides the letter report documenting the results of the geophysical equipment field tests.
- **Appendix L – Photographs (Electronic Only):** Contains a photo log of various items and activities during the EE/CA field investigation
- **Appendix M – Corrective Action Requests (Electronic Only):** Replies to government's requests for corrective action.

2.0 SITE DESCRIPTION AND HISTORY

2.1 LOCATION

The He'eia Combat Training Area and the Pali Training Camp consist of six separate parcels on the windward side of the Island of Oahu, Hawaii. The He'eia Kea tract consists of an approximately 204-acre parcel situated in He'eia Kea, and the larger, Kahalu'u tract covers approximately 2,254 acres in the Waihe'e and Ka'alaea Valleys (at the time fieldwork was executed right-of-entry could not be obtained to coincide with the field schedule for the Ka'alaea Valley). Both parcels are situated within the district of Ko'olaupoko near Kane'ohe Bay northwest of He'eia (Figure 1, Appendix B1, and Figure 1, Appendix B2, illustrate He'eia Kea and Kahalu'u, respectively). The Pali Training Camp consists of four non-contiguous parcels near Kailua, in portions of Makali'i and Maunawili Valleys (Figure 1, Appendix B3).

2.2 PHYSICAL DESCRIPTION

2.2.1 He'eia Combat Training Area

2.2.1.1 He'eia Kea

The hourglass-shaped He'eia Kea parcel covers approximately 204 acres located on the coastal plain adjacent to and on the slopes of Pu'u Ma'eli'eli, near the He'eia small boat harbor. The site is bordered to the east (*makai* – toward the ocean) by the Kamehameha Highway to the west (*mauka* – toward the mountains) by Kahekili Highway and the residential areas. (Figure 1, Appendix B1). The parcel's northern boundary follows the crest of the ridge down slope past the sewage disposal plant, and both the northern and the southern boundary generally follow ridges to the Kamehameha Highway. Most of this parcel is covered with dense vegetation including the densely forested coastal plain and thick grasses and shrubs in the higher elevations. There are several gulches throughout the parcel as well as areas with steep slopes. Elevations within the He'eia Kea parcel range from approximately 20 feet above mean sea level (MSL) to over 700 feet above MSL.

2.2.1.2 Kahalu'u

The Kahalu'u parcel covers approximately 2,254 acres, much consisting of densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys in Kahalu'u, Hawaii (Figure 1, Appendix B2). Both valleys consist of a mix of residential and agricultural lots (USACE, 1993). The western boundary is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet above MSL. The eastern portion of the site overlaps with residential and agricultural plots along the edge of the Waiahole Forest Reserve (AMEC, 2001). Pu'u Kuolani and Kalahaku Ridge bound the parcel to the north and south, respectively. Portions of the site within both valleys contain permanent streams that are subject to flash flooding during storms (AMEC, 2001).

2.2.2 Pali Training Camp

The Pali Training Camp is comprised of four non-contiguous properties totaling approximately 4,396 acres located near the base of Ko'olau Range primarily within Maunawili Valley (Figure 1, Appendix B3). The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* portion of Maunawili Valley and includes the

suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. This parcel ranges in elevation from approximately 200 feet MSL near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second, much smaller parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet MSL (AMEC, 2001). The third parcel, the Maunawili Stream Site, formerly known as Makali'i Valley, is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana. It ranges in elevation from approximately 50 to 200 feet MSL. The fourth and second largest parcel (500 acres), called the Ulumawao site, is located outside the Maunawili Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

2.3 HISTORY

2.3.1 He'eia Combat Training Area

2.3.1.1 Property Ownership

The He'eia Combat Training Area consisted of two parcels which were acquired in 1943 by lease, license, or owner permission of the Bernice Pauahi Bishop Estate, Sing Chong Company, Ltd., and numerous other private landowners. The camp was dismantled in 1945 and the impact area was cleared of ordnance by the Army. Per the DERP-FUDS Inventory Project Report, "Documents could not be located evidencing acquisition of the two parcels for use by the U.S. Armed Forces" (USACE, 1993). Likewise, such documentation was not found during historical research conducted during development of the EE/CA work plan.

2.3.1.1.1 He'eia Kea

The City & County of Honolulu currently owns the majority (eastern portion) of the He'eia Kea parcel with plans of developing a park (as seen on Figure 4, Appendix B1). The western portion of He'eia Kea has a mix of residential and commercial owners.

2.3.1.1.2 Kahalu'u

The Kahalu'u parcel is composed of two valleys, the Waihe'e and Ka'alaea Valleys. The majority of the Ka'alaea Valley (over 80 percent) is owned by the Fong Family and operated as Senator Fong's Plantation and Gardens. The Ka'alaea Valley is the location of the live fire impact area. The majority of the Waihe'e Valley (approximately 90 percent) is owned by the City & County of Honolulu. The remainder is a mix of farming and residential property and occupies several parcels near the mouth of each valley (as seen on Figure 4, Appendix B2).

2.3.1.1.2.1 Senator Fong's Plantation and Gardens

Senator Fong's Plantation and Gardens account for over 700 acres of the Ka'alaea Valley and rise from 80 feet above sea level to 2,600 feet at the top of the Ko'olau Mountains. The land was purchased by Hiram L. Fong in 1950; Hiram Fong (1906-2004) served in the US Senate from 1959 to 1977. After retirement, Mr. Fong and his wife managed the gardens, which were opened to the public in 1988. Senator Fong's Plantation and Gardens give guided tours of various gardens, hosts special events (e.g. weddings and receptions), and conducts workshops, such as lei

making. There are five different tour areas ranging from low valley to high ridgeline; i.e. Eisenhower Plateau, Ford Plateau, Johnson Plateau, Kennedy Valley, Lunalilo Heights, and Nixon Valley.

2.3.1.2 Military Activity

An encampment supporting 4,500 personnel compromising up to four infantry battalions was constructed in October 1943 including barracks, a mess hall, an open-air theater, a motor pool, and an ammunition storage shed on the He'eia Kea parcel. The He'eia Kea parcel supported the US Army's 98th Regimental Combat Team. Training facilities included several small arms ranges, a hand-grenade range, an infiltration course, two bayonet courses, two obstacle courses, a shipside platform, and a maneuver area (Hawaiian HQ, Department of Army, 1943). The (larger) Kahalu'u tract was reportedly utilized as maneuver and impact areas for jungle and assault training. An impact area is suspected for the firing of field artillery pieces, mortar, bazooka, and other assault weapons using live and practice rounds (INRP, 1993). By the end of 1945, structures and training facilities at both parcels were dismantled.

2.3.2 Pali Training Camp

2.3.2.1 Property Ownership

The training camp was opened in 1943 on property owned by Harold K. Castle (doing business as [dba] Kane'ohe Ranch). Documentation evidencing property acquisition could not be located following research at several locales. The municipal Pali Golf Course, privately owned Ko'olau Golf Course, and Hawaii Pacific University presently occupy the parcel previously supporting the primary troop encampment at the base of Nu'uanu Pali (Ulumawao). Other portions of the former artillery impact area at Maunawili and Makali'i Valleys (Maunawili Valley Impact Area and Stream Area) are presently owned by the Luana Hills Country Club, the Hawaii Agricultural Research Center (formerly Hawaii Sugar Growers Association) and multiple private landowners.

2.3.2.2 Military Activity

In 1943, Pali was established as a regimental combat team training center, emphasizing the use of and familiarity with modern arms and field weapons. In addition, the camp provided rugged terrain for jungle and Ranger training. Several military structures were erected for use, but by 1946, all were dismantled and removed from the property. Valley residents report that artillery rounds were fired into Maunawili Valley from firing points at the mouth of the valley or from other locations within Kailua. Although the 212th Ordnance Disposal Squad conducted ordnance clearance in 1945, a public warning was issued in June 1948 by the Commanding Officer of the Army Ordnance Services to exercise caution when entering former training areas (Maunawili Valley). A ranch manager reported a "155mm round" in the Maunawili Valley (USACE, 1995) and a few claims have been made by local residents about finding duds and .30 caliber blanks. No reports of MPPEH in Maunawili or Makali'i Valleys have been substantiated (USACE, 1995). It is also reported by local residents that mortar rounds and machine gun bullets were frequently turned over in plowed fields (USACE, 1995). During the Geophysical Prove-Out conducted in March 2002, it was reported by a worker on a movie set within the Maunawili Valley Impact Area that a 20mm projectile was recently found.

2.4 DEMOGRAPHIC PROFILE

2.4.1 According to the US Census Bureau, Census 2000, Honolulu County, which includes the Island of Oahu, is 600 square miles in area, and has a population of 876,156 or 1,460.3 persons per square mile. That population represents a 4.8 percent increase since 1990. The population in Honolulu County is outlined in Tables 2-1 and 2-2.

TABLE 2-1 HONOLULU COUNTY POPULATION BY SEX AND AGE

SEX AND AGE	NUMBER	PERCENT
Male	440,518	50.3
Female	435,638	49.7
Under 5 years	56,849	6.5
5 to 9 years	60,425	6.9
10 to 14 years	57,574	6.6
15 to 19 years	57,176	6.5
20 to 24 years	65,376	7.5
25 to 34 years	130,624	14.8
35 to 44 years	137,278	15.7
45 to 54 years	117,239	13.4
55 to 59 years	42,705	4.8
60 to 64 years	33,173	3.8
65 to 74 years	62,474	7.1
75 to 84 years	42,504	4.9
85 years and over	12,759	1.5

TABLE 2-2 HONOLULU COUNTY POPULATION BY RACE

RACE	NUMBER	PERCENT
One race	701,532	80.1
White	186,484	21.3
Black or African American	20,619	2.4
American Indian and Alaska Native	2,178	0.2
Asian	403,371	46.0
Asian Indian	1,191	0.1
Chinese	53,322	6.1
Filipino	124,072	14.2
Japanese	161,224	18.4
Korean	21,681	2.5
Vietnamese	7,392	0.8
Other Asian	34,489	3.9
Native Hawaiian and Other Pacific Islander	77,680	8.9
Native Hawaiian	49,267	5.6
Guamanian or Chamorro	1,484	0.2
Samoan	15,464	1.8
Other Pacific Islander	11,465	1.3
Some other race	11,200	1.3
Two or more races	174,624	19.9

2.4.2 Tourism remains Honolulu County's strongest economic sector. As a result, the primary industries in Honolulu County are retail, arts, entertainment, recreation, accommodation, and food services.

2.5 CURRENT AND FUTURE LAND USE

2.5.1 He'eia Combat Training Area

Currently, the He'eia Kea parcel is mostly undeveloped forest and coastal plain. However, the City & County of Honolulu recently acquired the eastern portion of He'eia Kea to keep the land as a nature preserve. The city is developing a master plan for botanical gardens, picnic grounds, open spaces and hiking trails. The western portion of He'eia Kea is a mix of residential and commercial use. The Kahalu'u parcel is currently used for a variety of purposes, including recreational, residential, ranching, and agriculture. The city has a long-term goal of developing Waihe'e Valley Nature Park in the southeast portion of the parcel, while Senator Fong's Plantation and Gardens occupy the northern portion of the parcel. The vast majority of the Kahalu'u parcel is undeveloped (see Figures 4, Appendix B1 and B2 for He'eia Kea and Kahalu'u land use, respectively).

2.5.2 Pali Training Camp

Currently, the Pali Training Camp parcels are mostly undeveloped. However, there are pockets of residential, recreational, and agricultural uses throughout the four parcels. Recreational activities include golfing, hiking, mountain biking, and horseback riding. The Luana Hills Country Club operates on approximately 40 acres of the Maunawili Valley Impact Area. There are also approximately 15 miles of public trails that pass through the Pali Training Camp's four

areas. Extensive agricultural activities are conducted in the Maunawili Valley Impact Area by the Hawaii Agriculture Research Center and Luluku Banana Farmers.

2.6 ANALYSIS OF HISTORIC RECORDS

Historical information, other than the information provided in Section 2.3, pertaining to He'eia Combat Training Area and the Pali Training Camp have not been obtained. Extensive informational searches at the National Archives Repository at College Park, Maryland and the State of Hawaii repositories yielded little to no information.

2.7 PREVIOUS INVESTIGATIONS AND REMOVAL ACTIONS

2.7.1 He'eia Combat Training Area

2.7.1.1 July 1991

On July 15 1991, a site visit was conducted at the He'eia Kea parcel. The Trip Report (included in the 1993 INPR) describes the area as being "overgrown with trees and vegetation" and "uninhabited." Trail access was by foot, and pathways were cut with machetes. The precise location of the site visit is described as "mountainside of the He'eia State Pier." The Trip Report states that an Unexploded Ordnance (UXO) survey was performed for the property owner in July 1989 and a Surface/Subsurface Clearance was conducted in November/December 1989 at the only site where MPPEH had been observed and located. The report stated that two M7A1 bazooka rounds (2.36-inch rocket, practice), two M7A1 bazooka round center cores, and a M9A1 rifle grenade (high explosive antitank) shroud were found. Also noted was the discovery of two Mk II hand grenades by an area resident several years earlier. The conclusion of the site visit was that the site may still contain MPPEH in limited quantities (USACE, 1993).

2.7.1.2 November 1992

In November 1992, a visual inspection and walk-through survey was conducted at the impact area in the Ka'alaea Valley. The corresponding Trip Report (included in the 1993 INPR) described steep ridges, streams, and heavy vegetation in the area. The observations revealed what were apparently three target sites located on the ridge that runs along the length of the Ka'alaea Valley. The report speculated that the type of ordnance utilized consisted of rifle ammunition, machine gun ammunition, mortar rounds and rifle grenades. It was recommended that further studies be conducted at the site to determine the extent and magnitude of MPPEH contamination.

2.7.1.3 December 1992

In December 1992, a site visit was conducted of Waihe'e and Ka'alaea Valleys in Kahalu'u, approximately 2.5 miles northwest of the He'eia Kea parcel, and a longtime community resident, Mr. Joaquin Mello, was interviewed. Mr. Mello offered his account of the Army's use of valley roads. The Mello family reported the discovery of spent .30 and .50 caliber cartridges and projectiles at the rear of Ka'alaea Valley. They also reported having discovered mortar rounds in Ka'alaea Stream (within the Ka'alaea Valley). The observation team noted .30 and .50 machine gun projectiles, a powder time train fuze from an 81mm illumination mortar, and identified a possible impact area (a section of bare soil along a ridge) where target frames were still in place (USACE, 1993).

2.7.2 Pali Training Camp

On March 13, 1992, representatives from the USACE, Honolulu District and Wil Chee Planning conducted a site visit to perform visual reconnaissance of the Pali Golf Course where the troop encampment was situated. Follow-up visits were conducted on November 12 and 15, 1993 at the Maunawili and Makali'i Valley areas by Wil Chee Planning and DEI. No MPPEH was observed during any of these site visits, although the Site Survey Summary Sheet, dated May 20, 1994, indicated that valley residents could recall that artillery rounds were fired into the Maunawili Valley. Furthermore this document states that a "155mm round" was discovered by a ranch manager in the Maunawili Valley and mortars and bullets have been recovered in the Makali'i Valley (USACE, 1995). No description of the mortars or specific information related to the 155mm round has been reported.

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3.0 SITE CHARACTERIZATION

3.0.1 Fieldwork for the He'eia Combat Training Area was initiated March 2003 and was completed July 2003, while fieldwork for the Pali Training Camp was initiated July 2006 and completed November 2006. The EE/CA field investigation for the He'eia Combat Training Area and Pali Training Camp occurred at separate times because of right-of-entry restrictions. Using data collected during the EE/CA field investigation and during previous field investigations, a qualitative risk evaluation was performed (Chapter 4.0) to determine the most appropriate munitions response actions for the sites. The characterization of the He'eia Combat Training Area and Pali Training Camp consisted of the following:

- Instrument Assisted Visual Reconnaissance;
- Surface Clearance;
- Geophysical Mapping;
- Mag-and-Flag; and
- Intrusive Investigation.

3.0.2 Details concerning each of these tasks and the results of the EE/CA field investigation are discussed further in the following sections.

3.0.3 During the course of this EE/CA, the Military Munitions Response Program introduced new terminology to help classify areas qualifying for munitions response actions. While not used throughout this EE/CA report, the He'eia Combat Training Area and Pali Training Camp are classified in this section in accordance with the new terminology.

3.0.3.1 The He'eia Combat Training Area and Pali Training Camp are Munitions Response Areas (MRA). A Munitions Response Area is any area on a defense site (current or former) that is known or suspected to contain UXO, DMM, or MC (as defined in 3.1, below). Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites. A Munitions Response Site (MRS) is a discrete location within a MRA that is known to require a munitions response. Both He'eia Combat Training Area and Pali Training Camp Munitions Response Areas are made up of Munition Response Sites and are detailed in Table 3-1, below. The sites are also depicted as MRAs and MRSs on Figure 5, Appendix B1, Figure 5, Appendix B2 and Figure 11, Appendix B3.

TABLE 3-1 MRA AND MRS BREAKDOWN

MUNITIONS RESPONSE AREA	MUNITIONS RESPONSE SITE
He'eia Combat Training Area	He'eia Kea
	Kahalu'u
Pali Training Camp	Maunawili Valley Impact Area
	Maunawili Stream Area
	Maunawili Site
	Ulumawao

3.1 MUNITIONS TERMINOLOGY

During the course of development of this EE/CA document, the terminology to describe ordnance and explosives and related items has been changed from the old ordnance and explosives, or "OE" terminology. The new terminology reflects the terms and acronyms adopted for use in the Military Munitions Response Program (MMRP), seen below in Table 3-2. Several new terms have been developed including MPPEH. All suspected munitions items are considered MPPEH until inspected for explosive hazards. Only after expert inspection are they deemed MEC (UXO, DMM, MC) or MD (no explosive potential), Cultural Debris, or non-explosive MC. UXO is commonly described as a subset of MEC. An abbreviated conversion of the terms from the old system is shown in Table 3-2, below.

TABLE 3-2 MUNITIONS RESPONSE TERMINOLOGY

OE (OLD) TERMINOLOGY	MMRP (NEW) TERMINOLOGY
Ordnance and Explosives (OE)	Military Munitions (MM)
OE Scrap	Munitions Debris (MD)
Non-OE Scrap	Cultural Debris (CD)
No Equivalent	Material Potentially Presenting an Explosive Hazard (MPPEH)
No Equivalent	• Munitions and Explosives of Concern (MEC)
Unexploded Ordnance (UXO)	o Unexploded Ordnance (UXO)
No Equivalent	o Discarded Military Munitions (DMM)
No Equivalent	o Munitions Constituents (MC)

3.1.1 Munitions and Explosives of Concern (MEC)

MEC is defined as Unexploded Ordnance (UXO), discarded military munitions (DMM) or MC (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard.

3.1.1.1 Unexploded Ordnance (UXO)

UXO includes munitions that:

a. have been primed, fuzed, armed, or otherwise prepared for action;

b. have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel or material; and

c. remain unexploded whether by malfunction, design, or any other cause (10 U.S.C. 101(e)(5)(A) through (C))).

3.1.1.2 Discarded Military Munitions (DMM)

Discarded Military Munitions are buried munitions, un-recovered kick-outs from open detonations, munitions left behind or discarded accidentally during munitions-related activities, and munitions intentionally disposed of without authorization during munitions-related activities.

3.1.1.3 Munitions Constituents (MC)

MC are the energetics or structural materials (lead, beryllium, etc.), and/or the residue resulting from incomplete combustion or detonation of munitions that could be explosive in nature and/or a threat to human health and the environment. Sampling for MC was not conducted as part of this EE/CA investigation.

3.1.2 Munitions Debris (MD)

MD is comprised of the remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

3.1.3 Cultural Debris (CD)

Cultural Debris (CD) is debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response that is not related to munitions or range operations. Such debris includes but is not limited to rebar, household items (refrigerators, washing machines, ect.), automobile parts, or automobiles that were not associated with range targets, fence posts, and fence wire. Cultural Debris does not include targets or parts of targets. Cultural Debris also excludes Cultural Resources such as historical or archeological items.

3.1.4 Small Arms

The DoD recognizes caliber 0.50 and smaller as small arms. The determining factor is that caliber .50 and smaller rarely contains explosive projectiles. Small arms cartridges present a very low explosive hazard. A deliberate effort must be applied to a very specific and small point (the primer) to make the round function. Using a tool resembling a firing pin, i.e., a nail and hammer, or dropping the cartridge on a sharp object could function the primer. If the round functions outside the weapons chamber (unconfined space), the propellant gases would cause the bullet and cartridge to separate and, in addition, the cartridge case could also rupture. If this took place in close proximity to a person, possible injury could result. Small arms ammunition (i.e., caliber .50 and smaller) presents a very low explosive risk to the public, however, in sufficient quantity, the constituents that make up small arms (lead, energetics, ect.) may present an environmental hazard.

3.1.5 Items Identified in Current EE/CA

All supporting documentation for the He'eia Combat Training Area was collected prior to adaptation of the new terminology and, as such, may be documented in the appendices of this report using old terminology. However, new terminology has been interpreted and applied throughout the EE/CA Report for the He'eia Combat Training Area and Pali Training Camp.

3.2 UXO CALCULATOR

Prior to conducting the EE/CA field investigation, the UXO Calculator was used as a guideline to estimate the number of acres to characterize each site for MPPEH. The UXO Calculator is a statistical engineering tool developed by the USAESCH that determines the acreage to be investigated based upon the size of the site. The UXO Calculator assumes a random homogenous distribution of MPPEH and requires that decisions pertaining to sampling sufficiency and target density estimation be made and updated during the EE/CA field investigation. The predetermined sampling acreage for each site was continuously evaluated during the EE/CA field investigation based on the results of field activities and whether UXO was found in any given site. Data collected in the investigated areas were sufficient to characterize the site and evaluate it using the OERIA (Chapter 4.0). The total acreage investigated in each site and the results of the EE/CA field investigation are summarized by activity in the following sections.

3.3 SITE INVESTIGATIONS

3.3.0.1 Site investigation components for this project include a visual reconnaissance, mag-and-flag, surface clearance, digital geophysical mapping, and an intrusive investigation as detailed in the Table 3-3, below for each area. Site investigations were conducted for both He'eia parcels; He'eia Kea and Kahalu'u, while three of the four Pali areas were designated for site investigation; the Maunawili Valley Impact Area, Maunawili Stream area, Maunawili site. Based on historical site information and previous investigations, the Ulumawao parcel was not designated for additional site investigation. At the time fieldwork was executed, right-of-entry could not be obtained to coincide with the field schedule; as such, field investigations were not conducted in the Ka'alaea Valley portion of Kahalu'u as part of this EE/CA; field investigations were, however, conducted in the Waihe'e Valley portion of Kahalu'u.

3.3.0.2 Vegetation within each of the areas ranges from older growth (significant stands of mature trees) to moderate growth (laurel and scrub-type trees) to younger/low/no growth (ferns and bare soil). Fern patches range in size from 0.25 to 10 acres. They are an invasive species and are generally the first thing to grow in open areas that are void of vegetation. Vegetation voids could be naturally occurring (landslides, natural fire) or a result of manmade disturbance (farming related, man-made fire, ordnance-related fire, or impact area). Areas that were heavily used as impact areas would typically be devoid of vegetation.

3.3.0.3 While younger growth areas may be those most likely to contain ordnance, fern covered areas are stable and more likely to prevent ordnance migration. Fern cover influences MEC movement because their high density and strong root structure prevent mobility of loose items (ordnance items). Areas of mature growth or standing forest would also prevent movement; ordnance items within standing forest would likely be in-situ because of less erosion, except in areas of drainage. However, areas of fern cover were bare soil prior to fern growth and erosion (and ordnance migration) could have occurred prior to fern growth. As a result, ordnance may be expected at lower elevations, near the base of fern patches. While fern patches are generally stable with respect to ordnance migration, earth movement (landslides) may expose ordnance, if present, and the resulting bare soil would increase potential for ordnance mobility.

TABLE 3-3 SITE INVESTIGATION BY AREA

	PALI TRAINING CAMP			HE'EIA TRAINING AREA	
CHARACTERIZATION ACTIVITY	MAUNAWILI VALLEY IMPACT AREA (ACRES)	MAUNAWILI STREAM AREA (ACRES)	MAUNAWILI SITE (ACRES)	HE'EIA KEA (ACRES)	KAHALU'U (WAIHE'E VALLEY) (ACRES)
Instrument Assisted Visual Reconnaissance	19.8	2.5	2.0		5.1
Surface Clearance	5.7			10.0	3.3
Digital Geophysical Mapping	5.7			10.0	3.3
Mag-and-Flag			0.2		
Intrusive Investigation	5.7		0.2	10.0	3.3

3.3.1 Visual Reconnaissance

Instrument assisted visual reconnaissance were conducted in areas that were less accessible because of steep terrain and or heavy vegetation. Reconnaissance was also conducted on several public hiking trails that pass through the areas. The trails varied in width from three to 15 feet; areas adjacent to trails varied in vegetation cover from grass or ferns to thick brush and varied from level to very steep. Subsurface anomaly counts were made where conditions were favorable along and adjacent to the trail. The reconnaissance was conducted to help delineate areas of known or suspected ordnance contamination. The paths can be seen on Figure 2, Appendix B2 and Figure 2, Appendix B3 for Kahalu'u (Waihe'e Valley) and Pali Training Camp, respectively. Munitions debris items recovered during reconnaissance activities are tabulated in Section 3.3.3, below and shown on Figure 6, Appendix B3.

3.3.1.1 He'eia Combat Training Area

An instrument assisted visual reconnaissance was conducted in the Kahalu'u (Waihe'e Valley) portion of the He'eia Combat Training Area covering approximately 5.1 acres. Reconnaissance of the Kahalu'u area did not result in significant subsurface anomaly concentrations, but a munitions debris item (practice 37mm, M74, armor piecing tracer [AP-T]) was recovered on the surface.

3.3.1.2 Pali Training Camp

3.3.1.2.1 A reconnaissance was conducted within all three of the areas designated for field investigation at the Pali Training Camp: the Maunawili Valley Impact Area, the Maunawili site, and the Maunawili Stream area. Public hiking trails pass through all three areas; a description of each trail and a table correlating trails to areas is in the following subsection. Approximately 26.3 acres were covered during the instrument assisted visual reconnaissance (Reconnaissance Path), which included the hiking trails and meandering paths (Figure 2, Appendix B3).

3.3.1.2.2 Some trails were cut into the sides of slopes and some were followed ridgelines (graded and less-graded areas). Trails that were cut into slopes were constructed by cutting a

"step" into the slope. Upper soil was cut and moved slightly downslope and functioned as the trail's base for grading purposes. Trails cut into slopes were generally not swept far beyond the limits of the trail. The upslope (sidewall) of the trail was checked for anomalies and the downslope was occasionally checked. Trail grading could have increased or decreased the quantity or density of surface/subsurface anomalies. Anomalies may have been disturbed during trail construction. Also, since these trails create a flat strip along the slope, they might serve as natural collection points for items washing down the hill. Surface MD found along the "graded" trails were generally small (frag, fuze portions, base plates, and shrapnel balls). It should be noted that the only "large" MD items (81mm mortar tail fins) were found on less graded (and less steep) portions of the trail.

3.3.1.2.1 Public Hiking Trails within the Pali Training Camp

The following table illustrates the distance surveyed on public hiking trails that pass through an area; a description of each trail is also below.

TABLE 3-4 PUBLIC HIKING TRAILS WITHIN THE PALI TRAINING CAMP

PUBLIC HIKING TRAIL	MAUNAWILI VALLEY IMPACT AREA, MILES SURVEYED	MAUNAWILI STREAM AREA, MILES SURVEYED	MAUNAWILI SITE, MILES SURVEYED
Maunawili Ditch Trail	0.84		
Maunawili Falls and Connector Trails	1.38		
Maunawili Demonstration Trail (Maunawili Trail Complex)	8.39		0.34
Olomana Trail	NS*	0.31	

*NS = Not Surveyed

3.3.1.2.1.1 Maunawili Demonstration Trail or Maunawili Trail Complex

The Maunawili Demonstration Trail contours the base of the Ko`olau Mountain Range on the windward side. It is also known as the Ko'olaupoko Trail. It begins off the Pali Highway and ends in Waimanalo (http://www.hawaiitrails.org/). It is a state trail that was built by volunteers from the Sierra Club and Na Ala Hele. Construction into the base of the southern, windward Ko'olau cliffs began in 1991. It was built as a graded trail, so it is relatively level. There are some ups and downs but the steepness is mild. The trail meanders through the gullies forming the ripples in the gigantic Nu'uanu Pali cliffs (http://www.backyardoahu.com/). The Maunawili Demonstration Trail passes through a southern portion of the Maunawili site and a large portion of the Maunawili Valley Impact Area.

3.3.1.2.1.2 Maunawili Falls Trail and Connector Trail

The Maunawili Falls Trail begins north of the Maunawili Valley Impact Area. The trail heads uphill into one of the lesser gulches at the foot of the windward Ko'olau cliffs. The majority of the trail is "wide" and very well graded. Most of this trail meanders upstream under a thick, overhead canopy of trees. Interrupted by three crossings within the first half, the trail frequently parallels close to Maunawili Stream. Eventually, the path finds itself gaining elevation atop a gentle hill; i.e., the finger ridge which forms one side of the Maunawili Gulch. The trail enters

the Maunawili Valley Impact Area at this finger ridge. About three-fourths of the way up the finger ridge, the trail reaches a turnoff junction made obvious with posted, metal signs. From here, the trail turns left and heads downhill into the gulch toward Maunawili Stream. The Maunawili Falls Connector Trail continues westward along the ridge and concludes at Maunawili Demonstration Trail.

3.3.1.2.1.3 Maunawili Ditch Trail

The Maunawili Ditch Trail starts in Waimanalo and passes through the western edge of the Maunawili Valley Impact Area. It is a mostly level trail that is on the eastern side of the Aniani Nui/Olomana Ridge.

3.3.1.2.1.4 Olomana Trail

The Olomana Trail follows the the Aniani Nui/Olomana Ridge and passes through the Maunawili Stream area. Findings along the trail were limited to excavations, identified as potential observation points.

3.3.1.2.2 Maunawili Valley Impact Area

3.3.1.2.2.1 The Maunawili Valley Impact Area can be broken into five sections; i.e., the Luana Hills Country Club, Hawaii Agriculture Research Center, Luluku Banana Farmers area, Maunawili Falls, and mountainous areas. Reconnaissance was conducted in or near each of these sections and along three public hiking trails that pass through each section (Figures 2 and 3, Appendix B3). Field Reconnaissance further defined areas of known ordnance contamination and characterized areas that were steep or afforded limited accessibility. Approximately 19.8 acres were surveyed within the Maunawili Valley Impact Area based on a 10-ft path width.

3.3.1.2.2.2 The Maunawili Demonstration Trail passes through the southern portion of the Maunawili site and the western and southern portions of the Maunawili Valley Impact Area. The entire trail was geophysically surveyed using handheld analog, electromagnetic instrumentation. Nothing was found within the Maunawili site along the trail, but munitions debris was found along the trail south of the Maunawili site and continued into the Maunawili Valley Impact Area. Munitions debris found included high explosive (HE) munitions fragments, tail fins, rotating bands, and fuze components. All MD found along the Maunawili Demonstration Trail was found within an approximately 3.5-mile stretch in the western quarter of the Maunawili Valley Impact Area that also extended north of the area.

3.3.1.2.2.3 The Maunawili Falls Trail and Connector Trail were also geophysically surveyed using analog, handheld, electromagnetic instrumentation, with exception of the last leg of the Maunawili Falls Trail that descends to the falls. Nothing was found along the Maunawili Falls Trail, but munitions debris was found near the beginning and along the Connector Trail within 200 feet of the falls. Munitions debris found consisted of HE munitions fragments and fuze components.

3.3.1.2.2.4 A portion of the Maunawili Ditch Trail was also surveyed, but nothing was found.

3.3.1.2.2.5 The Luana Hills Country Club is in the eastern area of the Maunawili Valley Impact Area. Reconnaissance was conducted to the east and south of the golf course. To the east,

reconnaissance focused along and next to the obsolete Maunawili Trail Road, which enters the area near the middle of the golf course and ends at the Maunawili Demonstration Trail. There were several open areas that were swept with analog geophysical instrumentation totaling approximately 2.0 acres (Figure 4, Appendix B3). To the south, a commonly traveled maintenance path for a water transfer system was surveyed. All subsurface and surface contacts encountered in the section were associated with cultural features or cultural debris.

3.3.1.2.2.6 Reconnaissance was also conducted north, south, and west of the Luluku Banana Farmers' buildings, which is in the western quarter of the Maunawili Valley Impact Area. All three areas yeilded HE munitions fragments.

3.3.1.2.3 Maunawili Stream Area

Reconnaissance within the Maunawili Stream area included coverage of the portion of the Olomana Trail that passes through the area and meandering path coverage closer to the base of the ridge. (The Olomana Trail follows the the Aniani Nui/Olomana Ridge.) Approximately 2.5 acres were survey based on a 15-ft path width. The Maunawili Stream area was suspected as a firing position directed toward the impact area. The only significant findings along the trail were two large holes along the ridge (Figure 8, Appendix B3) that may have been observation points for firing into the Maunawili Valley Impact Area. They are suspected to be observation points rather than impact craters because of their location relative to the suspected firing point in the valley below and their vantage point of the Maunawili Valley Impact Area (Figure 10, Appendix B3).

3.3.1.2.4 Maunawili Site

The Maunawili Demonstration Trail passes through a southern portion of the Maunawili site, which was geophysically, surveyed using analog, handheld, electromagnetic instrumentation. Nothing was found within the Maunawili site along the trail. Reconnaissance was also conducted at two locations near the center of the Maunawili site. The first segment was accessed from the Maunawili Neighborhood and did not result in significant findings. The second was accessed from St. Stephens Seminary and resulted in evidence of troop maneuvering; i.e., foxholes along ridgelines, small arms debris and C-ration residue. Approximately 2.0 acres were surveyed using on a 10-ft path width (Figure 8, Appendix B3).

3.3.2 Digital Geophysical Mapping

Digital Geophysical Mapping (DGM) was conducted at both the He'eia Combat Training Area and Pali Training Camp. DGM at He'eia consisted of transects, super-transects and grids; DGM activities at Pali were limited to grids. Prior to DGM, each area was surface swept, clearing it of surface metallic debris that would interfere with the DGM survey. Grid corners and transect centerlines were surveyed to Data Item Description (DID) standards so that they could be plotted on a map. Clearance of vegetation was required on numerous grids and along transects paths to facilitate geophysical sampling. After receiving approval of the GPO from the USAESCH geophysicist, Blackhawk conducted DGM surveying using the EM61 Time Domain EM (TDEM) instrumentation in the wheel mode. The geophysical data were processed, filtered, and enhanced, and dig sheets were created using minimum response criteria decided upon following the evaluation of the baseline GPO survey. Using the dig sheets, the anomalies were reacquired

and excavated to determine their identity. Completed dig sheets can be found in Appendix I, Intrusive Results.

3.3.2.1 He'eia Combat Training Area

Grids, transects, and super-transects were utilized at the He'eia sites. Grids generally were square and averaged 100 x 100 feet, but varied in dimensions. Transects were straight-line segments with two passes with the EM61, six feet in width, while super-transects were five passes of the EM61, 15 feet in width. Within the He'eia Kea site, DGM was conducted on a total of 10 acres (14 grids and three transects). At the Kahalu'u (Waihe'e Valley) site DGM was conducted on a total of 3.3 acres (18 grids and four super-transects).

3.3.2.2 Pali Training Camp

DGM was conducted in the Maunawili Valley Impact Area of the Pali Training Camp. One hundred by one hundred-foot grids were concentrated in six areas totaling 5.7 acres. DGM was conducted in four centrally located areas within the Hawaii Agriculture Research Center property, and two toward the western boundary of the area within the Luluku Banana Farmers controlled property.

3.3.3 Mag-and-Flag

Mag-and-flag operations were conducted at the Pali Training Camp Maunawili site. During the TPP process, a resident living nearby said that there were bomb craters within the Maunawili site. As a result, several grids were investigated by mag-and-flag techniques. The grids ranged in size from 50 x 50 feet to 50 x 100 feet and total 0.2 acre. Grid corners were established and the grid swept using analog magnetometers and electromagnetic instrumentation. Anomalous locations were flagged and intrusively investigated. Intrusive results/observations indicate the area was used as a maneuver area. Small arms cases and C-ration residue were found around foxholes. The bomb craters reported by the resident were actually foxholes along ridges used for maneuver training.

3.3.4 Intrusive Investigation and Reconnaissance Findings

Intrusive operations were conducted at the He'eia Kea, Kahalu'u (Waihe'e Valley), Maunawili Valley Impact Area, and the Maunawili site. Targets selected during the DGM process were intrusively investigated at Maunawili Valley Impact Area and the He'eia sites, while mag-and-flag targets were dug at the Maunawili site.

3.3.4.1 He'eia Combat Training Area

At the He'eia Kea site eight munitions debris items were found over a total of 14 grids and three transects (Figure 3, Appendix B1). At the Kahalu'u (Waihe'e Valley) site, two munitions debris items were found over a total of 19 grids (18 DGM grids and one reconnaissance grid), four super-transects, and reconnaissance paths (Figure 3, Appendix B2). Table 3-5 below, lists the number of targets per grid that were intrusively investigated. Table 3-6 includes munitions debris items that were found during intrusive investigations and during reconnaissance efforts.

TABLE 3-5 HE'EIA TARGETS PER GRID

HE'EIA KEA GRIDS	TARGETS		KAHALU'U GRIDS	TARGETS
1G	39		1G	7
2G	29		2G	3
3G	40		3G	4
4G	37		4G	4
5G	30		5G	8
6G	14		6G	5
7G	48		7G	8
8G	47		8G	5
9G	27		9G	5
10G	31		10G	5
11G	31		11G	3
12G	33		12G	3
13G	66		13G	10
14G	18		14G	4
15G	25		15G	10
1T	10		16G	13
2T	17		17G	4
3T	25		18G	6
QA Kea	6		1T	6
Total	**573**		2T	3
			3T	3
			QA Kahalu'u	9
			Total	**128**

TABLE 3-6 HE'EIA MUNITIONS DEBRIS ITEMS PER GRID AND RECONNAISSANCE

AREA	GRID	ANOMALY ID	MUNITIONS DEBRIS
He'eia Kea	11G	KEA11G-25	2.36-inch Rocket Parts
He'eia Kea	11G	KEA11G-37	2.36-inch Rocket Parts
He'eia Kea	11G	KEA11G-86	2.36-inch Rocket Parts
He'eia Kea	1T	KEA1T-2	MkII Fragmentation Grenade Piece
He'eia Kea	2G	KEA2G-5	2.36-inch Rocket Motor
He'eia Kea	2G	KEA2G-35	MkII Grenade, Practice
He'eia Kea	2G	KEA2G-109	2.36-inch Rocket Motor
He'eia Kea	3T	KEA3T-9	2.36-inch Rocket, Practice
Kahalu'u	KAH18G	N/A	2.36-inch Rocket, Practice
Kahalu'u	RECON	N/A	37mm, M74, AP-T

3.3.4.2 Pali Training Camp

3.3.4.2.1 At the Maunawili site, small arms, cultural debris, and magnetic rocks and soil were found over a total of three grids during mag-and-flag intrusive operations. The number of digs per grid is in Table 3-7.

3.3.4.2.2 At the Maunawili Valley Impact Area, 103 munitions debris items were found during investigation of five DGM grids areas, reconnaissance of trails, and reconnaissance of transects. Table 3-7, below, lists the number of targets per grid that were intrusively investigated. Table 3-8 includes munitions debris items that were found during intrusive investigations and during reconnaissance efforts.

3.3.4.2.3 An impact area was defined based on the results of the reconnaissance and the intrusive investigation. Nearly all of the MD was found in a bowl-shaped section of the Maunawili Valley that backs up to the Ko'olau Mountain Range to the west and is topographically open to the east. The northern and southern extents of the impact area are defined by finger ridges that extend eastward from the Ko'olau Range as seen on Figure 6, Appendix B3. There were five MD items found outside of the delineated impact area. The items were approximately 1,000-ft to the east and appear to be kick-outs from the impact area. These items were not included in the delineation of the impact area because of their distribution and remoteness.

TABLE 3-7 PALI TARGETS PER GRID

MAUNAWILI VALLEY IMPACT AREA (DGM)		
GRID AREA	**GRID ID**	**TARGETS DUG**
Area 01	01-01A	7
	01-01B	11
	01-01C	5
	01-07	3
	01-09	3
	01-20	15
	01-22	8
Area 03	03-01	12
	03-02	16
Area 04	04-01A	32
	04-01B	17
	04-02A	27
	04-02B	7
	04-02C	10
	04-02D	7
	04-02E	1
	04-02F	1
	04-09A	8
	04-09-B	6
	04-04	4
	04-23	5
Area 06	06-14A	0
	06-14B	3
	06-32A	5
	06-32B	6
	06-01	12
	06-02	18
	06-03	8
	06-05	10
	06-06	11
	06-07	9
	06-10	9
	06-11	11
	06-15	6
	06-17	3
Area 07	07-01	10
	07-03	9
	Total	**335**

MAUNAWILI SITE (MAG & DIG)	
GRID	**TARGETS DUG**
MS01	6
MS02	2
MS03	3
Total	**11**

TABLE 3-8 PALI MUNITIONS DEBRIS ITEMS PER GRID AND RECONNAISSANCE

AREA/TRAIL	GRID	ANOMALY ID	MUNITIONS DEBRIS
Area 01	01-01B	01-01B_042	Projectile Fuze, Expended
Area 01	01-01C	01-01C_005	HE Munitions Fragment, 2ea
Area 01	01-01C	01-01C_006	HE Munitions Fragment, 2ea
Area 04	04-09A	04-09A_138	HE Munitions Fragment
Area 06	06-01	06-01_076	MkI 75mm Shrapnel Round, Empty
Area 06	06-01	06-01_207	HE Munitions Fragment
Area 06	06-02	06-02_064	MkI 75mm Shrapnel Round, Empty
Area 06	06-02	06-02_168	Projectile Fuze, Expended
Area 06	06-05	06-05_147	M74 37mm AP-T, Solid Shot
Area 06	06-06	06-06_082	75mm Pusher Plate
Area 06	06-11	06-11_051	Projectile Fuze, Expended
Area 06	06-11	06-11_274	M1907M Shrapnel Fuze, Expended
Area 06	06-15	06-15_057	Projectile Fuze, Expended
Area 06	06-17	06-17_045	HE Munitions Fragment
Area 07	07-01	07-01_016	HE Munitions Fragment
Area 07	07-01	07-01_057	Projectile Fuze, Expended
Area 07	07-03	07-03_028	M48 HE 75mm Round Base, Low Ordered
Area 07	07-03	07-03_093	MkI 75mm Shrapnel Round, Empty
Area 07	07-03	07-03_157	HE Munitions Fragment
Meandering Path	Recon	N/A	HE Munitions Fragment, 32ea
Maunawili Demonstration	Recon	N/A	81mm Mortar Tail Fins, 3ea
Maunawili Demonstration	Recon	N/A	Rotating Band, 2ea
Maunawili Demonstration	Recon	N/A	HE Munitions Fragment, 40ea
Maunawili Demonstration	Recon	N/A	Fuze Head M521, M48A2, or M52, 2ea
Maunawili Connector	Recon	N/A	HE Munitions Fragment
Maunawili Connector	Recon	N/A	Fuze M51A1, Expended, 2ea

3.3.5 Description of Hazards of Specific Munitions

The following military munitions are a representative sampling of the types of items found during the 2003/2006 EE/CA intrusive investigation. Features and hazards listed below are based on ORDATA II, Version 1.0, which is a database containing details of various ordnance items. Photographs of actual items found during the 2003/2006 EE/CA intrusive investigation are included in Appendix L. (Note that the types of munitions presented in the following sections can also be of inert configuration.)

3.3.5.1 U.S. Projectile, 81-MM

This is an Army, fin stabilized, mortar fired, high explosive (HE) projectile. The body is painted olive drab with yellow markings and a red warning label. Three 81mm tail fins were found during the EE/CA field investigation. The tail fins found during the EE/CA investigation were likely from an M43 or M43A1.

Measurement Information:

Diameter/Width	Length	Weight
81.00 mm	337.06 mm	3.20 kg

Explosive Information:

Explosive/Filler Type	Net Explosive/Filler Weight
TNT	553.39 g

FIGURE 3-1 M43A1, 81MM HE MORTAR

3.3.5.2 U.S. PROJECTILE, 37-MM, AP-T, M74 OR M80

This is an Army, spin stabilized gun fired projectile. It may be painted blue or black and may have a brown band. The projectiles are made of steel. Two 37mm projectiles were found during EE/CA field investigations; i.e., both were 37mm armor piercing tracer (M74 or M80).

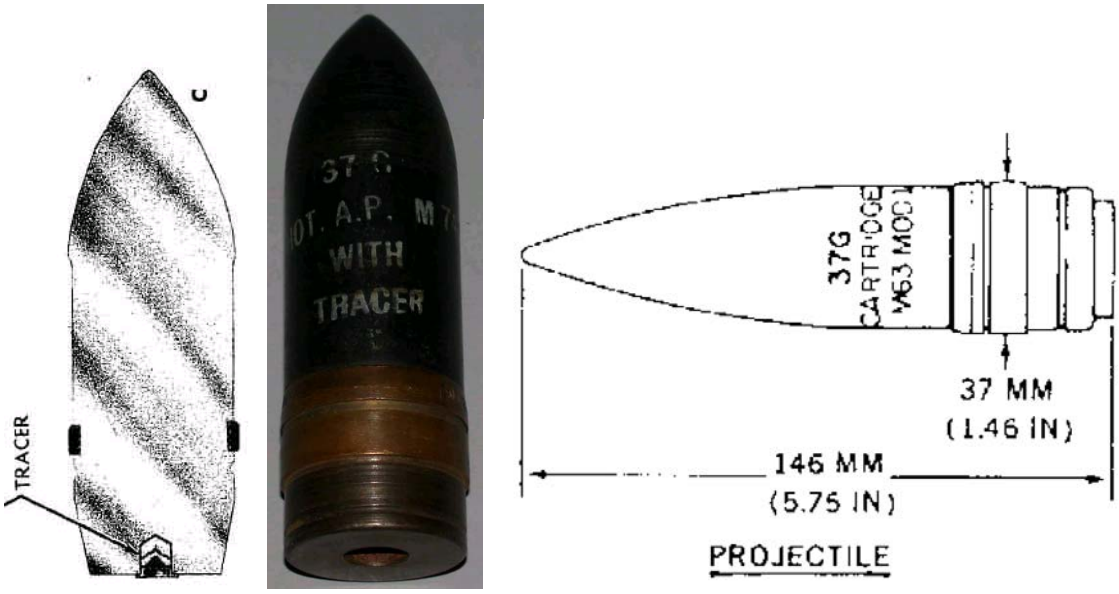

FIGURE 3-2 37MM ARMOR PIERCING TRACER

3.3.5.3 U.S. ROCKET, 2.36-IN HEAT, M6 SERIES

This is a high explosive antitank rocket. As seen in the photo, the M6A3 and the M6A1 are identical except for the difference in the "ogive" and tail assembly. The M6A3 can be seen on the left in the schematic and cutaway photograph. The M6A1 is on the right in the cutaway photograph. The warhead is made of steel. A practice version of this rocket was found (M7A1) as well as several motors and other parts during EE/CA and previous field investigations.

Country of Origin: **United States**

Diameter/Width: **60.00 mm**

Weight: **Not Available**

Length: **546.00 mm**

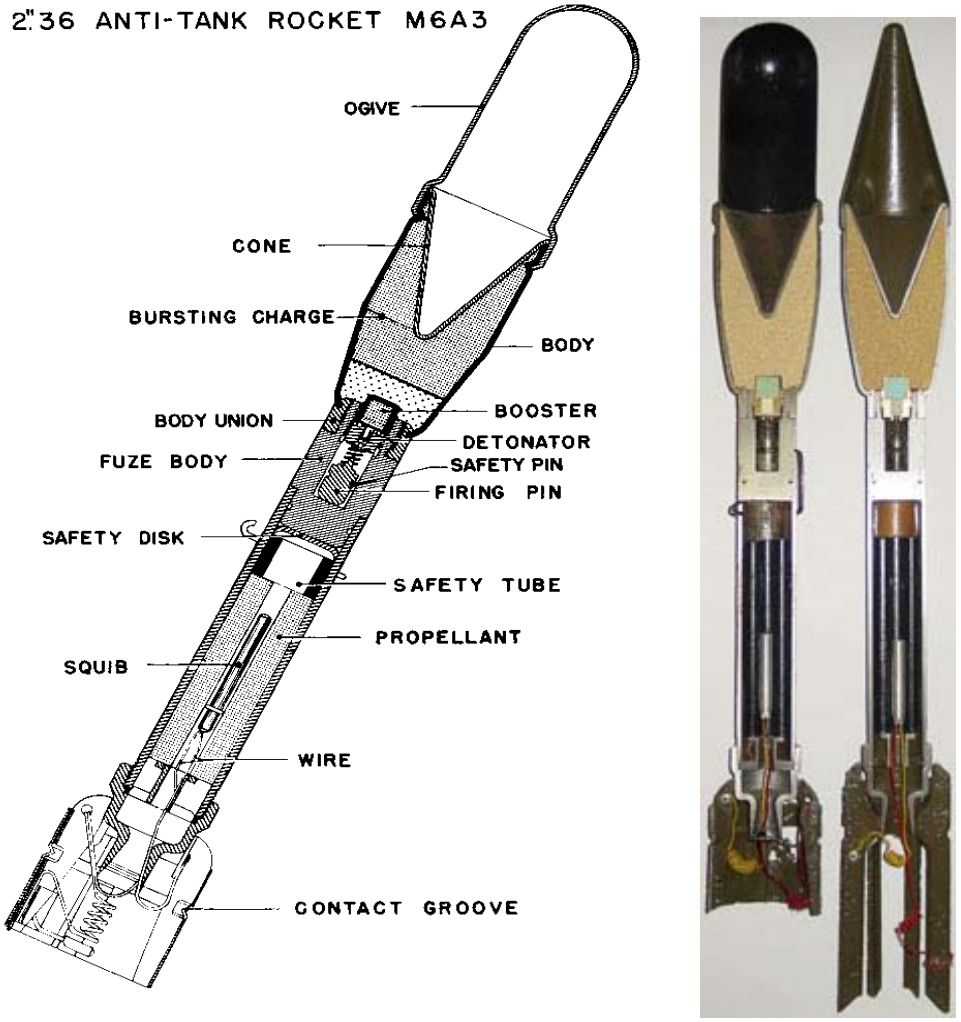

FIGURE 3-3 2.36-INCH ROCKET – M6A3 SCHEMATIC AND CUTAWAY (M6A3 ON LEFT AND M6A1 ON RIGHT)

3.3.5.4 U.S. PROJECTILE, 75MM SHRAPNEL ROUND, MK I

This is a 75mm Shrapnel projectile. The projectile consists of a steel surface and is filled with 270 lead balls. It has a base ignition charge that expends the lead balls while in the air and is fired from a 75mm gun. It is fuze with the 0 to 21 second delay M1907M. Three empty Mk I Shrapnel projectiles were found during EE/CA field investigations as well as the M1907M fuze.

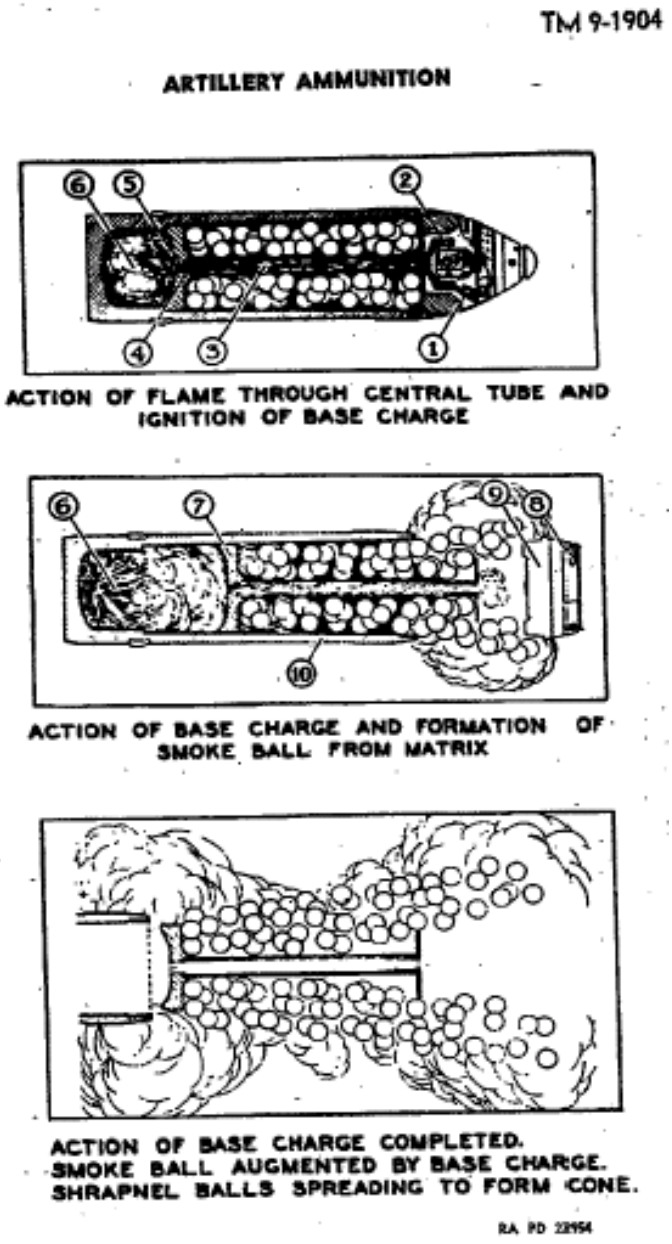

FIGURE 3-4 75MM SHRAPNEL ROUND

3.3.5.5 U.S. PROJECTILE, 75MM HIGH EXPLOSIVE, M48

The high-explosive projectile was designed for use against personnel, demolition of above-ground targets or for penetration effects against heavier targets. It is painted olive drab with yellow stenciling. The bottom half of a M48 projectile was found during the EE/CA field investigation. The round apparently underwent low-order detonation. Fuze components used for this round were also found.

FIGURE 3-5 75MM HE PROJECTILE

4.0 ORDNANCE AND EXPLOSIVES RISK IMPACT ASSESSMENT

4.0.1 This qualitative evaluation of MEC risk for the He'eia Combat Training Area and Pali Training Camp was developed following protocols defined in the Ordnance and Explosives Risk Impact Assessment (OERIA). OERIA uses direct analysis of site conditions and demographics to evaluate MEC risk. The results of this risk assessment were used to help determine the most appropriate munitions response action for these sites.

4.0.2 Sections 4.1 through 4.5 discuss the risk factors and the approach and rationale used in this risk evaluation. Sections 4.6, 4.7, and 4.8 provide the risk impact assessment for the sites. Section 4.9 summarizes the results.

4.1 RISK IMPACT ASSESSMENT

Risk Impact Assessment is a tool used to evaluate safety hazards to people posed by MEC. The risk impact assessment was performed in accordance with Interim Guidance 01-01, Ordnance and Explosives Risk Impact Assessment, from the U.S. Army Engineering and Support Center, Huntsville (USAESCH, 2001). Risk impact assessment is a stakeholder-friendly method of risk assessment for use during MEC-site EE/CA evaluations. This method uses direct evaluation of site conditions and human issues that create MEC risk. The results of the risk impact assessment are an input into the evaluation of the effectiveness criterion of the EE/CA response alternatives evaluation. The three processes in the risk impact assessment method are:

- Evaluate base risk factors
- Perform a baseline risk assessment
- Assess response action alternatives.

4.2 BASE RISK FACTORS

The potential risk posed by MEC at a site may be characterized by evaluating the likelihood of exposure to MEC, the severity of exposure, and likelihood of detonation. These components can be further defined by a set of risk factors. For example, the type of munition and its sensitivity must be considered to evaluate the likelihood of detonation and severity of exposure. Similarly, the likelihood of exposure may be evaluated by considering the MEC potential, the number of people using the site, the type of activities conducted, and the accessibility of the site. These risk factors are listed below and defined further in the following paragraphs.

- MEC Factors (Type, Sensitivity, Density, Depth);
- Site Characteristics Factors (Site Accessibility, Site Instability); and
- Demographic Factors (Site Activities, Site Population).

4.3 MEC FACTORS

4.3.1 Types of MEC

The type of MEC affects the likelihood of an incident and the severity of an injury if MEC detonates when encountered by an individual. There are four categories of MEC impacts. These categories are presented in order from highest to lowest potential hazard in Table 4-1. The MEC type for each site reflects the results of the EE/CA field investigation as well as the results of previous investigations. When multiple categories of MEC are discovered at a site, the highest hazard category is used in the risk assessment.

TABLE 4-1 MEC TYPE RISK FACTOR DETERMINATION

MEC TYPE CATEGORIES	QUALITATIVE RISK LEVEL
MEC that may kill an individual if detonated by an individual's activities	High
MEC that may cause major injury to an individual if detonated by an individual's activities	Moderate
MEC that may cause minor injury to an individual if detonated by an individual's activities	Low
Inert Items (*i.e.*, MD) will cause no injury	None

4.3.2 Sensitivity of MEC

Sensitivity affects the likelihood of an MEC item functioning as designed when encountered by an individual. There are four categories of MEC sensitivity presented in order from highest to lowest in Table 4-2. The sensitivity of specific MEC recovered during the field investigation and the resulting hazards they present are outlined in this document.

TABLE 4-2 MEC SENSITIVITY RISK FACTOR DEFINITION

MEC SENSITIVITY	QUALITATIVE RISK LEVEL
MEC that is highly sensitive	High
MEC that is sensitive	Moderate
MEC that may have functioned correctly or is unfuzed but has a residual risk.	Low
Munition Debris Only (non-hazardous and, therefore, not sensitive)	None

4.3.3 Depth Range of MEC

The depth of MEC is related to the probability that an individual will be exposed to MEC. The evaluated depth is based on the depth that MEC is recovered during the EE/CA field investigation. In general, the deeper the MEC item, the less likely it will be encountered by the public (see Paragraph 4.5.1 and Table 4-5).

4.4 SITE CHARACTERISTIC FACTORS

4.4.1 Site Accessibility

The accessibility of a site affects the likelihood of an individual being exposed to MEC. Structural barriers (e.g., fences) or natural barriers (e.g., rough terrain) can limit site accessibility. Both structural and natural barriers at the site are considered when evaluating the site accessibility risk factor. The three categories within this risk factor are presented in order from highest to lowest in Table 4-3.

TABLE 4-3 SITE ACCESSIBILITY RISK FACTOR DEFINITION

ACCESSIBILITY OF SITE	DESCRIPTION	QUALITATIVE RISK LEVEL
No restriction to site	No structural barriers; gently rolling terrain; no vegetation or water restricts access	High
Limited restriction to site	Remoteness of site; structural barriers; vegetation, water, or terrain restricts access.	Moderate
Complete restriction to site	All points of entry are controlled; locked and gated	Low

4.4.2 Site Stability

Site stability affects the potential for individuals to come into contact with MEC by human or natural processes. Natural processes include recurring natural events (e.g., erosion and soil movement) or extreme natural events (e.g., volcanic eruptions and hurricanes). Human processes occur when a site experiences intentional land disturbances within its boundaries (e.g., by means of trail blazing). The three categories within this risk factor are presented in order from highest to lowest in Table 4-4.

TABLE 4-4 SITE STABILITY RISK FACTOR DEFINITION

SITE STABILITY	DESCRIPTION	QUALITATIVE RISK LEVEL
MEC most likely to be exposed by natural or human events	Unstable	High
MEC may be exposed by natural or human events	Moderately Stable	Moderate
MEC not likely to be exposed by natural or human events	Stable	Low

4.5 HUMAN FACTORS

4.5.1 Site Activities

The likelihood of an individual coming into contact with MEC is related to activities generally classified as recreational (e.g., hiking, camping, biking) or occupational (e.g., farming, construction) and are directly related to the depth of MEC. There are three risk factors within this category that take into account depth of MEC and activities at a site. For example, if MEC is deeper than one-foot below ground surface (bgs) and only surface-impact activities are being performed, the activities are considered as low-impact activities with very little risk associated with MEC exposure. On the other hand, where MEC is on the surface, all activities that can affect MEC on the surface have a high level of risk associated with MEC exposure. Table 4-5 presents the definitions for this risk factor.

TABLE 4-5 SITE ACTIVITIES RISK FACTOR DEFINITION

ACTIVITIES	DEPTH ACTIVITIES AFFECT MEC	DEPTH OF MEC (INCHES BGS)	QUALITATIVE RISK LEVEL
Child play, hiking, off-road driving, horseback riding	Surface	0 - 6 6 - 12 > 12	High Moderate Low
Ranching, camping, surveying, metal detecting (*i.e.*, treasure hunting)	Surface/ Subsurface up to 1 ft bgs	0 - 12 12 - 24 > 24	High Moderate Low
Construction, crop farming	Surface/ Subsurface, more than 1 ft bgs	0 - 24 24 - 48 > 48	High Moderate Low

4.5.2 Site Population

The number of people using a site and the frequency of that use affect the probability that MEC will be encountered by an individual. Three categories within this risk factor are presented in order from highest to lowest in Table 4-6.

TABLE 4-6 SITE POPULATION RISK FACTOR DEFINITION

NUMBER OF PEOPLE USING SITE	QUALITATIVE RISK LEVEL
Public attraction such as tourist sites, parks, beaches, other	High
Public has access to land, but not an attraction to the public	Moderate
Public access is restricted; landowners sole users of land	Low

4.6 RISK IMPACT ASSESSMENT

4.6.1 Each of the base factors identified above was evaluated using data collected during the EE/CA and previous investigations. The following sections discuss the risk evaluation by each of the primary risk factors discussed above.

4.6.2 This risk evaluation for the He'eia Combat Training Area and Pali Training Camp uses data collected from the EE/CA field investigation, data from previous investigations, documented reports of discovered MEC, current and future land uses, and the decision criteria discussed in Sections 4.7 and 4.8, to qualitatively assess the MEC hazard level.

4.6.3 Table 4-7 summarizes for each risk evaluation area, total area evaluated, number of MEC and munitions debris recovered during the EE/CA field investigation, the potential for exposure to MEC, and the rationale for determining the level of MEC exposure potential for each OERIA evaluation site.

4.6.4 Specific areas for field investigation were defined during the Technical Project Planning (TPP) process. Factors influencing whether an area was investigated included results from

previous investigations and/or recommendations, historical records review (area usage, firing points, impact areas, range types, ordnance type/sensitivity), and anecdotal accounts of ordnance use/firing points/sighting. Field investigation were not conducted at the Ulumawao site as part of this EE/CA because it is was only an encampment and ordnance use is not suspected based on a historical records review and anecdotal evidence.

TABLE 4-7 ESTIMATING POTENTIAL FOR ORDNANCE AND EXPLOSIVES

OERIA Evaluation Site	Total Area (Acres)	Area Invest (Acres)	MEC Recovered during EE/CA	MD Items Recovered during EE/CA	MEC Exposure Potential[A]	Rationale for Level of MEC Exposure Potential
He'eia Combat Training Area						
He'eia Kea	204	10	0	8	High	Presence of MD and Evidence of HE Usage
Kahalu'u	2,254	9	0	2	High	Presence of Practice MD and Evidence of HE Usage
Pali Training Camp						
Maunawili Impact Area (Maunawili Valley Impact Area)	3,450	25.5	0	103	High	Presence of MD and Evidence of HE Usage
Maunawili Site (Maunawili)	400	2	0	0	Low	No evidence of MEC or MD during investigation
Makali'i Valley (Maunawili Stream)	46	2.5	0	0	Low	No evidence of MEC or MD during investigation
Ulumawao	500	0	NI[B]	NI[B]	Low	Used only as Encampment

A High MEC Exposure Potential if MEC or MD indicative of HE has been discovered at the site.
Low MEC Exposure Potential if neither MEC nor MD has been discovered at the site.

B NI: No Field Investigation Conducted; Historical Records Review Only.

4.7 HE'EIA COMBAT TRAINING AREA – SITE RISK EVALUATION

A site risk evaluation is below for each of the sites at the He'eia Training Area; i.e., the Kea and Kahalu'u parcels.

4.7.1 He'eia Kea - Risk Evaluation

Results of the evaluation of the He'eia Kea parcel are summarized in Table 4-8. A discussion of each risk factor for the He'eia Kea parcel is presented in the following subsections. Field investigations during this EE/CA were limited to the eastern portion on He'eia Kea as decided through the TPP process. Previous field investigations found ordnance only on the eastern side and recommended further investigation in that area. A historical records review identified ranges on the eastern side, but nothing in the western section.

4.7.1.1 Presence of MEC Factors

4.7.1.1.1 He'eia Kea - Type of MEC

During the EE/CA investigation, eight MD items were discovered and documented within He'eia Kea. MD items found during the EE/CA investigation include: five 2.36-inch rocket components, one complete 2.36-inch practice rocket, a MkII fragmentation grenade piece and a MkII practice grenade. No UXO items were found. Because MD indicating HE use was found MEC Risk is classified as high.

4.7.1.1.2 He'eia Kea - Sensitivity of MEC

The MkII grenade fragments and 2.36-inch rocket parts may have been from HE version, which are sensitive items. As such, the MEC sensitivity risk level is classified as moderate, as described in Table 4-2.

4.7.1.1.3 He'eia Kea - Quantity or Density

ZAPATA recovered eight MD items from the approximately 10 acres sampled within the 204-acre site. No MEC was found during the EE/CA field investigations.

4.7.1.1.4 He'eia Kea - Depth Distribution

Hawaii generally has fairly shallow soils underlain by volcanic rock. This directly impacts the depth at which MEC/MD is expected, because it usually doesn't penetrate the volcanic rock. Based on soil surveys conducted by the University of Hawaii, soil types within He'eia Kea ranges in depth from less than 20 inches to 60 inches. Based on the dig results, depths of the eight MD items ranged from less than or equal to 0.1 inch bgs to approximately 6 inches bgs. The average MD item depth was 2.2 inches bgs. All MD items at He'eia Kea were found near the base of the Pu'u Ma'eli'eli Mountain near where the slope increased to greater than 33 percent. No MEC was found at this site.

4.7.1.2 Site Characteristic Factors - He'eia Kea

4.7.1.2.1 He'eia Kea - Site Accessibility

As previously mentioned, He'eia Kea is an hour-glass-shaped parcel. Field investigations were conducted in the (larger) east portion of the He'eia Kea hour glass, which is a bowl shaped valley that is open on the east side. Mountains are to the north, south, and west and the Kamehameha Highway runs along the eastern boundary. A fence parallels the road restricting site access (see Figure 4-1). The single point of entry is along the one mile stretch of highway through a fenced parking and storage area (see Figure 4-2). Site access is controlled by live-in caretakers. There are several unimproved roads within the site. One of the roads/trail ends at the Pu'u Ma'eli'eli summit. The (smaller) west portion is mainly residential with some commercial development.

The summit and the east side can be accessed by trail on foot. The eastern valley area is 20 feet MSL, while the ridge to the south is about 200 feet MSL, which climbs to 718 feet at the summit along the western boundary and continues along the northern boundary at approximately 300 feet MSL (see Figure 1, Appendix B2). Based on Table 4-3, the site accessibility risk level is moderate.

FIGURE 4-1 HE'EIA KEA FENCE FROM KAMEHAMEHA HIGHWAY

FIGURE 4-2 HE'EIA KEA SITE ACCESS POINT AND STORAGE AREA

(Figures 4-1 and 4-2 were reprinted with permission from Lostvirtualtour.com.)

4.7.1.2.2 He'eia Kea - Site Stability

Naturally occurring events, such as flooding, landslides and soil erosion down steep banks have the potential to expose MEC in portions of He'eia Kea. Approximately 77 acres of the 204-acre parcel have a slope greater than 33 percent. MD items found at He'eia Kea were near the base of the break in slope. MEC items could be uncovered by owner activities, such as land clearing for horticultural purposes. Due to future nature park construction plans by the City & County of Honolulu, MEC, if present, would likely be exposed to humans, thereby classifying the site as unstable with a high qualitative risk level (See Table 4-4).

4.7.1.3 Demographic Factors - He'eia Kea

4.7.1.3.1 He'eia Kea - Site Activities

4.7.1.3.1.1 Site activities are limited because site access is controlled. Live-in caretakers maintain and monitor the parcel, which their family has been farming since just after WWII. Currently, they have a small vegetable garden, taro plots and flowers near the fenced parking area. Film crews also use the area, with the caretakers helping to facilitate and manage their site visits.

4.7.1.3.1.2 As described above, the City & County of Honolulu has plans for construction of a park in portions of He'eia Kea, and they plan to keep the land as a nature preserve. The city is developing a master plan for botanical gardens, picnic grounds, open spaces and hiking trails. Construction of an amphitheater has also been mentioned near grids KEA1G and KEA8G (Figure 2, Appendix B1).

4.7.1.3.1.3 The depth of MEC items found, in conjunction with the type of activities engaged in on site determine the Site Activities Risk Factor for each item. All eight of the MD items were found at a depth of less than six inches and are indicative of HE use. However, since MEC was not found, the Qualitative Risk Level is low for all site activities. Each Qualitative Risk Level determination is based on Table 4-5.

4.7.1.3.2 He'eia Kea - Site Population

Currently, there is a low accessibility and public use of He'eia Kea (see Site Activities, Section 4.7.1.3.1). However, due to plans for a future nature park, there could be an increase in population and a higher frequency of area usage. Considering this, the Site Population Risk Factor is determined to be high, based on Table 4-6.

4.7.1.4 Baseline Risk Impact Assessment - He'eia Kea

Only MD was found at this site. Although MEC items were not found at this site, MEC could still be present. The fragmentation grenade part and historical documentation (live grenade ranges) and previous site investigations (M9A1 high explosive antitank rifle grenade) indicate that high explosives were used at the site. It is also possible that the 2.36-inch rocket parts were from HE versions, which are sensitive ordnance items. Based on the types of activities that occur and/or will occur in this area, it is possible that individuals would be exposed to MEC, if present, during area activities. Since MD that is indicative of HE use was found, the MEC Hazard Level is high. The summary of risk factors for He'eia Kea is in Table 4-8.

TABLE 4-8 SUMMARY OF RISK FACTORS – HE'EIA KEA

	MEC DISCOVERED	QUALITATIVE RISK LEVEL	OVERALL SITE MEC HAZARD LEVEL
MUNITIONS AND EXPLOSIVES OF CONCERN FACTORS	Type: None*	High	High
	Sensitivity	Moderate	
	Site Density*	0.6 HE MD/acre	
	Depth Range (bgs)	0.1 to 6 inches	
SITE FACTORS	Access	Moderate	
	Stability	High	
DEMOGRAPHIC FACTORS	Activity	Low	
	Population	High	

* Based on 0 MEC and 6 HE MD Items (potentially from HE ordnance) over 10-acres found during the EE/CA investigation (a total of 8 MD items were found)
bgs = below ground surface

4.7.2 Kahalu'u (Waihe'e and Ka'alaea Valleys) - Risk Evaluation

Results of the evaluation of the Kahalu'u parcel are summarized in Table 4-9. A discussion of each risk factor for the Kahalu'u parcel is presented in the following subsections. Kahalu'u is composed of two valleys; the Waihe'e and Ka'alaea Valleys. At the time of fieldwork right-of-entry could not be obtained for the Ka'alaea Valley; however, sufficient data exist from past site visits to evaluate Ka'alaea Valley as part of this EE/CA.

4.7.2.1 Presence of MEC Factors

4.7.2.1.1 Kahalu'u (Waihe'e and Ka'alaea Valleys) - Type of MEC

4.7.2.1.1.1 During the EE/CA investigation, two MD items were discovered and documented within the Waihe'e Valley of Kahalu'u. MD items found during the EE/CA investigation were one 2.36-inch practice rocket, and one practice 37mm, M74, AP-T.

4.7.2.1.1.2 The Ka'alaea Valley is the location of the live fire impact area, which overlaps slightly into the Waihe'e Valley. The MD items found within the Waihe'e Valley were near the

boundary of the impact area, which expands into and occupies most of the Ka'alaea Valley. The Ka'alaea Valley was utilized as a maneuver and impact area for jungle and assault training. The impact area was purportedly established for the firing of field artillery pieces, mortar, bazooka and other assault weapons using live and practice rounds. During a November 1992 site visit, it was reported that there were three apparent target sites located on a ridge running through the center of the valley. MD observed during the site visit included mortar and rifle grenade fragments, as well as fox holes and trenches. During a December 1992 site visit, shrapnel from a rifle grenade and a powder train time fuze (PTTF) from an 81mm mortar were found at one of the target sites, which also had a corroded and bent metal target frame. Mortar rounds were also reportedly found in the Ka'alaea Stream by members of the Mello family. No UXO items were found. Because MD resulting from HE munitions were found (shrapnel from mortars and rifle grenade fragments) and the parcel was historically used as a live fire impact area, the MEC Risk is classified as high.

4.7.2.1.2 Kahalu'u (Waihe'e and Ka'alaea Valleys) - Sensitivity of MEC

MD resulting from HE munitions (shrapnel mortars and rifle grenades) are sensitive and have a moderate MEC qualitative risk level as described in Table 4-2.

4.7.2.1.3 Kahalu'u - Quantity or Density

ZAPATA recovered two MD items within the approximately 9 acres sampled of the 1,066-acre Waihe'e Valley. Prior site investigations within the 1,188-acre Ka'alaea Valley resulted in one mortar round fuze, and fragments/shrapnel from mortar and rifle grenades found. No MEC was found during the EE/CA field investigations.

4.7.2.1.4 Kahalu'u - Depth Distribution

Hawaii generally has fairly shallow soils underlain by volcanic rock. This directly impacts the depth at which MEC/MD is expected, because it usually doesn't penetrate the volcanic rock. Based on soil surveys conducted by the University of Hawaii, soil within the Kahalu'u parcel ranges in depth from zero to 80 inches. All MD items found during the EE/CA field investigation at Kahalu'u were found at the northeastern section of Waihe'e Valley near the valley's entrance. The items were down slope of the impact area as defined in historical documentation. Both MD items were found on the surface. MD found within the Ka'alaea Valley was found during past site visits and was on the surface. The MD was near remains of a target along a central ridge. Mortars have also been reported in the Ka'alaea Stream near the rear of the valley. While MD was found, no MEC was found at this site.

4.7.2.2 Site Characteristic Factors - Kahalu'u

4.7.2.2.1 Kahalu'u - Site Accessibility

The Kahalu'u parcel is densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys. The western boundary is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet MSL. Ulimakoli and Kalahaku Ridge bound the valley to the north and south of the Waihe'e Valley, respectively. The eastern portion of the site overlaps with residential and agricultural plots and the Waihe'e Nature Preserve. Site access to the Waihe'e Valley is restricted to a single gated road (Waihe'e Road) and foot access by trails. The Ka'alaea Valley shares the Ulimakoli Ridge (with Waihe'e Valley) to the south and is bound to the north by the Pu'ukuloani Ridge. The Ka'alaea Valley

the similarly restricted and bounded by residences to the east. Based on Table 4-3, the site accessibility risk level is moderate.

4.7.2.2.2 Kahalu'u - Site Stability

Naturally occurring events, such as flooding, landslides and soil erosion down steep banks has the potential to expose MEC in portions of the Kahalu'u parcel. Approximately 1,672 acres of the 2,254-acre area have a slope greater than 33 percent. Portions of the site within the valleys contain permanent streams that are subject to flash flooding during storms (AMEC, 2001). MEC items could be uncovered by owner activities, thereby classifying the site as unstable with a high qualitative risk level (see Table 4-4).

4.7.2.3 Demographic Factors - Kahalu'u

4.7.2.3.1 Kahalu'u - Site Activities

Site activities within the valleys include limited hiking, filming, agricultural, and recreational activites. The Waihe'e Valley Trail is a 1.5-mile trail ending at the Hamama Falls. Organized hikes are periodically set up by the Hawaiian Trail and Mountain Club (http://www.htmclub.org/), however, trail access requires permission from the Hawaii Board of Water Supply. Also, several locations along the trail and the waterfall have been used for the filming of the television show, "Lost" (http://www.lostvirtualtour.com/lost/filming_locations/Waiheevalley/). Further, the Waihe'e Valley is featured as a suggested filming location by the Honolulu Film Office (http://www.filmhonolulu.com/locations.asp). Agricultural activities in the area are conducted near the mouth of each valley. The Site Activities Risk Factor is determined by the depth of MEC items found, in conjunction with the type of activities engaged in on site. Two practice MD items were found on the surface. A mortar fuze was found, mortars have been reported in the area, and fragment-producing items may have been used. However, since MEC has not been found, the Qualitative Risk Level is low for all site activities. Each Qualitative Risk Level determination is based on Table 4-5.

4.7.2.4 Kahalu'u - Site Population

The Waihe'e Nature Park (at the mouth of the valley) is a public attraction and used by the local community, which is interested in long term development of the park. Senator Fong's Plantation and Gardens is also a public attraction within the Ka'alaea Valley, however, the population is controlled and has limited site access. As such the Site Population Risk Factor is determined to be high, based on Table 4-6.

4.7.2.5 Baseline Risk Impact Assessment - Kahalu'u

Only MD were found at this site. Although MEC was not found at this site, MEC could still be present. The MD found during the EE/CA investigation was down slope of the suspected impact area. The impact area is primarily within Ka'alaea Valley and 88 acres overlap into Waihe'e Valley. The slope of the impact area within Waihe'e Valley is greater than 33 percent and the MD was found approaching the impact area/Ka'alaea Valley. Previous site investigations and historical documentation suggest the presence of high explosive ordnance in the adjacent Ka'alaea Valley, but not in Waihe'e Valley. Based on previous site investigation, findings during the EE/CA field investigation and the types of activities that occur and/or will occur in

this area, the MEC Hazard Level is high. The summary of risk factors for Kahalu'u is in Table 4-9.

TABLE 4-9 SUMMARY OF RISK FACTORS – KAHALU'U

	MEC DISCOVERED	QUALITATIVE RISK LEVEL	OVERALL SITE MEC HAZARD LEVEL
MUNITIONS AND EXPLOSIVES OF CONCERN FACTORS	Type: None*	High	High
	Sensitivity	Moderate	
	Site Density*	0 HE MD/acre	
	Depth Range (bgs)	N/A	
SITE FACTORS	Access	Moderate	
	Stability	High	
DEMOGRAPHIC FACTORS	Activity	Low	
	Population	High	

* Based on HE MD (potentially from HE ordnance) and evidence of HE use found during past site visits. 0 MEC/HE indicative MD Items were found over 8.4-acres during the EE/CA investigation (2 practice MD items were found.)
bgs = below ground surface

4.8 PALI TRAINING CAMP – SITE RISK EVALUATION

This section contains site risk evaluations for three of the four sites at the Pali Training Camp: Maunawili Valley Impact Area, Maunawili Stream Area, and the Maunawili site. Field activities were not conducted at the Ulumawao parcel as part of this EE/CA, as historical documentation indicated that the area was used as an encampment only.

4.8.1 Maunawili Valley Impact Area – Risk Evaluation

Results of the evaluation of the Maunawili Valley Impact Area are summarized in Table 4-10. A discussion of each risk factor for the Maunawili Valley Impact Area is presented in the following subsections. Field investigations during this EE/CA were focused in the relatively level sections of the valley as decided during the TPP process. An impact area was defined during the historical records review and grids were placed downslope of the impact area. The northeast section of the area was excluded from the field investigation because of the topographic boundary the Olomana Ridge creates isolating it from the impact area and suspected firing point.

4.8.1.1 Presence of MEC Factors

4.8.1.1.1 Maunawili Valley Impact Area - Type of MEC

During the EE/CA investigation, no MEC items were found. However, 103 MD items were found, including 81mm tail fins, a 75mm HE projectile (low ordered), HE munitions fragments, fuzes (expended), and 75mm shrapnel rounds (expended). Because HE was used at this site, the MEC Risk is classified as high.

4.8.1.1.2 Maunawili Valley Impact Area - Sensitivity of MEC

The type of HE used at this site includes items that are sensitive. As such, the MEC sensitivity risk level is classified as moderate, as described in Table 4-2.

4.8.1.1.3 Maunawili Valley Impact Area - Quantity or Density

A total of 103 MD items was found, but no MEC items were found during the EE/CA investigation while sampling approximately 25.5 acres of the 3,450-acre site.

4.8.1.1.4 Maunawili Valley Impact Area - Depth Distribution

Hawaii generally has fairly shallow soils underlain by volcanic rock. This directly impacts the depth at which MEC/MD is expected, because it usually doesn't penetrate the volcanic rock. Based on soil surveys conducted by the University of Hawaii, soil within the Maunawili Valley Impact Area ranges in depth from zero to 80 inches. MEC items were not found at this site. However, 103 MD items were found ranging in depth from zero to 14 inches bgs. The average depth of items found during intrusive operations was three inches bgs. Eighty-two were found during reconnaissance operations and 21 during intrusive operations. Most of the MD were found within the western quarter of the site. Based on field findings, an impact area was delineated as an area of potential concern; it is shown on Figures 1, 2, 6 and 10, Appendix B3.

4.8.1.2 Site Characteristic Factors - Maunawili Valley Impact Area

4.8.1.2.1 Maunawili Valley Impact Area - Site Accessibility

4.8.1.2.1.1 The Maunawili Valley Impact Area can be accessed by road from the Kalanianaole Highway through the Luana Hills Country Club (by Auloa and Luana Hills Roads) or through the Maunawili Neighborhood (by Auloa and Maunawili Roads). The Luana Hills Country Club guard building controls vehicular traffic along Luana Hills Road, and a locked gate at the end of Maunawili Road restricts vehicular access from the neighborhood (see Figure 3, Appendix B3). The only means of site access for the general public is by foot, bicycle or horse. There are numerous public hiking trails that pass through the Maunawili Valley Impact Area.

4.8.1.2.1.2 The Maunawili Falls Trail/Connector Trail starts just past the gate at Maunawili Road and is a major access point into the area. The Maunawili Connector Trail dead-ends into the Maunawili Demonstration Trail, which can be accessed from the Pali Highway two miles to the north or Waimanalo seven miles to the south. The Maunawili Ditch Trail and several other unnamed trails can also be accessed from Waimanalo. The Olomana trail can be accessed from Luana Hills Road.

4.8.1.2.1.3 The Maunawili Valley Impact Area can be broken into five major sections; the Luana Hills Country Club, Hawaii Agriculture Research Center, Luluku Banana Farmers area,

Maunawili Falls, and mountainous areas (Figure 3, Appendix B3). Hiking trails pass through or near all of these areas; however, in many places thick vegetation and steep terrain inhibit departure from the trail.

4.8.1.2.1.4 The Luluku Banana Farmers area is a good example of this. It is bordered by the Maunawili Falls/Connector Trails to the north and Maunawili Demonstration Trail to the south and west, yet thick vegetation and steep terrain isolate the trail from the Banana Farmers area. The unimproved road that runs from the Maunawili Road gate through the Agriculture Research Center area has a second locked gate at the entrance to the Luluku Banana Farmers area, adding to the inaccessibility of the area.

4.8.1.2.1.5 There are several unimproved roads within the Agriculture Research Center and, while access is officially prohibited, it is accessible by foot. Occasionally, hikers exit the site by roads within the area.

4.8.1.2.1.6 The Luana Hills Country Club area includes the southern half of the golf course and hiking trails between Mount Olomana and the club house. Golf course clienteles are generally restricted to the golf course and cart path. Occasionally, hikers exit the site through the golf course.

4.8.1.2.1.7 Based on Table 4-3, the overall site accessibility risk level is high.

4.8.1.2.2 Maunawili Valley Impact Area - Site Stability

Naturally occurring events, such as flooding, landslides (see Figure 4-3, below) and soil erosion down steep banks has the potential to expose MEC in portions of Maunawili Valley Impact Area. Approximately 1,700 acres of the 3,450-acre parcel have slopes greater than 33 percent. If present, MEC could be uncovered by owner activities. The site is classified as unstable with a high qualitative risk level (See Table 4-4).

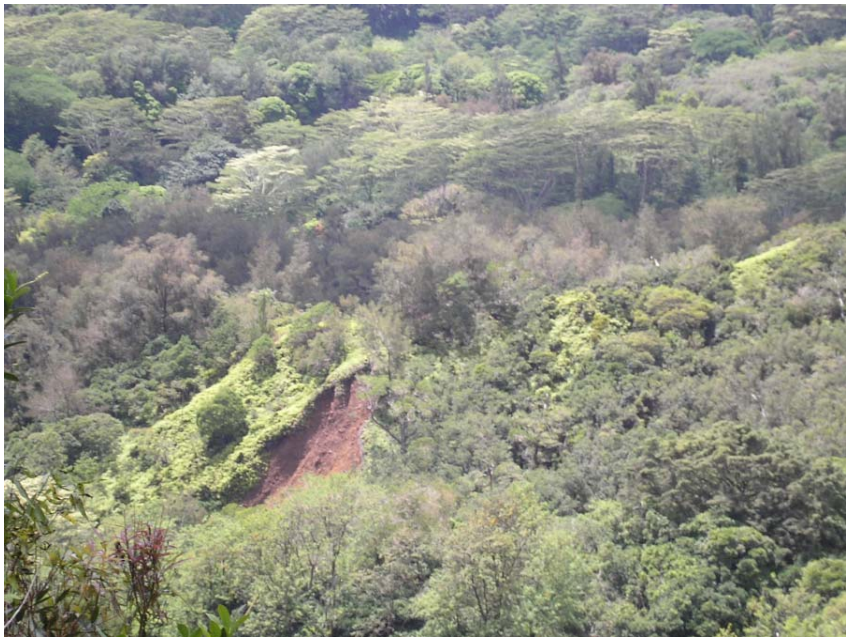

FIGURE 4-3 LANDSLIDE NEAR MAUNAWILI FALLS

4.8.1.3 Demographic Factors - Maunawili Valley Impact Area

4.8.1.3.1 Maunawili Valley Impact Area - Site Activities

4.8.1.3.1.1 Site activities within the Maunawili Valley Impact Area include infrastructure maintenance (power lines), agriculture, and recreational activities. Power lines pass through all five sections of the Maunawili Valley Impact Area, which occasionally require maintenance by the Hawaiian Electric Company. Hiking trails pass through all of the sections, with the exception of the Agriculture Research Center area, which sometimes requires stabilization, including erosion control via plant stabilization or other reinforcement (see Figure 4-4, below).

FIGURE 4-4 EROSION CONTROL ON MAUNAWILI DEMONSTRATION TRAIL

http://www.hi.nrcs.usda.gov/partnerships/swcs/manawili.html

4.8.1.3.1.2 Site activities at the Luana Hills Country Club area include golfing, hiking, and occasionally construction. Site activities within the Hawaii Agriculture Research Center and Luluku Banana Farmers area include crop farming and hunting. Limited hunting is required to control the feral pig population, which destroys crops. Crops include bananas, taro, koa trees, coffee, forage, vegetable crops, tropical fruits, and sugarcane. Educational tours are occasionally given within the Luluku area (http://www.kbac-hi.org/streamwalks/pikoakea.htm). Filming has been conducted in the Luluku area and on the Maunawili Demonstration Trail within the mountainous area. The Maunawili Falls are a major recreational hiking and swimming area. However, since no MEC items were found at the site, the Qualitative Risk Level is classified as low. Each Qualitative Risk Level determination is based on Table 4-5.

4.8.1.3.2 Maunawili Valley Impact Area - Site Population

While the population in the Agriculture Research Center and Banana Farmers area is generally low, it is high in the Maunawili Falls and mountainous area, The Maunawili neighborhood is adjacent to east and the public hiking trail is a site attraction. Because of the area's proximity to neighborhoods and the public hiking trail, the Site Population Risk Factor is determined to be high, based on Table 4-6.

4.8.1.4 Baseline Risk Impact Assessment - Maunawili Valley Impact Area

Although MEC items were not found at this site, considering the type of MD recovered (indicative of high explosives) and site history (anecdotal evidence of 155mm), MEC could be present. Based on the types of activities occurring and the site stability, it is possible that individuals would be exposed to MEC during area activities, if present. Since MD was found that indicates HE was used at the site, the MEC Hazard Level is high. The summary of risk factors for Maunawili Valley Impact Area is in Table 4-10.

TABLE 4-10 SUMMARY OF RISK FACTORS – MAUNAWILI VALLEY IMPACT AREA

	MEC DISCOVERED	QUALITATIVE RISK LEVEL	OVERALL SITE MEC HAZARD LEVEL
MUNITIONS AND EXPLOSIVES OF CONCERN FACTORS	Type: None*	High	High
	Sensitivity	Moderate	
	Site Density*	4 HE MD/acre	
	Depth Range (bgs)	0 to 14 inches	
SITE FACTORS	Access	High	
	Stability	High	
DEMOGRAPHIC FACTORS	Activity	Low	
	Population	High	

* Based on 0 MEC and 102 HE MD Items (potentially from HE ordnance) found over 25.5-acres during the EE/CA investigation (of 103 MD items, 102 were potentially from HE ordnance).
bgs = below ground surface

4.8.2 Maunawili Stream Area - Risk Evaluation

Results of the evaluation of the Maunawili Stream Area are summarized in Table 4-11. A discussion of each risk factor for the Maunawili Stream Area is presented in the following subsections.

4.8.2.1 Presence of MEC Factors

4.8.2.1.1 Maunawili Stream Area - Type of MEC

During the EE/CA investigation, no MEC/MD items were found. As such, the MEC Risk is classified as none.

4.8.2.1.2 Maunawili Stream Area - Sensitivity of MEC

Since no MEC/MD items were found, the MEC sensitivity risk level as none, as described in Table 4-2.

4.8.2.1.3 Maunawili Stream Area - Quantity or Density

No MEC/MD items were found during the EE/CA investigation while sampling 2.5 acres of the 46-acre site.

4.8.2.1.4 Maunawili Stream Area - Depth Distribution

Hawaii generally has fairly shallow soils underlain by volcanic rock. This directly impacts the depth at which MEC/MD is expected, because it usually doesn't penetrate the volcanic rock. Based on soil surveys conducted by the University of Hawaii, soil within the Maunawili Stream area ranges in depth from 28 inches to 58 inches. Intrusive operations were not conducted within the Maunawili Stream Area, but rock outcrops were observed along the ridge and within the valley. The GPO plot is near the area and contains excavations to a depth of 27 inches. Neither MD nor MEC was found at this site.

4.8.2.2 Site Characteristic Factors - Maunawili Stream Area

4.8.2.2.1 Maunawili Stream Area - Site Accessibility

The Maunawili Stream Area is accessed by Luana Hills Road. Luana Hills Road runs from Auloa Rd (just off Kalanianaole Highway) to the Launa Hills Country Club. The road cuts through the western boundary of the area just south of the Country Club's guard building. The guard monitors vehicular traffic only; the Olomana trailhead (see Figure 4-5) is less than one-half mile south of the guard's building off Luana Hills Road. The public hiking trail runs up to and then along a ridge that nearly defines the area's eastern boundary. The valley area along the western boundary is 40 feet above MSL, while the ridgeline is about 400 feet above MSL. Based on Table 4-3, the site accessibility risk level is high.

FIGURE 4-5 OLOMANA TRAILHEAD

4.8.2.2.2 Maunawili Stream Area - Site Stability

Naturally occurring events, such as flooding, landslides and soil erosion down steep banks has the potential to expose MEC in portions of Maunawili Stream Area. Approximately 36 acres of the 46-acre parcel have a slope greater than 33 percent. While MEC items were not found, they may be present, as this area was reported as a potential firing point. If present, MEC items could be uncovered by owner activities. The site is classified as unstable with a high qualitative risk level (See Table 4-4).

4.8.2.3 Demographic Factors - Maunawili Stream Area

4.8.2.3.1 Maunawili Stream Area - Site Activities

Site activities are limited to recreational use. Hiking occurs up to along the ridgeline, but steep terrain precludes many additional activities. Since no MD or MEC were found at the site the Qualitative Risk Level is classified as low. Each Qualitative Risk Level determination is based on Table 4-5.

4.8.2.3.2 Maunawili Stream Area - Site Population

There are several neighborhoods less than one mile from the Maunawili Stream Area and the public hiking trail is a site attraction. Because of the area's proximity to neighborhoods and the public hiking trail, the Site Population Risk Factor is determined to be high, based on Table 4-6.

4.8.2.4 Baseline Risk Impact Assessment - Maunawili Stream Area

Neither MD nor MEC was found at this site. Although MEC items were not found at this site, the area is a suspected firing point and MEC could be present. Anecdotal historical evidence indicated that a dud mortar round was found in the area while tilling. However, considering the types of activities likely occurring, it is unlikely that individuals would be exposed to MEC

during area activities. The MEC Hazard Level is low. The summary of risk factors for Maunawili Stream Area is located on Table 4-11.

TABLE 4-11 SUMMARY OF RISK FACTORS – MAUNAWILI STREAM AREA

	MEC DISCOVERED	QUALITATIVE RISK LEVEL	OVERALL SITE MEC HAZARD LEVEL
MUNITIONS AND EXPLOSIVES OF CONCERN FACTORS	Type: None	None	Low
	Sensitivity	None	
	Site Density*	0 MEC/acre	
	Depth Range (bgs)	N/A	
SITE FACTORS	Access	High	
	Stability	High	
DEMOGRAPHIC FACTORS	Activity	Low	
	Population	High	

* Site Density is based on 0 MEC Items found over 2.5-acres during the EE/CA investigation
bgs = below ground surface

4.8.3 Maunawili Site - Risk Evaluation

Results of the evaluation of the Maunawili site are summarized in Table 4-12. A discussion of each risk factor for the Maunawili Site is presented in the following subsections.

4.8.3.1 Presence of MEC Factors

4.8.3.1.1 Maunawili Site - Type of MEC

During the EE/CA investigation, no MEC/MD items were found. As such the MEC Risk is classified as none. Only small arms were found.

4.8.3.1.2 Maunawili Site - Sensitivity of MEC

Since no MEC/MD items were found, the MEC sensitivity risk level is classified as none, as described in Table 4-2.

4.8.3.1.3 Maunawili Site - Quantity or Density

No MEC/MD was found during the EE/CA investigation while sampling 2 acres of the 400-acre site.

4.8.3.1.4 Maunawili Site - Depth Distribution

Hawaii generally has fairly shallow soils underlain by volcanic rock. This directly impacts the depth at which MEC/MD is expected, because it usually doesn't penetrate the volcanic rock. Based on soil surveys conducted by the University of Hawaii, soil within the Maunawili Site ranges in depth from zero to 60 inches. No MEC/MD items were found at this site.

4.8.3.2 Site Characteristic Factors - Maunawili Site

4.8.3.2.1 Maunawili Site - Site Accessibility

The Maunawili site is located on the western edge of the Maunawili Valley; it is bordered to the east by the Maunawili neighborhood and to the north and west by the Pali Highway. From the west the site can be accessed through the St Stephens Seminary property, or from the east through the Maunawili neighborhood. The Maunawili Demonstration Trail passes through a southern portion of the area. Elevations range from approximately 400 to 1,200 feet MSL. Based on Table 4-3, the site accessibility risk level is high.

4.8.3.2.2 Maunawili Site - Site Stability

Naturally occurring events, such as flooding, landslides and soil erosion down steep banks has the potential to expose MEC in portions of Maunawili site. Approximately 100 acres of the 400-acre parcel have a slope greater than 33 percent. While MEC items were not found, they may be present. If present, MEC items could be uncovered by owner activities, thereby classifying the site as unstable with a high qualitative risk level (See Table 4-4).

4.8.3.3 Demographic Factors - Maunawili Site

4.8.3.3.1 Maunawili Site - Site Activities

Site activities are limited to recreational use and infrastructure maintenance. The Maunawili Trail passes through a southern portion of the site and power lines bisect the area. Since no MD or MEC items were found at the site, the Qualitative Risk Level is classified as low. Each Qualitative Risk Level determination is based on Table 4-5.

4.8.3.3.2 Maunawili Site - Site Population

The Maunawili neighborhood is adjacent to east and the public hiking trail is a site attraction. Because of the area's proximity to neighborhoods and the public hiking trail, the Site Population Risk Factor is determined to be high, based on Table 4-6.

4.8.3.4 Baseline Risk Impact Assessment - Maunawili Site

Neither MD nor MEC were found at this site. Although MEC items were not found at this site, if present, MEC could be exposed because of site stability. However, considering the types of activities occurring and since no MEC was found or is suspected, the MEC Hazard Level is low. The summary of risk factors for Maunawili site is located on Table 4-12.

TABLE 4-12 SUMMARY OF RISK FACTORS – MAUNAWILI SITE

	MEC DISCOVERED	QUALITATIVE RISK LEVEL	OVERALL SITE MEC HAZARD LEVEL
MUNITIONS AND EXPLOSIVES OF CONCERN FACTORS	Type: None	None	Low
	Sensitivity	None	
	Site Density*	0 MEC/acre	
	Depth Range (bgs)	N/A	
SITE FACTORS	Access	High	
	Stability	High	
DEMOGRAPHIC FACTORS	Activity	Low	
	Population	High	

* Site Density is based on 0 MEC Items found over 2.5-acres during the EE/CA investigation
bgs = below ground surface

4.9 RESPONSE ALTERNATIVE EVALUATION

Each response-action alternative discussed below is assigned an impact evaluation score using a alphabetic rank from "A" to "D" representing the relative impact of the response-action alternative, with "A" having the highest relative impact and "D" having no impact. The comparisons, as seen in Tables 4-13 through 4-17, provide a qualitative indication of the change in the potential for harm and level of protectiveness at the area for each response-action alternative that could be implemented. Comparisons are independent of costs associated with each alternative.

4.9.1 Alternative 1: No Department of Defense Action Indicated (NDAI)

The NDAI alternative is included to provide a baseline comparison with other risk-reduction alternatives. No technology is associated with this alternative, which is synonymous with the "No DOD Action Indicated" choice. No risk-reduction measure resulting in the treatment, containment, removal of or limited exposure to MEC will be implemented. Therefore, potential MEC will not be removed and no restriction will be placed on access to the site. The NDAI alternative is appropriate for sites where no MEC has been found, where there is no documented

evidence of MEC usage, or where the nature and extent of the MEC occurrence poses minimal threat to those who may encounter the items.

4.9.2 Alternative 2: Institutional Controls

This alternative utilizes education and land-use restrictions to minimize exposure of area users to MEC. Institutional Controls rely on behavior modification and site-access control strategies to eliminate or minimize risk. Institutional Control strategies including educational programs (e.g., informational pamphlets and depiction of site hazards) and/or physical site-access controls, are appropriate where risk to the public has been documented as low to moderate, and can be managed without the removal of MEC. With the exception of digging for signpost installation, intrusive activity is not typically associated with this alternative. Institutional controls can be implemented with low capital cost and low subsequent annual operating costs.

4.9.3 Alternative 3: Surface Clearance

This alternative involves UXO technicians who are trained to perform a visual inspection of the entire surface of the area, to recognize, handle, and dispose of ordnance, and to remove MEC from the ground surface. The UXO technicians are responsible for ensuring proper disposal of the recovered material. This alternative is effective in minimizing the risk of accidental contact with MEC in areas where intrusive activities are not likely.

4.9.4 Alternative 4: Clearance to Detectable Depth

4.9.4.1 This alternative involves all activities necessary to fully locate excavate and remove MEC to a depth consistent with the geophysical instrument's maximum depth of detection. Activities may potentially include vegetation clearance as necessary to conduct geophysical surveys, completion of geophysical investigations, excavation of anomalies and destruction of MEC. Technologies that may be used for this alternative include magnetic and/or electromagnetic geophysical investigative methods and management/disposal of MEC (including detonation of UXO). This alternative includes Surface Clearance over the entire site and excavation and removal in suspected impact areas.

4.9.4.2 The overall OERIA hazard level for He'eia Kea, Kahalu'u, and the Maunawili Valley Impact Area is ranked high. The OERIA hazard level for the Maunawili Stream Area and Maunawili site is ranked low. These conclusions are reached through evaluations of each area, as supported by criteria outlined in the March 27, 2001 Interim Guidance for OERIA. High-explosive-related MD items were discovered at He'eia Kea, Kahalu'u and the Maunawili Valley Impact Area during the EE/CA investigation and prior field investigations.

TABLE 4-13 MEC RISK IMPACT ASSESSMENT – HE'EIA KEA

ALTERNATIVES[1]	MEC FACTORS[2]				SITE CHARACTERISTICS[3]		HUMAN FACTORS[4]		OVERALL RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	High	Moderate	0.6 HE MD/acre	0.1 to 6 inches	Moderate	High	Low	High	Overall Hazard: High
No DOD Action Indicated	D	D	D	D	D	D	D	D	D
Institutional Controls	D	D	D	D	A	D	A	A	C
Surface Clearance	D	D	B	B	D	D	C	D	B
Clearance to Detectable Depth	A	A	A	A	D	D	B	D	A

bgs = Below Ground Surface.
1 Each response-action alternative is assigned an impact evaluation score with "A" having the highest relative impact and "D" having no impact.
2 MEC factors are discussed/defined in Section 4.3.
3 Site Characteristics are discussed/defined in Section 4.4.
4 Human Factors are discussed/defined in Section 4.5.

TABLE 4-14 MEC RISK IMPACT ASSESSMENT – KAHALU'U

ALTERNATIVES[1]	MEC FACTORS[2]				SITE CHARACTERISTICS[3]		HUMAN FACTORS[4]		OVERALL RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	High	Moderate	None	N/A	Moderate	High	Low	High	Overall Hazard: High
No DOD Action Indicated	D	D	D	D	D	D	D	D	D
Institutional Controls	D	D	D	D	A	D	A	A	C
Surface Clearance	D	D	B	B	D	D	C	D	B
Clearance to Detectable Depth	A	A	A	A	D	D	B	D	A

bgs = Below Ground Surface.
1 Each response-action alternative is assigned an impact evaluation score with "A" having the highest relative impact and "D" having no impact.
2 MEC factors are discussed/defined in Section 4.3.
3 Site Characteristics are discussed/defined in Section 4.4.
4 Human Factors are discussed/defined in Section 4.5.

TABLE 4-15 MEC RISK IMPACT ASSESSMENT – MAUNAWILI VALLEY IMPACT AREA

ALTERNATIVES[1]	MEC FACTORS[2]				SITE CHARACTERISTICS[3]		HUMAN FACTORS[4]		OVERALL RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	High	Moderate	4 HE MD/acre	0 to 14 inches	High	High	Low	High	Overall Hazard: High
No DOD Action Indicated	D	D	D	D	D	D	D	D	D
Institutional Controls	D	D	D	D	A	D	A	A	C
Surface Clearance	D	D	B	B	D	D	C	D	B
Clearance to Detectable Depth	A	A	A	A	D	D	B	D	A

bgs = Below Ground Surface.
1 Each response-action alternative is assigned an impact evaluation score with "A" having the highest relative impact and "D" having no impact.
2 MEC factors are discussed/defined in Section 4.3.
3 Site Characteristics are discussed/defined in Section 4.4.
4 Human Factors are discussed/defined in Section 4.5.

TABLE 4-16 MEC RISK IMPACT ASSESSMENT – MAUNAWILI STREAM AREA

ALTERNATIVES[1]	MEC FACTORS[2]				SITE CHARACTERISTICS[3]		HUMAN FACTORS[4]		OVERALL RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	None	None	None	N/A	High	High	Low	High	Overall Hazard: Low
No DOD Action Indicated	D	D	D	D	D	D	D	D	D
Institutional Controls	D	D	D	D	A	D	D	D	D
Surface Clearance	D	D	D	D	D	D	D	D	D
Clearance to Detectable Depth	D	D	D	D	D	D	D	D	D

bgs = Below Ground Surface.
1 Each response-action alternative is assigned an impact evaluation score with "A" having the highest relative impact and "D" having no impact.
2 MEC factors are discussed/defined in Section 4.3.
3 Site Characteristics are discussed/defined in Section 4.4.
4 Human Factors are discussed/defined in Section 4.5.

TABLE 4-17 MEC RISK IMPACT ASSESSMENT – MAUNAWILI SITE

ALTERNATIVES[1]	MEC FACTORS[2]				SITE CHARACTERISTICS[3]		HUMAN FACTORS[4]		OVERALL RANK
	TYPE	SENSITIVITY	DENSITY	DEPTH	ACCESS	STABILITY	ACTIVITY	POPULATION	
Baseline Risk Assessment (Existing Conditions)	None	None	None	N/A	High	High	Low	High	Overall Hazard: Low
No DOD Action Indicated	D	D	D	D	D	D	D	D	D
Institutional Controls	D	D	D	D	A	D	D	D	D
Surface Clearance	D	D	D	D	D	D	D	D	D
Clearance to Detectable Depth	D	D	D	D	D	D	D	D	D

bgs = Below Ground Surface.

1 Each response-action alternative is assigned an impact evaluation score with "A" having the highest relative impact and "D" having no impact.

2 MEC factors are discussed/defined in Section 4.3.

3 Site Characteristics are discussed/defined in Section 4.4.

4 Human Factors are discussed/defined in Section 4.5.

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5.0 IDENTIFICATION OF RESPONSE ACTION ALTERNATIVES AND EVALUATION

5.1 IDENTIFICATION OF RESPONSE ACTION ALTERNATIVES

5.1.0.1 The four MEC response action alternatives identified and evaluated in this EE/CA report were developed in response to conditions identified in Chapter 4.0 by reducing the potential for public interaction with MEC. These alternatives were selected because they provide discernible variability in their potential effectiveness, implementability, and cost and they are consistent with other ordnance sites throughout the United States. These alternatives are:

- Alternative 1: No DOD Action Indicated (NDAI);
- Alternative 2: Institutional Controls (engineering controls, educational programs, legal mechanisms, and construction support);
- Alternative 3: Surface Clearance; and
- Alternative 4: Clearance to Detectable Depth.

5.1.0.2 Implementation of the NDAI alternative would involve no site-specific work. Implementation of Institutional Controls focuses on separating the public from MEC and educating the public to recognize the hazards associated with MEC. MEC clearance alternatives include implementation of technologies for efforts associated with removal of MEC from the surface and subsurface (i.e., Surface Clearance and Clearance to Detectable Depth). A combination of institutional controls and surface/subsurface clearance can also be implemented at the sites based upon the presence of UXO and the current and future land use. For example, institutional controls can be implemented to effectively manage residual risk that may remain once a surface clearance has been conducted.

5.1.1 Alternative 1: No DOD Action Indicated

Surface and subsurface MEC clearance would not occur under this alternative, which does not include any US Army (USA)-initiated actions under current or projected future land use. However, NDAI includes that the FUDS program will review any new information regarding DOD activities as it becomes available. If munitions are discovered in the future, the USACE will reconsider the status of the property. NDAI is indicative of a determination that is open to further and future review of an area.

5.1.2 Alternative 2: Institutional Controls

5.1.2.1 Institutional controls protect property owners and the public from hazards present at a site by warning of the MEC hazard and/or limiting the access or use of a site. Institutional controls include engineering controls, educational programs, legal mechanisms, and construction support. The overall effectiveness of administrative institutional controls depends entirely on local agencies and private landowner support, involvement, and willingness to enforce and maintain institutional controls implemented to eliminate public interaction with MEC.

5.1.2.2 Institutional controls can be established by federal, state, and local governmental authorities, as well as by private individuals and landowners. State and local governments, in

particular, have a legitimate interest in institutional control. Traditionally, governments have carried out this function over lands within their jurisdictions using their police power.

5.1.2.3 An Institutional Analysis was performed to identify local agencies and private landowners and determine how institutional controls could be implemented at the He'eia Training Camp and Pali Training Area. The analysis identified which, if any, of the described institutional controls were applicable and which agencies or entities would be responsible for implementing, maintaining, or enforcing the institutional controls. The following paragraphs describe in detail the four types of institutional controls. Additional details are in Appendix E.

5.1.2.4 Engineering Controls

5.1.2.4.1 Engineering controls either limit the public's access to a site or limit the potential for the public's exposure to the residual contamination that remains on a site to an acceptable level. Engineering controls can take on many forms and are often developed to meet the specific conditions of a site. Engineering controls are most effective when implemented in conjunction with other types of institutional controls (e.g., educational programs, construction support), rather than as stand-alone mechanisms.

5.1.2.4.2 When using engineering controls to limit the public's exposure to MEC, the current land use of the area around the contaminated site must be considered. For example, if residential areas, schools, or playgrounds surround the property, or if the public frequents the property, the potential for exposure and adverse consequences is increased and, therefore, a higher level of access control would be necessary. Examples of engineering controls that have historically been effective in limiting access and reducing exposure to MEC are warning signs, fences, security patrols, and soil caps.

5.1.2.4.3 Engineering controls protect against inadvertent access or exposure to the hazards associated with a site. They have the advantage of being passive (i.e., once they are in place they do not require human interaction to provide notice or protection, other than to maintain the integrity of the control). Another advantage of engineering controls is that they provide a direct deterrent to those who are the most likely to come into contact with a contaminated area by either limiting access or providing a warning describing the nature of the hazards posed by a contaminated site. Engineering controls are an important part of institutional control programs in areas where it is particularly important to protect against inadvertent access, such as in areas where it can be expected that children will be in the vicinity. Engineering controls require routine inspection and maintenance in order to remain effective.

5.1.2.4.4 Warning Signs

5.1.2.4.4.1 Warning signs can be used to provide notice and information regarding the MEC hazard present at a site. Warning signs typically provide the following information:

- Nature of the MEC hazard;
- How to avoid the MEC hazard; and
- Who to contact for additional information.

5.1.2.4.4.2 Warning signs installed on posts or warning signs affixed to existing or added fencing can be used to deter access to a site or give notice so that inappropriate uses of the site are avoided.

5.1.2.4.4.3 While warning signs on posts may not provide the physical barrier of a fence, a warning sign has the added benefit of providing information to the public concerning the nature of the MEC hazard present at a site in areas where fencing may not be an option.

5.1.2.4.4.4 Warning signs on posts can be installed at all major access points of entry and/or along the perimeter fencing of an MEC site. There has been considerable debate whether warning signs are an effective means of communicating safety hazards at an MEC site, or if they actually encourage scavenging of MEC items. Given the potential for an otherwise unwary public to access an area containing MEC, and given the current trend in legal liability cases involving injury and death, warning signs communicating a hazard to the public are useful and have been proven effective at similar MEC sites throughout the United States. The posted warning signs will inform the public of potential safety hazards and typically communicate the following information:

- Why a safety hazard exists in the context of the history of the military installation or training area;
- How to avoid encountering a MEC item (e.g., by staying within picnic or campground areas or on specified roads and trails where MEC has been removed, and by avoiding access and/or excavation in areas of suspected MEC); and
- What to do and whom to contact if an MEC item is encountered.

5.1.2.4.5 Fences

5.1.2.4.5.1 Fences are probably the most common type of engineering control that has historically been used to limit public access to an MEC site. Fences are used to restrict inadvertent public entry to a site that poses a threat to human safety. By providing access only at certain points of entry, appropriate notice can be given to all users and uses incompatible with the existing site conditions.

5.1.2.4.5.2 Fences can physically restrict access to a site and can vary in effectiveness, based upon the type and height of the fence installed. Generally speaking, the more substantial a fence, the more effective it is (i.e., a wall is more effective than a barbed-wire fence). Taller fences are considered to be more effective at restricting access than shorter fences. Fences are considered for use in areas where MEC is present and where public access to MEC would likely result in potential exposures. At sites where the risk of MEC exposure is low, fencing may not be necessary. Generally, fences would not be appropriate as a permanent method of exposure prevention because they require continual maintenance and repair, and a determined individual can overcome even the best of fences. A barbed-wire fence affixed with warning signs is considered an effective temporary measure to restrict access to MEC sites. This type of fence would prevent individuals from inadvertently accessing a MEC site.

5.1.2.4.5.3 Barricades can be of value when closing roads or trails that access MEC sites. Barricades consist of locking gates that limit or preclude public access. Other forms of

barricades, including rock barriers or densely vegetated areas, can also be effective in blocking road/trail access. As with fences, barricades are generally more effective when combined with warning signs.

5.1.2.4.6 Security Patrols

Security patrols can be instituted by the entity having jurisdiction over an individual area and would involve law enforcement authorities or private security firms. To be effective, regulations regarding site access would have to be implemented and enforced by the entity having jurisdiction over that area. Private entities could restrict trespassing through a combination of local police and private security firms.

5.1.2.4.7 Soil Caps

Placing a cap on a contaminated site by covering it with concrete, asphalt, or clay has been proven to be an effective physical barrier to public exposure to certain types of residual contamination. Such an engineering control would have definite application for certain MEC-contaminated sites, if the cap were combined with a restriction on any future excavation at the site. By combining the engineering control of the cap with the legal restriction of limiting future use, the risk of the public coming into contact with MEC is virtually eliminated.

5.1.2.4.8 Educational Programs

5.1.2.4.8.1 The use of educational programs is an effective strategy to manage and reduce residual risk from public exposure to MEC. An educational program may take on many forms and be easily tailored to meet the specific needs of a site and the surrounding community. Examples of educational programs include formal education seminars and public notices.

5.1.2.4.8.2 Educating the local community is an extremely important part of any institutional control program. 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, and developers) and can be performed as often as necessary to educate those that are at greatest risk of exposure to MEC. Educational efforts constitute a stand-alone institutional control, but can also improve the effectiveness of other controls that are part of the overall program.

5.1.2.4.9 Formal Education Seminars

Formal education seminars may include periodic community education classes. The classes can be given to a number of different audiences including open public forums, local government and/or regulatory personnel, emergency response personnel, property owners, private developers and real estate agents, children at the local schools, and local business personnel who may have laborers who work in the area of concern. The training seminars can be tailored to meet the specific interests/concerns of the audience, and can be an effective method to "spread the word" as to the nature and extent of the hazards associated with MEC and the precautions to be taken in the event that a person comes in contact with MEC. The training classes may either be provided by personnel knowledgeable in the specific conditions of the site or through the distribution of MEC safety awareness training videos to local organizations and public libraries. In order to be

effective, educational seminars need to be continual (e.g., every six months) so that the audience of concern does not forget or become complacent about the hazards associated with MEC. Formal education seminars that are consistently performed are successful in educating new homeowners and visitors to an area.

5.1.2.4.10 Public Notices

The local community can be educated through implementation of a wide-ranging public notice campaign that may include mass mailings of informational pamphlets, display case installation, public service announcements on local radio or television stations, or periodic notices in local newspapers. This type of educational media will serve to educate the local community and visitors to the area. One method that has been used at sites with a high public turnover rate is to notify any new residents/businesses to the area once they have contacted the local utility to start a new service. Once the utility company has received the request for the new service, they can include in their initial mailing to the new customer a brochure outlining the site-specific hazards and what should be done in the event of an emergency. The following paragraphs provide details concerning various types of public notices that can be used to educate and inform local communities.

5.1.2.4.11 Real Estate Environmental Notices

Some state codes require real estate disclosure statements on residential real property proposed for transfer. These state codes usually require disclosure of matters relating to the physical condition of the property to be transferred, including the known presence of hazardous materials or substances.

5.1.2.4.12 Community Awareness Meetings

Community awareness meetings are generally held when significant site remediation documents that address MEC issues are released to the public and provide information regarding:

- MEC previously recovered at the site;
- Options available to remove ordnance (if required) and enhance public safety;
- How this information was evaluated in the EE/CA report; and
- Recommendations being made to address ordnance issues at a particular site.

5.1.2.4.13 Media Advertisements and Information Spots

Media advertisements and information spots can be important tools in promoting public awareness regarding MEC issues at a site. Media advertisements can include newspaper, radio, and television interviews. Although the media is generally limited in terms of the depth of information portrayed, it does have the advantage of reaching the widest possible audience.

5.1.2.4.14 Display Cases

Display cases can be positioned throughout the area of concern with emphasis on local public gathering areas (e.g., post offices, schools, libraries, and shopping centers). Display cases can showcase the types of ordnance used at the site, provide visual schematics/photographs that can be used to educate the public concerning the hazards associated with MEC, and provide information concerning whom to contact if MEC is found. Display cases typically provide a distribution slot for informational pamphlets/fact sheets that can be picked up by the public.

5.1.2.4.15 Informational Pamphlets, Fact Sheets, and Letter Notifications

Informational pamphlets and fact sheets can be developed and distributed to support safety briefings and/or speaking engagements and are also effective as stand-alone educational materials. Informational pamphlets and fact sheets can be developed to warn the public of the hazards of ordnance in the historical context of former military operations that occurred at a MEC site. Informational pamphlets and fact sheets can be mailed to residents in the vicinity of an MEC site or they can be distributed from central locations such as libraries, or posted on educational display cases positioned at strategic locations throughout the site (e.g., hiking trailheads and local libraries). In that regard, an effective informational pamphlet or fact sheet will contain photographs and/or drawings of typical ordnance items that the public might encounter and a map showing previous locations of recovered MEC. A telephone number for the appropriate local authority is typically included in the informational pamphlet or fact sheet. Letter notifications (generally distributed via US certified mail) are also an effective means of informing local property owners of the results of the EE/CA investigation and the types of ordnance that have been found surrounding their property. Letter notifications can be mailed to each landowner within a MEC site to inform them of the EE/CA investigation results and the proposed recommendations for the area. The initial distribution and development of educational materials would be funded by the USACE. Long-term implementation would be the responsibility of landowners and local agencies.

5.1.2.4.16 Internet

As the general public's use of the Internet increases, a Web site can become a valuable public information tool, allowing the reader greater proficiency in understanding MEC issues. Web sites are accessible through public Web browsers in local libraries and educational institutions and via Web browsers in the home or workplace. Use of a Web site has several benefits: a large amount of information can be posted (e.g., public notices, news releases, fact sheets, maps, reports, survey results) and the information can be updated on a regular basis.

5.1.2.5 Legal Mechanisms (Local Government Control)

5.1.2.5.1 Specific legal approaches including easements, restrictive covenants, reversionary interests, zoning, permitting, siting restrictions, and overlay zoning have been used for many purposes other than limiting exposure to environmental risks such as MEC. Legal mechanisms are particularly effective types of institutional controls because:

- Other than periodic monitoring necessary for enforcement, legal mechanisms do not require the physical maintenance that is necessary for other types of institutional controls, such as engineering controls; and
- Title recording systems, local planning commissions, and other administrative systems and associated staff already exist in most jurisdictions and can be used to implement a legal mechanism as part of an institutional control program. Additional funding may be required for the administering agency depending on the extent of additional effort required due to the implementation of an institutional control program at a site within their jurisdiction.

5.1.2.5.2 Legal mechanisms require constant oversight and support in order to remain effective. Administrative programs to implement and enforce legal mechanisms are already in place;

however, they are sometimes not effective in protecting against inappropriate land use and should be used in conjunction with other programs. Legal mechanisms are categorized into two broad areas; i.e., proprietary controls and local government controls.

5.1.2.6 Proprietary Controls (Local Government Control)

5.1.2.6.1 Proprietary controls are those institutional controls that are associated with ownership of the land and are, therefore, often included in the deed for the land. Proprietary controls are classified as either non-possessory or possessory controls.

5.1.2.6.2 Non-possessory proprietary controls means the holder of these interests has a right to use or restrict use of a piece of land, but does not have the right to actually possess it. Examples of this type of control include easements, restrictive covenants, and reversionary interests.

5.1.2.6.3 A possessory proprietary control means that the holder of the control retains either a full or partial interest in the future use of the land. Such controls can be achieved either by retaining ownership or by retaining a major share in a joint ownership of a property through a limited partnership with others. Such programs have been used both in the private sector, as well as by the government, where the holder of the possessory proprietary control wishes to retain some say in the future use of a property without having the responsibility of complete and total ownership. Limited partnerships are an example of a possessory proprietary control that has been used in the past to limit future land use.

5.1.2.6.4 Easements

5.1.2.6.4.1 The most common non-possessory proprietary control is known as an easement. An easement is an interest in a piece of land that entitles its holder to use the land or restrict the use of the land owned by another. Easements may be categorized as appurtenant or gross, affirmative or negative, or statutory.

- Appurtenant Easement. An easement is considered appurtenant if the holder is the owner of nearby land that benefits from the easement. For example, this occurs when a neighbor is allowed to walk across another person's property to access the beach.
- Gross Easement. A gross easement is one in which the holder, usually a company or public entity, does not own the land, but has the ability to use it. For example, this occurs when a gas company is allowed to lay a gas line on another person's property.
- Affirmative Easement. An affirmative easement allows the holder of the easement to use the land in a way that otherwise they could not. This is the most common type of easement.
- Negative Easement. A negative easement prohibits the use of the land in a manner that would otherwise be legal. An example of a negative easement is the owner of a hazardous waste landfill who is prohibited from developing the property for another use because of the current use of the site.
- Statutory Easements. Some states have developed statutory easements, including conservation easements, which restrict the property use to one that is compatible with conservation of the environment or scenery. In the particular case of sites contaminated with MEC, an easement may be enacted that would restrict the new

property owner to land uses that are compatible with the level of MEC clearance performed during the removal action.

5.1.2.6.4.2 As with all proprietary controls, the effectiveness of an easement to control appropriate use of a property containing residual contamination is dependent on the compliance of the property owner with the easement. Generally, only the holder of an easement has the power to enforce compliance with the terms of the easement. This requires that the holder remain aware of activities at the property and is kept informed of any proposed changes in use of the property. If the holder of the easement (e.g., DOD) does not act on a land use violation once it has been identified, third parties (such as local or county governments) do not have the authority to enforce the easement.

5.1.2.6.5 Restrictive Covenants

5.1.2.6.5.1 A restrictive covenant, which is also known as a deed restriction, can be used to prohibit certain types of development, use, or construction on a piece of land where residual contamination does not allow unrestricted use of the property. Under a restrictive covenant, legal action can be taken to enforce the restriction if the new property owner does not abide by the development restrictions imposed at the time of sale or lease. A restrictive covenant may be either affirmative or negative. An example of an affirmative restrictive covenant would be a landowner that is required to do something that they would otherwise not be required to do. An example of a negative restrictive covenant would be a landowner that may not do something that they are otherwise normally free to do.

5.1.2.6.5.2 Restrictive covenants tend to be a less desirable method of control than easements. Restrictive covenants have been controversial in the past because many were intended to maintain elite neighborhoods and viewed to be racist in their intent. For this reason, many restrictive covenants have been removed by judicial order. In addition, the variability of state property laws tends to be greater for restrictive covenants than for easements, making them more difficult to administer. In general, a covenant does not give the holder the right to enter and inspect the property to ensure that the owner is complying with the covenant. Therefore, an easement or some other agreement should also be agreed upon at the time a covenant is implemented as an institutional control.

5.1.2.6.6 Reversionary Interests

This type of proprietary control is also known as "future estates." The deed establishes certain conditions that would cause the property to revert back to the original owner if the conditions cited in the reversionary interest are violated. As such, this type of institutional control is like an easement, but with the added provision that if the terms of the institutional control are violated, the property will revert back to the original owner (the holder of the reversionary interest). The existence of a reversionary interest does not, in itself, prevent incompatible land uses, but it does provide the means for stopping the incompatible activities by reverting ownership rights to the original owner if a violation were to occur. Reversionary interests have been effectively used in the past to control future land use on sites that contain environmental contamination. Although a reversionary interest does not prevent inappropriate use of a property, it can serve to halt such activities by reacquisition of the land by the holder of the reversionary interest.

5.1.2.7 Other Local Government Controls

Local government controls provide potential avenues for the implementation of institutional controls at sites that are contaminated with MEC. Controls on land use that local governments have the power to impose and enforce include zoning restrictions, permitting programs, siting restrictions, and overlay zoning.

5.1.2.7.1 Zoning Restrictions

The primary method of locally controlling land use is through the development of zoning ordinances and community master plans. A typical zoning program geographically divides an area into zones with different regulations written to apply to each zone. The regulations vary between zones but apply equally to all properties within a zone. Generic zoning categories include residential, commercial, and industrial. The zoning restrictions that have been developed by the local zoning board are often posted in a master plan that lays out the type of land use that is allowed in a particular area.

5.1.2.7.2 Permitting Programs

5.1.2.7.2.1 Permitting programs are another means that local governments have to limit land use. In establishing a permit program, the permitting agency determines specific conditions that must be met before a certain use or action is allowed on a property. Existing permit programs include building permits, water/sewer connection permits, and state well drilling permitting systems that have been developed to protect the quality and use of groundwater. 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 (e.g., 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 safety and the environment because of residual contamination that remains on a property.

5.1.2.7.2.2 The general protection standard for construction safety in MEC sites identified in this EE/CA report is to maintain a two-foot buffer (which will have been subjected to MEC excavation and clearance) between the anticipated level of construction disturbance and any potential MEC that may lie below the disturbed site. For this reason, and because of the potential for excavation to occur in small, focused areas, construction support has been identified. Construction support would require anomaly detection and excavation similar to that of a Clearance to Detectable Depth. Each site where construction support is contemplated should be scrutinized to determine whether there is a reasonable potential to expect MEC at depth.

5.1.2.7.3 Siting Restrictions

Siting restrictions have historically been used to limit land use in areas subject to natural hazards such as earthquakes and floods. This type of control has also been used to protect natural resources from development (such as with the existing wetlands program). Several states and local governments also have substantial siting restrictions in place that limit the future development of properties within their jurisdiction.

5.1.2.7.4 Overlay Zoning

5.1.2.7.4.1 Siting restrictions may be combined with local zoning ordinances or master plans to establish an effective institutional control. This practice is known as "overlay zoning." When using overlay zoning, the specific siting restriction is used as an overlay on the local government's master plan, thereby highlighting any discrepancies between the two. In the case of sites contaminated with MEC, the location of the site may be identified on an overlay of the local zoning map or master plan. The overlay would serve to notify those involved in land use planning of the hazards and land use restrictions associated with the site.

5.1.2.7.4.2 A MEC overlay could be applied to any land use at the sites, allowing the county to regulate development in consideration of potential MEC issues. For example, if an area identified as an MEC site fell within a commercial land use, that area could be identified as "commercial" with an "MEC overlay" designation. For a MEC overlay to be effective, it should define the depth and extent to which MEC clearances have occurred at the site. The county could then stipulate the conditions under which excavation or development could occur.

5.1.2.7.4.3 In practice, construction support could be implemented as an "overlay" applied to those areas at the sites where construction may occur. For example, a portion of the area may be designated for residential development or a parking lot requiring cut and fill. Here, an overall recommendation for a MEC clearance throughout the site may be made (to address public access). In portions of the area where cut and fill would be required, deeper MEC clearances could be specifically designated in the areas to be cut. The same concept could be applied to a deep utility corridor that may transect the area.

5.1.2.8 Construction Support

5.1.2.8.1 Construction support is UXO support where construction would occur. Construction support is an option in areas that have not been recommended for a subsurface clearance. These are areas where there is a very low probability of subsurface ordnance being present (i.e., areas with little or no MEC that are recommended for institutional controls only).

5.1.2.8.2 UXO support during construction activities may require the following:

- UXO safety support; or
- A complete subsurface clearance response, depending on the probability of encountering UXO.

5.1.2.8.3 If the probability of encountering UXO is low, only UXO safety support will be required. Once a determination is made that the probability of encountering UXO is moderate to high (e.g., MEC was employed or disposed of in the area of concern), UXO-qualified personnel must conduct a Clearance to Detectable Depth of the known construction footprint and remove all discovered UXO. The level of effort for construction support is both site specific and task specific and will be determined on a case-by-case basis.

5.1.2.8.4 Typically, standard MEC excavation operating procedures associated with construction support are similar to those described in Engineer Pamphlet (EP) 75-1-2.

Construction support would likely be implemented at the time of construction. It should be noted that construction support should be initiated if the following two conditions exist:

- The area identified for construction will be excavated deeper than that anticipated for the land use; and
- MEC is suspected in the area of anticipated ground disturbance associated with construction.

5.1.2.8.5 UXO Safety Support

A UXO team consisting of a minimum of two qualified UXO personnel (one UXO Technician III and one UXO Technician II) is normally used to provide safety support during construction activities in areas potentially contaminated with UXO. The UXO team reviews any archival information available regarding the area of the proposed construction activities. If possible, the UXO team determines the probable types of UXO that may be encountered and specific safety considerations. The UXO team meets with on-site management and construction personnel and conducts a general work and safety briefing prior to commencement of any on-site activities. The UXO team then monitors all excavation activities in areas potentially contaminated with UXO. One member of the team should be positioned to the rear and upwind of the excavation equipment for continuous visual observation of activities. If the construction contractor unearths or otherwise encounters suspect UXO, all excavation activities are stopped. The UXO team then assesses the condition of the MEC item to determine if disposal by means of explosive detonation is required. Once UXO has been encountered in an excavation, no further excavation is permitted at that location until the UXO item has been removed.

5.1.2.8.6 Subsurface Clearance of Construction Footprint

5.1.2.8.6.1 The subsurface clearance process requires close coordination among on-site management personnel of the CEPOH, the construction contractor, and the UXO contractor. The UXO team should physically preview the actual construction footprint with other on-site management personnel and discuss visual observations and potential areas of concern. Subsurface clearance actions must be accomplished in strict accordance with the approved Work Plan, Site-Specific Health and Safety Plan, Explosives Safety Plan, and Explosives Safety Submission (if required).

5.1.2.8.6.2 The UXO team should be familiar with these plans and should review any archival information available regarding the area of the proposed construction activities. If possible, the UXO team should determine the probable types of UXO that may be encountered and specific safety considerations. Prior to commencing subsurface clearance activities, the UXO team should provide a general work and safety briefing to all on-site personnel.

5.1.2.8.6.3 In the event subsurface utilities are suspected in an excavation area, the UXO team must attempt to verify their location. All located utilities should be marked by paint, pin flags, or other appropriate means to visually delineate their approximate subsurface routing.

5.1.2.8.6.4 Area preparation may require reduction and/or removal of vegetation that may impede or limit the effectiveness of subsurface clearance actions. Vegetation reduction/removal may be accomplished through manual removal, mechanical removal, controlled burning, or

defoliation. A surface clearance may be required to remove any existing MEC from the surface of the work area. All MEC, MD, and metallic scrap (cultural debris) that may interfere with a subsurface geophysical survey will be removed from the surface of the work area and staged for later disposal. A subsurface geophysical survey will be conducted to identify and locate all anomaly sources. Subsurface geophysical surveys may be completed using detection instrumentation with real time or post-processing identification and discrimination techniques.

5.1.2.8.6.5 Anomaly excavation operations are required to intrusively investigate and identify the source of all anomalies located during the subsurface geophysical survey of the construction footprint. During excavation operations, only those personnel deemed necessary for the operation shall be within the exclusion zone. Typically, activity-essential personnel will manually complete anomaly excavations of less than one foot using a shovel (or similar hand tool). If an anomaly source is deeper than one foot, earth-moving machinery can be used to assist in excavation efforts unless site constraints or accessibility restrict or prohibit use. Earth-moving machinery should not be used to excavate within 12 inches of an anomaly source. When an anomaly excavation gets within approximately 12 inches of an anomaly source, the excavation should be completed manually with a shovel (or similar hand tool).

5.1.2.8.6.6 After the source of the anomaly is identified and removed, an approved geophysical instrument will be used to validate the process. If the geophysical instrument does not continue to detect an anomaly, then the excavation may be backfilled and restored in accordance with contract requirements. Estimated costs for implementation of various types of Institutional Controls, including construction support, are provided in detail in Appendix F.

5.1.2.8.7 Implementation of Construction Support

5.1.2.8.7.1 Construction support must be coordinated in advance of construction activities with the CEPOH office. Property owners will be required to provide a to-scale plan map showing the location and footprint of the planned construction, as well as a description of the activity and the anticipated depth of intrusion (e.g., a footing for a garage with a two-foot below grade excavation; construction of a below-ground swimming pool with a planned nine-foot below-ground surface excavation).

5.1.3 Alternative 3: Surface Clearance

5.1.3.1 This MEC response action alternative includes location and removal of ordnance from the ground surface. For surface clearance, teams of UXO-qualified personnel use visual identification, aided by hand-held metal detectors, to search for ordnance. The surface clearance would be conducted by establishing a system of grids within a series of sweep lanes. These lanes are typically five feet in width or narrower, depending upon the geophysical instrumentation used. Should metal be detected, the area would be excavated by hand to the extent necessary to fully identify and remove/destroy any *partially* exposed MEC.

5.1.3.2 UXO recovered during the surface clearance would be detonated in place if not safe to move to an on-site area specifically designated for destruction of recovered UXO items. Additionally, surface clearance and detonation of UXO would occur within public safety exclusion zones, which vary in size, depending upon the maximum fragmentation range of the

UXO item recovered. Munitions debris would be taken off site and turned in to a scrap metal recycler for demilitarization and disposal.5.1.3.3 The average cost per acre to perform a Surface Clearance of MEC at the He'eia Combat Training Area and Pali Training Camp is provided in Appendix F.

5.1.4 Alternative 4: Clearance to Detectable Depth

5.1.4.1 This MEC response action alternative includes the subsurface excavation and clearance of all detected ordnance items using geophysical instrumentation within a specified MEC site. Risk reduction benefits and costs increase as the depth of clearance increases. Clearance to Detectable Depth removes detectable hazards and provides effective risk reduction for areas subject to both surface and limited intrusive activities (e.g., recreational activities and fence post installation). Clearance to Detectable Depth would require teams of UXO-qualified personnel to excavate all detected subsurface anomaly sources and dispose of all UXO items discovered. Geophysical methods would be used to map and identify anomalies in the proposed clearance areas. The geophysical methods that would be used to detect subsurface ordnance for a clearance action would be very similar to those employed for the EE/CA field investigation. The subsurface source locations of anomalies identified through processing of the geophysical data would be located (surveyed) and marked with pin flags. UXO-qualified personnel would intrusively investigate the marked locations to identify the sources of the anomalies. Depending upon the amount of ordnance expected on the surface, a surface clearance might be necessary prior to geophysical mapping and subsequent removal of detectable ordnance. UXO recovered during the intrusive investigation would be relocated if safe and moved for disposal, or detonated in place after establishment of a public safety exclusion zone sized to provide a safe fragmentation distance from the item being detonated.

5.1.4.2 Clearance to Detectable Depth does not address unlimited intrusive activities because no detection, mapping, and clearance of MEC based on above-ground-deployed detection methods can be 100 percent effective. Intrusive activities requiring excavations below the level of MEC clearance in known MEC areas should be evaluated and, if necessary, performed only in conjunction with construction support.

5.1.4.3 The average cost per acre to perform a Clearance to Detectable Depth the He'eia Combat Training and Area Pali Training Camp is provided in Appendix F.

5.1.4.4 Clearance to Depth may disturbe an areas natural state and precludes certain activities during intrusive operations. It usually requires the removal of vegetation sufficient to conduct the geophysical survey. This may entail removing all vegetation up to three inches in diameter to a height of six inches above the ground or no vegetation removal if the ground surface can be seen and is sufficiently clear. Intrusive operations sometimes disturbed archeological site, however, archeologists do check the area prior to and after excavation. Safety zones are establish, which prohibit intrusive operations if non-essential personnel (the general public) are within a specified distance.

5.2 MEC RESPONSE ACTION ALTERNATIVE EVALUATION CRITERIA

5.2.0.1 An EE/CA is a non time-critical decision process by which the most applicable, technically feasible, and socially acceptable alternatives (including No DOD Action Indicated) for remediating a site are evaluated for their effectiveness, implementability, and cost.

5.2.0.2 Removal of all MEC is not considered practicable, given technical limitations and cost considerations. In addition, permanent exclusion of the public from areas that have the potential to contain MEC is not feasible, given private land ownership, future demands for use of the land, and the potential for entry, inadvertent or intentional, to the former He'eia Combat Training Area and Pali Training Camp. The purpose of an EE/CA is to evaluate potential ordnance risk and develop alternative plans of action.

5.2.0.3 The chain of events that can result in a potential MEC incident causing injury or death involves many steps and may be viewed as a process flow. The chain is:

MEC present	→	MEC in a sensitive state or configured to detonate	→	Public access (including excavation) → Individual interaction with MEC (potential MEC incident)

5.2.0.4 Breaking or weakening this chain of events is a major focus for developing alternatives that limit public interaction with MEC. The steps in this process are:

- Document available information pertaining to the nature and extent of MEC;
- Identify areas where further investigation is warranted;
- Conduct a field investigation of the project site to statistically characterize the nature and extent of MEC;
- Provide decision criteria for evaluating and recommending the most feasible alternatives; and
- Utilize proven technologies and management strategies (long- and short-term) to manage MEC in a manner that will break or weaken the chain of events identified above.

5.2.0.5 Using these steps, four MEC response action alternatives were considered for the purpose of this EE/CA. Detailed descriptions of these alternatives are presented in Section 5.3.

5.2.0.6 This section describes the evaluation criteria and process used to determine the most appropriate MEC response actions for the He'eia Combat Training Area and Pali Training Camp. The results of the qualitative risk analysis in Chapter 4.0 are used as a basis for the evaluation of the four MEC response action alternatives. The evaluation and determination of the most appropriate MEC response action alternative for each OERIA evaluation area is used to form the basis for the specific recommendations made for the He'eia Combat Training Area and Pali Training Camp (Chapter 7.0).

5.2.0.7 For each OERIA evaluation area, MEC response action alternatives are first evaluated in terms of their effectiveness, implementability, and cost. The purpose of this evaluation is to

identify the most appropriate MEC response action alternatives to render each evaluation area compatible with its current and projected future land use. For effectiveness, the ranking considers protection of human safety, compliance with applicable or relevant and appropriate requirements (ARARs), and long- and short-term effectiveness. For implementability, the alternatives are ranked by technical and administrative feasibility, agency and community acceptance, and availability of services and materials. Cost considerations are made using detailed costing assumptions and costing backup (Appendix F). The exception is the NDAI alternative, which has no associated cost.

5.2.1 Effectiveness

Effectiveness is a measure of an alternative's ability to reduce the potential for exposure to or interaction with MEC. It is generally a measure of an alternative's ability to meet the criteria of protecting public safety and the identified ARARs. Effectiveness is also evaluated in terms of long-and short-term practicability. A concise interpretation of these criteria is as follows:

5.2.1.1 Protection of Human Safety

5.2.1.1.1 This criterion is a measure of how well the alternative reduces the public's exposure to and interaction with MEC, the reduction in terms of possible injury or death to humans, and protection of the environment. As such, it considers the following:

- The net reduction in MEC;
- The estimated quantity of residual MEC;
- The expected depth of residual MEC;
- The potential exposure pathway between humans (considering future land use) and MEC; and
- The potential for an individual to interact with any MEC once an exposure occurs.

5.2.1.1.2 Effectiveness rankings are based mainly upon whether MEC was recovered during the EE/CA field investigation (or during previous investigations) and the probability of exposure to MEC based on population data and current and future land uses. For Institutional Controls (Alternative 2), it is difficult to account for the benefit in reduction of exposure as a result of display board placement, community awareness outreach programs, or educational media. It has been assumed that the effectiveness of Institutional Controls in protecting human safety would be greater than NDAI (Alternative 1), but less than Surface Clearance (Alternative 3) or Clearance to Detectable Depth (Alternative 4).

5.2.1.2 Compliance with ARARs

5.2.1.2.1 This criterion is a measure of how well the alternative meets the identified chemical, action, and location-specific ARARs (Federal, state, and local). Currently, no chemical-specific ARARs exist for ordnance sites.

5.2.1.2.2 Recommended MEC response actions will be conducted in accordance with appropriate regulations. An analysis of the ARARs for the He'eia Combat Training Area and Pali Training Camp is presented in Section 5.4.

5.2.1.3 Long-Term Effectiveness

This criterion is a measure of how well the MEC response action alternative protects human safety once it has been implemented. The remaining potential for exposure or interaction with UXO is characterized by the following factors:

- The magnitude of potential exposures and interaction following implementation of the selected alternative;
- The permanence of the exposure and interaction reduction due to implementation of the selected alternative; and
- The reliability of the controls and maintenance measures in managing residual MEC following implementation of the selected alternative.

5.2.1.4 Short-Term Effectiveness

This criterion is a measure of how well the MEC response action alternative meets the exposure and interaction reduction objectives during its implementation. This includes:

- The ability of the alternative to reduce risk during implementation;
- The potential for adverse effects on the environment during the alternative's implementation;
- The time required to implement the alternative; and
- The potential for adverse effects on humans, including the community and personnel involved in implementation of the alternative.

5.2.2 Implementability

Implementability is a measure of whether an MEC response action alternative can be physically and administratively implemented, such as the ability to construct, excavate, or demolish. It is also a measure of the availability of the services and materials needed to implement the alternative. Other considerations regarding implementability include local agency and community acceptance of a given alternative. A concise interpretation of the criteria governing implementability is as follows:

5.2.2.1 Technical Feasibility

This criterion refers to:

- The reliability of the action with regard to implementation;
- The actual ease of field implementation (e.g., construction, clearance action);
- The ease in undertaking future actions related to the initial undertaking; and
- The ability to monitor the effectiveness of the action.

5.2.2.2 Administrative Feasibility

This criterion is a measure of the ease with which an alternative can be implemented in terms of permits and rights-of-entry, coordination of services to support the action (e.g., legal services), or the arrangement of delivery or security services.

5.2.2.3 Availability of Services and Materials

This criterion is a measure of the availability of goods and services needed to support implementation of the alternative. Examples of this criterion include the availability of specialized personnel (i.e., UXO-qualified technicians) and equipment (e.g., geophysical

instruments), availability of explosives for demolition purposes, availability of a suitable disposal facility for the ordnance scrap (i.e., proximity of local scrap metal recycling facility), and the condition of the existing infrastructure to allow ingress and egress of personnel and material to and from the project site.

5.2.2.4 Local Agency Acceptance

This criterion deals with the acceptance of the alternative by applicable state, county, and city agencies, as expressed by representatives under the agency's authority. Rankings of alternatives under this criterion are marked under the "Agency Acceptance" column in the tables in Section 5.3 showing rankings of implementability. Local agency acceptance has been established based on information gathered during several Restoration Advisory Board (RAB) meetings, public meetings, and interaction with local agencies to date, and may be updated at any time during the EE/CA review process.

5.2.2.5 Community Acceptance

This criterion relates to the degree of acceptance of the alternative by the community, including owners of property adjacent to the area. Public sentiment expressed during town hall meetings, public workshops, city council or county supervisor meetings, or institutional analysis is a means of determining community acceptance. Rankings of alternatives under this criterion are marked under the "Community Acceptance" column in the tables in Section 5.3 showing rankings of implementability. Community acceptance has been established based on information gathered during several RAB meetings, community meetings, and interaction with private landowners to date, and may be updated at any time during the EE/CA review process.

5.2.3 Cost

5.2.3.1 The cost of implementing each of the MEC response action alternatives has been estimated. The exception is NDAI, which has no associated costs. A detailed summary of these costs and costing assumptions is presented in Appendix F. For Institutional Controls (Alternative 2), the costs include those associated with access controls (e.g., warning signs), community awareness outreach programs (e.g., display cases, periodic community awareness meetings, informational pamphlets, landowner notifications, MEC safety awareness training video), construction support, and administration and maintenance costs associated with these activities. For Surface Clearance (Alternative 3) and Clearance to Detectable Depth (Alternative 4), the costs are one-time capital costs and do not include monitoring for sensitive species or habitat restoration.

5.2.3.2 Examples of capital costs include those costs incurred by the UXO-qualified contractor for conducting the field activities (i.e., surface clearance, geophysical mapping, intrusive MEC sampling, and demolition activities) associated with implementing a subsurface clearance. Examples of operation and maintenance costs would include repairing and replacing perimeter signs and educational display boards over a specified length of time.

5.2.3.3 The benefit of the investment in reducing risk is also considered when ranking the MEC response action alternatives. This involves identifying the overall reduction in risk to the public versus the cost of implementing the alternative. For example if two alternatives provide an equal or comparable amount of protection, the less expensive alternative would provide the

greatest benefit for the dollars spent and, therefore, would be ranked as the better alternative in terms of cost benefit.

5.2.4 Example of Alternative Evaluation Process

5.2.4.1 Table 5-1 provides an example evaluation of the four MEC response action alternatives, as presented below. As shown in Table 5-1, each alternative is ranked according to the criteria presented in Sections 5.2.1, 5.2.2, and 5.2.3. The alternative that is determined to be the best alternative when assessed with the criteria receives a numerical ranking of 1. The second best alternative receives a numerical ranking of 2, and so forth. Once the numerical ranking has been determined for the three criteria (effectiveness, implementability, and cost) for each of the four MEC response action alternatives, the overall score is determined by adding up the individual numerical rankings for each alternative. For example, NDAI received a ranking of "4" for effectiveness, a ranking of "1" for implementability, and a ranking of "3" for cost. The overall score is determined by adding these up, yielding a final score of "8." This is continued for each of the four alternatives until all of the individual rankings have been added up and the totals have been placed into the column marked "Overall Score."

TABLE 5-1 EXAMPLE OF ALTERNATIVE EVALUATION PROCESS

ALTERNATIVE	EFFECTIVENESS RANK	IMPLEMENTABILITY RANK	COST RANK	OVERALL SCORE	OVERALL RANK
1. No DOD Action Indicated (NDAI)	4	1	1	6	1
2. Institutional Controls	3	2	2	7	2
3. Surface Clearance	2	2	3	7	2
4. Clearance to Depth	1	3	4	8	3

Note: Ranking from best to worst; best = 1

5.2.4.2 Using the overall score, an overall ranking of the four alternatives is performed in the column marked "Overall Rank." The alternative with the lowest score (in this case, NDAI) is ranked 1 (best), the alternative with the second lowest score is ranked 2 (second best), and the alternative with the highest score is ranked 4 (last). As shown in Table 5-1, NDAI (Alternative 1) ranked as the best alternative (ranked 1) in this example evaluation based on its effectiveness, implementability, and cost.

5.2.4.3 Using this comparative evaluation and ranking process, an analysis of the four MEC response action alternatives was performed for each of the OERIA evaluation areas at the He'eia Combat Training Area and Pali Training Camp (Chapter 4.0).

5.3 COMPARATIVE ANALYSIS OF MEC RESPONSE ACTION ALTERNATIVES

5.3.0.1 This section describes the evaluation process for determining the most appropriate MEC response action alternatives for the He'eia Combat Training Area and Pali Training Camp. The evaluation criteria used to assess the alternatives are presented in Chapter 4.0. The results of the qualitative risk assessment and the comparative analysis of the four MEC response action alternatives in this section form the basis for the recommendations made for the He'eia Combat

Training Area and Pali Training Camp, which are presented in Chapter 7.0, Recommended MEC Response Action Alternatives.

5.3.0.2 Prior to conducting this comparative analysis of the four MEC response action alternatives, the level of hazard that MEC presents in each of the OERIA risk evaluation areas (Table 5-2) was determined (Chapter 4.0) based on current and future land uses, results of the EE/CA field investigation and previously documented reports of discovered MEC. Using this information, and the three risk factors (MEC Factors, Site Characteristics Factors, and Demographic Factors) evaluated in Chapter 4.0, the hazard level that MEC presents to the public was qualitatively assessed. The MEC hazard level for each OERIA evaluation area (Table 5-2) was used in this comparative analysis to help determine the most appropriate MEC response action alternatives for the He'eia Combat Training Area and Pali Training Camp.

TABLE 5-2 OERIA EVALUATION SITES AND HAZARD LEVEL RESULTS

OERIA EVALUATION SITE	OERIA HAZARD LEVEL
He'eia Kea	High
Kahalu'u	High
Maunawili Valley Impact Area	High
Maunawili Stream Area	Low
Maunawili Site	Low
Ulumawao	Low*

* Historical Records Review; Field Investigation Not Conducted

5.3.0.3 This chapter analyzes the effectiveness, implementability, and cost of each MEC response action alternative for the risk evaluation areas identified in Chapter 4.0. Effectiveness includes protection of human safety, compliance with ARARs, and both long- and short-term effectiveness. In terms of effectiveness, protection of human safety was evaluated first as a threshold criterion. Once the alternative met the threshold level, the evaluation was performed weighing all criteria equally. The equal weighing of criteria complies with the NCP provided that minimum threshold levels are met. Implementability includes technical and administrative feasibility, availability of services and materials, and both local agency and community acceptance. Local agency and community acceptance of the various alternatives was rated based on public meetings and interaction with local agencies and the community to date. Cost includes both the value of the investment and its corresponding benefit.

5.3.0.4 The MEC hazard level determined in Chapter 4.0 for the six OERIA evaluation areas (see Table 5-2) was used as the basis for the effectiveness rankings throughout this comparative analysis of the four MEC response action alternatives. For example, in an OERIA evaluation area with a "High" MEC hazard level, NDAI (Alternative 1) is considered an unacceptable MEC response action alternative and it is not evaluated for that specific evaluation area. NDAI would offer no risk reduction benefits in terms of protecting human safety in an area with a high MEC hazard level. For an area with a "Low" MEC hazard level, NDAI is evaluated as an acceptable MEC response action alternative and is ranked accordingly in terms of its effectiveness.

5.3.0.5 The six OERIA evaluation areas were evaluated using this comparative analysis of the four MEC response actions to help identify the best MEC response action alternative(s) to render the areas compatible with their intended disposition. Alternatives were ranked in numerical order, with "1" being the best alternative for that criterion. The alternative with the lowest ranking score is considered the best in terms of these evaluation criteria.

5.3.0.6 Institutional Controls, although evaluated as a separate MEC response action alternative in this comparative analysis, is recommended in conjunction with a surface and/or subsurface clearance action or may be recommended as a site-wide MEC response action.

5.3.1 He'eia Kea

The overall MEC hazard level in this area is high, based on the results of the EE/CA field investigation and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Using this information, the four MEC response action alternatives evaluated in this EE/CA report are comparatively analyzed in the following subsections to determine the most appropriate MEC response action alternative for He'eia Kea.

5.3.1.1 Effectiveness

Table 5-3 provides the effectiveness criteria of the four alternatives for He'eia Kea. The evaluation of each of these alternatives is presented below.

TABLE 5-3 EFFECTIVENESS CRITERIA EVALUATION – HE'EIA KEA

	EFFECTIVENESS					
ALTERNATIVE	PROTECTION OF HUMAN HEALTH	COMPLIANCE WITH ARARS	LONG-TERM	SHORT-TERM	SCORE	RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	3	1	3	1	8	1
3. Surface Clearance	2	2	2	2	8	1
4. Clearance to Depth	1	3	1	3	8	1

Note: Ranking from best to worst; best = 1.

5.3.1.1.1 Protection of Human Safety

NDAI is not considered an acceptable alternative for the He'eia Kea because it does not meet the minimum threshold criterion for the protection of human safety. Clearance to Depth is ranked 1 (most effective) in terms of human safety because of its ability to provide reduction in risk associated with MEC on the surface and subsurface in the near and distant future. Surface Clearance is ranked 2 for protection of human safety, as it is limited to a one-time reduction of MEC onsite. Institutional Controls is ranked 3 because it does not provide for the removal of MEC and is therefore less protective of human safety in a high hazard area where MD resulting from HE munitions have been located.

5.3.1.1.2 Compliance with ARARs

Compliance with the ARARs would be addressed for any activity that would require vegetation clearance, construction/installation, or intrusive activities at the site. Alternatives that require

less effort should also require less compliance with ARARs, so the Alternatives are rated appropriately with their level of effort.

5.3.1.1.3 Long-Term Effectiveness

Clearance to Depth is ranked 1 (best), as it would involve Surface Clearance followed by a Subsurface Clearance to detectable depth, making it more effective that a Surface Clearance alone, which is ranked 2. Clearance to Depth is unaffected by MEC migration and with high OERIA hazard levels it is normally the most effective alternative over the long term, because in those situations it usually provides the maximum protection of human safety. Institutional Controls are ranked 3 (last) because they would not be as effective over the long term as a removal action in reducing risks associated with the high OERIA hazard level in He'eia Kea. NDAI is not considered an acceptable alternative due to the high-risk level associated with He'eia Kea.

5.3.1.1.4 Short-Term Effectiveness

Since the OERIA hazard level of the He'eia Kea is high, Institutional Controls would be the most effective alternative over the short term because of current land use and site accessibility. Surface Clearance is ranked 2 (second) because it would take more time to implement than Institutional Controls. Clearance to Depth is ranked 3 (last) for short-term effectiveness because it would take the longest to implement. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.1.1.5 Overall Effectiveness Ranking for Alternatives 1 through 4

Based upon un-weighted OERIA scoring, Institutional Controls (alternative 2) ranks first. However, subjectively Protection of Human Health greatly outweighs the other Effectiveness criteria and ought to have greater consideration in the selection of a remedial action alternative. On that basis, Clearance to Detectable Depth (Alternative 4) is judged the most effective munitions response action alternative when considering overall effectiveness based upon its ongoing ability to greatly reduce the risk associated with the high OERIA hazard level and because it provides the most protection to the public from MEC. Because the OERIA hazard level is high and MEC is suspected to be present onsite, NDAI is not considered an acceptable alternative. Surface Clearance (Alternative 3) is ranked second, because it would provide a one-time reduction of the risk associated with MEC and reduce the risk associated with the overall OERIA hazard level, while affording less protection than Alternative 4. Due to heavy rains and the severe erosion problems within the area with MEC resurfacing and migrating down the steep slopes, Alternative 3 has a short-term effectiveness. Institutional Controls (Alternative 2) are ranked first and ought to be considered a part of any munitions response action.

5.3.1.2 Implementability

The implementability criteria evaluation consists of technical feasibility, administrative feasibility, services and materials, local agency acceptance, and community acceptance. The evaluation of each alternative based on technical and administrative feasibility considers the extent of logistical and managerial support. Service and materials evaluates each alternative in relation to the extent of personnel and supplies required. Local agency and community acceptance of an alternative is based on interviews with entities affected by activity on-site.

Table 5-4 provides the implementability criteria of the four alternatives for He'eia Kea. The evaluation of each of these alternatives is presented below.

TABLE 5-4 IMPLEMENTABILITY CRITERIA EVALUATION – HE'EIA KEA

	IMPLEMENTABILITY						
ALTERNATIVE	TECHNICAL FEASIBILITY	ADMINISTRATIVE FEASIBILITY	SERVICES AND MATERIALS	LOCAL AGENCY ACCEPTANCE	COMMUNITY ACCEPTANCE	SCORE	RANK
1. No DOD Action Indicated(NDAI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	3	9	1
3. Surface Clearance	2	2	2	2	2	10	2
4. Clearance to Depth	3	3	3	1	1	11	3

Note: Ranking from best to worst; best = 1.

5.3.1.2.1 Technical and Administrative Feasibility

NDAI is not considered an acceptable alternative due to the high hazard level associated with the site. Utilization of Institutional Controls is ranked 1 (first) as a stand-alone response, in terms of technical and administrative feasibility, as it would require less technical and administrative expertise than a stand-alone removal action. Implementation of a Surface Clearance would be the second ranked approach, after Institutional Controls only, as it involves more technical effort associated with a removal action. Although the Surface Clearance alternative requires specially trained and qualified UXO personnel and a means of MEC disposal, this alternative requires fewer resources than the lower ranked Clearance to Depth of Detection alternative. Administratively, Surface Clearance and Clearance to Depth score similarly.

5.3.1.2.2 Services and Materials

Institutional Controls is ranked 1 because the supplies and personnel needed to install and maintain warning signs and distribute informational pamphlets are less than those required for a removal action. Surface Clearance is ranked 2 because it would require qualified UXO-personnel as well as the means of disposing MEC. Implementation of the Clearance to Depth of Detection alternative would require more equipment and expertise than a Surface Clearance, in addition to UXO personnel and additional MEC disposal. Therefore, Clearance to Depth of Detection is ranked 3 for availability of services and materials. NDAI is not considered an acceptable alternative due to the moderate hazard level associated with the site.

5.3.1.2.3 Local Agency Acceptance

Based on interaction with agency representatives to date, it has been determined that local agencies are likely to consider the Clearance to Depth as the most appropriate and acceptable alternative for He'eia Kea based on the high overall hazard level and current and projected site activities. Therefore Surface Clearance is ranked 2 on its ability to reduce the risk associated with MEC on the surface. Institutional Controls are ranked 3 for this area, considering the current and projected land use for He'eia Kea and the suspected presence of MEC.

5.3.1.2.4 Community Acceptance

The community has considered that a Clearance to Depth is the most acceptable alternative in this area based on the high OERIA hazard level and the current and future land. Surface Clearance is therefore ranked 2 because the removal of surface MEC would provide a reduction in the risk associated with MEC items on the surface. Likewise, the community may favor a Surface Clearance over Institutional Controls. Institutional Controls is ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.1.2.5 Overall Implementability Ranking for Alternatives 1 through 4

Based on implementability rankings in areas of technical feasibility, administrative feasibility, services and materials required, local agency acceptance, and community acceptance, Institutional Controls is ranked 1 (most effective). Surface Clearance was ranked 2 and Clearance to Depth is ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.1.3 Cost

The cost evaluation considers evaluation of the actual cost, investment, and benefit associated with each alternative. The cost of each alternative is detailed in Appendix F. The investment criterion 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 the action. Table 5-5 provides the cost criteria of the four alternatives for He'eia Kea. The evaluation of each of these alternatives is presented below.

TABLE 5-5 COST CRITERIA EVALUATION – HE'EIA KEA

	COST				
ALTERNATIVE	**COST**	**INVESTMENT**	**BENEFIT**	**SCORE**	**RANK**
1. No DOD Action Indicated(NDAI)	$0	N/A	N/A	N/A	N/A
2. Institutional Controls	$28,461	1	3	4	1
3. Surface Clearance	$661,314	2	2	4	1
4. Clearance to Depth	$2,565,332	3	1	4	1

Note: Ranking from best to worst; best = 1.

5.3.1.3.1 Investment and Benefit

Alternatives 2, 3, and 4 are ranked equally based on their score. The Clearance to Depth of Detection alternative ranks 1 in benefit when considering the specific site conditions, and current and projected land use of the site, but 3 in investment. The cost associated with Institutional Controls is considerably lower than the two removal options and therefore receives a ranking of 1 in terms of investment and a rank of 3 when considering level of protection produced for the cost. Surface Clearance ranks 2 in investment and benefit producing the same benefit for the investment, because of the dynamic nature of the terrain and environment. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.1.4 Overall Ranking of Alternatives

The overall ranking of the different alternatives in term of their effectiveness, implementatibility and cost is presented in Table 5-6. The alternative with the lowest score would be considered best for the combined criteria. However, as discussed in paragraph 5.3.1.1.5, Protection of Human Health is weighted more than the other effectiveness factors. On that basis, although the un-weighted scoring indicates that Institution Controls have the best score, weighted scoring indicates that Clearance to Detectable Depth is the best remedial action alternative. Institutional Controls, based on the un-weighted scoring, should be considered a part of an effective munitions response action.

TABLE 5-6 ALTERNATIVE EVALUATION – HE'EIA KEA

	ALTERNATIVE				
ALTERNATIVE	**EFFECTIVENESS RANK**	**IMPLEMENTABILITY RANK**	**COST RANK**	**SCORE**	**RANK**
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	1
3. Surface Clearance	1	2	1	4	2
4. Clearance to Depth	1	3	1	5	3

Note: Ranking from best to worst; best = 1.

5.3.2 Kahalu'u (Waihe'e and Ka'alaea Valleys)

The overall MEC hazard level in this area is high, based on the results of historical documentation, the EE/CA field investigation, and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Using this information, the four MEC response action alternatives evaluated in this EE/CA report are comparatively analyzed in the following subsections to determine the most appropriate munitions response action alternative for the Waihe'e and Ka'alaea Valleys of Kahalu'u.

5.3.2.1 Effectiveness

Table 5-7 provides the effectiveness criteria of the four alternatives for Waihe'e and Ka'alaea Valleys. The evaluation of each of these alternatives is presented below.

TABLE 5-7 EFFECTIVENESS CRITERIA EVALUATION – KAHALU'U (WAIHE'E AND KA'ALAEA VALLEYS)

	EFFECTIVENESS					
ALTERNATIVE	PROTECTION OF HUMAN HEALTH	COMPLIANCE WITH ARARS	LONG-TERM	SHORT-TERM	SCORE	RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	3	1	3	1	8	1
3. Surface Clearance	2	2	2	2	8	1
4. Clearance to Depth	1	3	1	3	8	1

Note: Ranking from best to worst; best = 1.

5.3.2.1.1 Protection of Human Safety

NDAI is not considered an acceptable alternative for Waihe'e and Ka'alaea Valleys because it does not meet the minimum threshold criterion for the protection of human safety. Clearance to Depth is ranked 1 (most effective) in terms of human safety because of its ability to provide greater reduction in risk associated with MEC on the surface and subsurface in the near and distant future. Surface Clearance is ranked 2 for protection of human safety, as it is limited to a one-time reduction of MEC onsite. Institutional Controls is ranked 3 because it does not provide for the removal of MEC, and is therefore less protective of human safety in a high hazard area where MD resulting from HE munitions have been located. Additionally, the live fire impact area overlaps portions of each valley.

5.3.2.1.2 Compliance with ARARs

Compliance with the ARARs would be addressed for any activity that would require vegetation clearance, construction/installation, or intrusive activities at the site. Alternatives that require less effort should also require less compliance with ARARs, so the Alternatives are rated appropriately with their level of effort.

5.3.2.1.3 Long-Term Effectiveness

Clearance to Depth of Detection in an area with a high OERIA hazard level would be the most effective alternative over the long term, because it would provide the maximum protection of human safety and support a variety of future land use options. Surface Clearance is ranked 2 (second best), because it would be more effective over the long term than Institutional Controls, but less effective than Clearance to Depth of Detection. Institutional Controls are ranked 3 (last), because they would not be effective over the long term in reducing the risk associated with the high OERIA hazard level in the Waihe'e and Ka'alaea Valleys. NDAI is not considered an acceptable alternative due to the high OERIA hazard level associated with the valleys.

5.3.2.1.4 Short-Term Effectiveness

Institutional Controls would be the most effective alternative over the short term because of the type of MD found, and current and projected land use. Surface Clearance is ranked 2 (second) because it would take less time to implement than a Clearance to Depth of Detection, and would reduce the risk associated with surface MEC items. Clearance to Depth of Detection is ranked 3 (last) for short-term effectiveness because it would take significantly more time to implement than a Surface Clearance. This is due to the fact that Clearance to Depth of Detection requires more equipment and expertise, as well as excavation equipment for MEC removal. NDAI is not considered an acceptable alternative due to the high hazard level associated with the valley.

5.3.2.1.5 Overall Effectiveness Ranking for Alternatives 1 through 4

Based upon un-weighted OERIA scoring, Institutional Controls (alternative 2) ranks first. However, subjectively Protection of Human Health greatly outweighs the other Effectiveness criteria and ought to have greater consideration in the selection of a remedial action alternative. On that basis, Clearance to Detectable Depth (Alternative 4) is judged the most effective munitions response action alternative when considering overall effectiveness based upon its ongoing ability to greatly reduce the risk associated with the high OERIA hazard level and because it provides the most protection to the public from MEC. Because the OERIA hazard level is high and MD is present onsite, NDAI is not considered an acceptable alternative. Surface Clearance (Alternative 3) is ranked second, because it would provide a one-time reduction of the risk associated with MEC and reduce the risk associated with the overall OERIA hazard level, while affording less protection than Alternative 4. Institutional Controls (Alternative 2) are ranked first and ought to be considered a part of any munitions response action.

5.3.2.2 Implementability

Table 5-8 provides the implementability criteria of the four alternatives for Waihe'e and Ka'alaea Valleys. The evaluation of each of these alternatives is presented below.

TABLE 5-8 IMPLEMENTABILITY CRITERIA EVALUATION – KAHALU'U (WAIHE'E AND KA'ALAEA VALLEYS)

	IMPLEMENTABILITY						
ALTERNATIVE	TECHNICAL FEASIBILITY	ADMINISTRATIVE FEASIBILITY	SERVICES AND MATERIALS	LOCAL AGENCY ACCEPTANCE	COMMUNITY ACCEPTANCE	SCORE	RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	3	9	1
3. Surface Clearance	2	2	2	2	2	10	2
4. Clearance to Depth	3	3	3	1	1	11	3

Note: Ranking from best to worst; best = 1.

5.3.2.2.1 Technical and Administrative Feasibility

NDAI is not considered an acceptable alternative due to the high hazard level associated with the site. Utilization of Institutional Controls is ranked 1 (first) as a stand-alone response, in terms of technical and administrative feasibility, as it would require less technical and administrative expertise than a stand-alone removal action. Implementation of a Surface Clearance would be the second ranked approach, after Institutional Controls only, as it involves more technical effort associated with a removal action. Although the Surface Clearance alternative requires specially trained and qualified UXO personnel and a means of MEC disposal, this alternative requires fewer resources than the lower ranked Clearance to Depth of Detection Alternative.

5.3.2.2.2 Services and Materials

Institutional Controls is ranked 1 because the supplies and personnel needed to install and maintain warning signs and distribute informational pamphlets are less than those required for a removal action. Surface Clearance is ranked 2 because it would require qualified UXO-personnel as well as the means of disposing MEC. Implementation of the Clearance to Depth of Detection alternative would require more equipment and expertise than a Surface Clearance, in addition to UXO personnel and additional MEC disposal. Therefore, Clearance to Depth of Detection is ranked 3 for availability of services and materials. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.2.2.3 Local Agency Acceptance

Based on interaction with agency representatives to date, it has been determined that local agencies are likely to consider the Clearance to Depth (Alternative 4) as the most appropriate and acceptable alternative for the Waihe'e and Ka'alaea Valleys based on the high overall hazard level;
Surface Clearance is ranked 2 based on its ability to reduce the risk associated with MEC and Institutional Controls are ranked 3 for this area, considering the current and projected land use of Waihe'e and Ka'alaea Valleys within Kahalu'u.

5.3.2.2.4 Community Acceptance

The community has considered that a Clearance to Depth is the most acceptable alternative in this area based on the high OERIA hazard level and the current and future land. Surface Clearance is therefore ranked 2 because the removal of surface MEC would provide a reduction in the risk associated with MEC items on the surface. Likewise, the community may favor a Surface Clearance over Institutional Controls. Institutional Controls is ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.2.2.5 Overall Implementability Ranking for Alternatives 1 through 4

Based on implementability rankings in areas of technical feasibility, administrative feasibility, services and materials required, local agency acceptance, and community acceptance, Institutional Controls is ranked 1 (most effective). Surface Clearance was ranked 2 and Clearance to Depth is ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.2.3 Cost

The cost evaluation considers evaluation of the actual cost, investment, and benefit associated with each alternative. The cost of each alternative is detailed in Appendix F. The investment criterion 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 the action. Table 5-9 provides the cost criteria of the four alternatives for the Waihe'e and Ka'alaea Valleys. The evaluation of each of these alternatives is presented below.

TABLE 5-9 COST CRITERIA EVALUATION – KAHALU'U (WAIHE'E AND KA'ALAEA VALLEYS)

	COST				
ALTERNATIVE	COST	INVESTMENT	BENEFIT	SCORE	RANK
1. No DOD Action Indicated (NDAI)	$0	N/A	N/A	N/A	N/A
2. Institutional Controls	$14,230	1	3	4	1
3. Surface Clearance	$212,380	2	2	4	1
4. Clearance to Depth	$511,457	3	1	4	1

Note: Ranking from best to worst; best = 1.

5.3.2.3.1 Investment and Benefit

Alternatives 2, 3, and 4 are ranked equally based on their score. The Clearance to Depth of Detection alternative ranks 1 in benefit when considering the specific site conditions, current and projected land use of the site, but 3 in investment. The cost associated with Institutional Controls is considerably lower than the two removal options and therefore receives a ranking of 1 in terms of investment and a rank of 3 when considering level of protection produced for the cost. Surface Clearance ranks 2 in investment and benefit producing the same benefit for the investment, because of the dynamic nature of the terrain and environment. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.2.4 Overall Ranking of Alternatives

The overall ranking of the different alternatives in term of their effectiveness, implementatibility and cost is presented in Table 5-10. The alternative with the lowest score would be considered best for the combined criteria. However, as discussed in paragraph 5.3.2.1.5, Protection of Human Health is weighted more than the other effectiveness factors. On that basis, although the un-weighted scoring indicates that Institution Controls have the best score, weighted scoring indicates that Clearance to Detectable Depth is the best remedial action alternative. Institutional Controls, based on the un-weighted scoring, should be considered a part of an effective munitions response action.

TABLE 5-10 ALTERNATIVE EVALUATION – KAHALU'U (WAIHE'E AND KA'ALAEA VALLEYS)

	ALTERNATIVE				
ALTERNATIVE	EFFECTIVENESS RANK	IMPLEMENTABILITY RANK	COST RANK	OVER ALL SCORE	OVER ALL RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	1
3. Surface Clearance	1	2	1	4	2
4. Clearance to Depth	1	3	1	5	3

Note: Ranking from best to worst; best = 1.

5.3.3 Pali – Maunawili Valley Impact Area

The overall MEC hazard level in this area is high, based on the results of the EE/CA field investigation and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Using this information, the four MEC response action alternatives evaluated in this EE/CA report are comparatively analyzed in the following subsections to determine the most appropriate MEC response action alternative for the Maunawili Valley Impact Area.

5.3.3.1 Effectiveness

Table 5-11 provides the effectiveness criteria of the four alternatives for the Maunawili Valley Impact Area. The evaluation of each of these alternatives is presented below.

TABLE 5-11 EFFECTIVENESS CRITERIA EVALUATION – MAUNAWILI VALLEY IMPACT AREA

	EFFECTIVENESS					
ALTERNATIVE	PROTECTION OF HUMAN HEALTH	COMPLIANCE WITH ARARS	LONG-TERM	SHORT-TERM	SCORE	RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	3	1	3	1	8	1
3. Surface Clearance	2	2	2	2	8	1
4. Clearance to Depth	1	3	1	3	8	1

Note: Ranking from best to worst; best = 1.

5.3.3.1.1 Protection of Human Safety

NDAI is not considered an acceptable alternative for the Maunawili Valley Impact Area because it does not meet the minimum threshold criterion for the protection of human health and safety. Clearance to Depth is ranked 1 (most effective) in terms of human safety because of its ability to provide reduction in risk associated with MEC on the surface and subsurface in the near and distant future. Surface Clearance is ranked 2 for protection of human safety, as it is limited to a one-time reduction of MEC onsite. Institutional Controls is ranked 3 because it does not provide

for the removal of MEC and is therefore less protective of human health and safety in a high hazard area where MEC/MD indicative of HE have been located.

5.3.3.1.2 Compliance with ARARs

Compliance with the ARARs would be addressed for any activity that would require vegetation clearance, construction/installation, or intrusive activities at the site. Alternatives that require less effort should also require less compliance with ARARs, so the Alternatives are rated appropriately with their level of effort.

5.3.3.1.3 Long-Term Effectiveness

Clearance to Depth of Detection in an area with a high OERIA hazard level would be the most effective alternative over the long term because it would provide the maximum protection of human safety and support a variety of future land use options. Surface Clearance is ranked 2 (second best) because it would be more effective over the long term than Institutional Controls, but less effective than Clearance to Depth of Detection. Institutional Controls are ranked 3 (last) because they would not be effective over the long term in reducing the risk associated with the high OERIA hazard level in the Maunawili Valley Impact Area. NDAI is not considered an acceptable alternative due to the high OERIA hazard level associated with the area.

5.3.3.1.4 Short-Term Effectiveness

Institutional Controls would be the most effective alternative over the short term because of the type of MD found, and current and projected land use. Surface Clearance is ranked 2 (second) because it would take less time to implement than a Clearance to Depth of Detection and would reduce the risk associated with surface MEC items. Clearance to Depth of Detection is ranked 3 (last) for short-term effectiveness because it would take significantly more time to implement than a Surface Clearance. This is because Clearance to Depth of Detection requires more equipment and expertise, as well as excavation equipment for MEC removal. NDAI is not considered an acceptable alternative due to the high hazard level associated with the area.

5.3.3.1.5 Overall Effectiveness Ranking for Alternatives 1 through 4

Based upon un-weighted OERIA scoring, Institutional Controls (alternative 2) ranks first. However, subjectively Protection of Human Health greatly outweighs the other Effectiveness criteria and ought to have greater consideration in the selection of a remedial action alternative. On that basis, Clearance to Detectable Depth (Alternative 4) is judged the most effective munitions response action alternative when considering overall effectiveness based upon its ongoing ability to greatly reduce the risk associated with the high OERIA hazard level and because it provides the most protection to the public from MEC. Because the OERIA hazard level is high and MEC is suspected to be present onsite, NDAI is not considered an acceptable alternative. Surface Clearance (Alternative 3) is ranked second, because it would provide a one-time reduction of the risk associated with MEC and reduce the risk associated with the overall OERIA hazard level. Institutional Controls (Alternative 2) are ranked first and ought to be considered a part of any munitions response action.

5.3.3.2 Implementability

Table 5-12 provides the implementability criteria of the four alternatives for the Maunawili Valley Impact Area. The evaluation of each of these alternatives is presented below.

TABLE 5-12 IMPLEMENTABILITY CRITERIA EVALUATION – MAUNAWILI VALLEY IMPACT AREA)

	IMPLEMENTABILITY						
ALTERNATIVE	TECHNICAL FEASIBILITY	ADMINISTRATIVE FEASIBILITY	SERVICES AND MATERIALS	LOCAL AGENCY ACCEPTANCE	COMMUNITY ACCEPTANCE	SCORE	RANK
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	3	9	1
3. Surface Clearance	2	2	2	2	2	10	2
4. Clearance to Depth	3	3	3	1	1	11	3

Note: Ranking from best to worst; best = 1.

5.3.3.2.1 Technical and Administrative Feasibility

NDAI is not considered an acceptable alternative due to the overall high hazard level associated with the site. Utilization of Institutional Controls is ranked first as a stand-alone response, in terms of technical and administrative feasibility, as it would require less technical and administrative expertise than a stand-alone removal action. Implementation of a Surface Clearance would be the second ranked approach, after Institutional Controls only, as it involves more technical effort associated with a removal action. Although the Surface Clearance alternative requires specially trained and qualified UXO-personnel and a means of MEC disposal, this alternative requires fewer resources than the Clearance to Depth of Detection Alternative. Administratively, however, Surface Clearance and Clearance to Depth of Detection are similar, especially considering the type of Clearance to Depth operation most suitable for this area (mag-and-dig). Surface Clearance and Clearance to Depth of Detection do fall behind Institutional Controls considering Administrative Feasibility.

5.3.3.2.2 Services and Materials

Institutional Controls is ranked 1 because the supplies and personnel needed to install and maintain warning signs and distribute informational pamphlets are less than those required for a removal action. Surface Clearance is ranked 2 because it would require qualified UXO-personnel as well as the means of disposing MEC. Implementation of the Clearance to Depth of Detection alternative would require more equipment and expertise than a Surface Clearance, in addition to UXO personnel and additional MEC disposal. Therefore, Clearance to Depth of Detection is ranked 3 for availability of services and materials. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.3.2.3 Local Agency Acceptance

Based on interaction with agency representatives to date, it has been determined that local agencies are likely to consider the Clearance to Depth (Alternative 4) as the most appropriate and acceptable alternative for the Maunawili Valley Impact Area, based on the high overall hazard level; Surface Clearance is ranked 2 based on its ability to reduce the risk associated with MEC and Institutional Controls are ranked 3 for this area, considering the current and projected land use of the Maunawili Valley Impact Area.

5.3.3.2.4 Community Acceptance

Many in the community may consider Clearance to Depth of Detection as the most acceptable alternative in this area based on the high OERIA hazard level and the current and future land use. Likewise, the community may consider a Surface Clearance over Institutional Controls, because the removal of surface MEC would provide a reduction in the risk associated with MEC items on the surface. Institutional Controls is ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.3.2.5 Overall Implementability Ranking for Alternatives 1 through 4

Based on implementability rankings in areas of technical feasibility, administrative feasibility, services and materials required, local agency acceptance, and community acceptance, Institutional Controls is ranked 1 (most easily implemented), Surface Clearance is ranked 2, and Clearance to Depth was ranked 3. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.3.3 Cost

The cost evaluation consists of actual cost, investment, and benefit. The cost of each alternative is detailed in Appendix F. 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 the action. Table 5-13 provides the cost criteria of the four alternatives for the Maunawili Valley Impact Area. The evaluation of each of these alternatives is presented below.

TABLE 5-13 COST CRITERIA EVALUATION – MAUNAWILI VALLEY IMPACT AREA

	COST				
ALTERNATIVE	**COST**	**INVESTMENT**	**BENEFIT**	**SCORE**	**RANK**
1. No DOD Action Indicated (NDAI)	$0	N/A	N/A	N/A	N/A
2. Institutional Controls	$37,948	1	3	4	1
3. Surface Clearance	$293,573	2	2	4	1
4. Clearance to Depth	$781,697	3	1	4	1

Note: Ranking from best to worst; best = 1.

5.3.3.3.1 Investment and Benefit

Alternatives 2, 3, and 4 are ranked equally based on their score. The Clearance to Depth of Detection alternative ranks 1 in benefit when considering the specific site conditions, current and projected land use of the site, but 3 in investment. The cost associated with Institutional Controls is considerably lower than the two removal options and therefore receives a ranking of 1 in terms of investment and a rank of 3 when considering level of protection produced for the cost. Surface Clearance ranks 2 in investment and benefit producing the same benefit for the investment, because of the dynamic nature of the terrain and environment. NDAI is not considered an acceptable alternative due to the high hazard level associated with the site.

5.3.3.4 Overall Ranking of Alternatives

The overall ranking of the different alternatives in term of their effectiveness, implementatibility and cost is presented in Table 5-14. The alternative with the lowest score would be considered best for the combined criteria. However, as discussed in paragraph 5.3.3.1.5, Protection of Human Health is weighted more than the other effectiveness factors. On that basis, although the un-weighted scoring indicates that Institution Controls have the best score, weighted scoring indicates that Clearance to Detectable Depth is the best remedial action alternative. Institutional Controls, based on the un-weighted scoring, should be considered a part of an effective munitions response action.

TABLE 5-14 ALTERNATIVE EVALUATION – MAUNAWILI VALLEY IMPACT AREA

	ALTERNATIVE				
ALTERNATIVE	**EFFECTIVENESS RANK**	**IMPLEMENTABILITY RANK**	**COST RANK**	**OVER ALL SCORE**	**OVER ALL RANK**
1. No DOD Action Indicated (NDAI)	N/A	N/A	N/A	N/A	N/A
2. Institutional Controls	1	1	1	3	1
3. Surface Clearance	1	2	1	4	2
4. Clearance to Depth	1	3	1	5	3

Note: Ranking from best to worst; best = 1.

5.3.4 Pali – Maunawili Stream Area

The overall MEC hazard level in this area is low, based on the results of the EE/CA field investigation and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Anecdotal evidence indicated that a mortar was found while plowing a field in the area. During the EE/CA field investigations two suspected observation points were found along a ridge above the suspected firing point; however, neither MEC nor MD was discovered during field activities. Using this information, NDAI is considered an acceptable alternative for the Maunawili Stream Area because it meets the minimum threshold criterion for the protection of human health given the overall low hazard level associated with the site.

5.3.5 Pali – Maunawili Site

The overall MEC hazard level in this area is low, based on the results of the EE/CA field investigation and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Using this information, NDAI is considered an acceptable alternative for the Maunawili site because it meets the minimum threshold criterion for the protection of human health given the overall low hazard level associated with the site.

5.3.6 Pali – Ulumawao

The overall MEC hazard level in this area is low, based on historical documentation and evaluation of the three risk factors (i.e., MEC Type, Site Characteristics, Site Demographics) defined in the qualitative risk assessment (Chapter 4.0). Using this information, NDAI is

considered an acceptable alternative for Ulumawao, because it meets the minimum threshold criterion for the protection of human health given the overall low hazard level associated with the site.

5.4 ARARs

Specific ARARs for future work will be determined during the cleanup phase of the project.

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6.0 INSTITUTIONAL CONTROL PLAN

6.1 GENERAL DESCRIPTION OF SITE BOUNDARIES

6.1.1 He'eia Combat Training Area

6.1.1.1 He'eia Kea

The hourglass-shaped He'eia Kea parcel covers approximately 204 acres located on the coastal plain adjacent to and on the slopes of Pu'u Ma'eli'eli, near the He'eia small boat harbor. The site is bordered to the east (*makai* – toward the ocean) by the Kamehameha Highway and to the west (*mauka* – toward the mountain) by Kahekili Highway and the residential areas. (Figure 1, Appendix B1). The parcel's northern boundary follows the crest of the ridge down slope past the sewage disposal plant, and both the northern and the southern boundary generally follow ridges to the Kamehameha Highway. Most of this parcel is covered with dense vegetation including the densely forested coastal plain and thick grasses and shrubs in the higher elevations. There are several gulches throughout the parcel as well as areas with steep slopes. Elevations within the He'eia Kea parcel range from approximately 20 feet above mean sea level (MSL) to over 700 feet above MSL.

6.1.1.2 Kahalu'u (Waihe'e and Ka'alaea Valleys)

The Kahalu'u parcel covers approximately 2,254 acres, much consisting of densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys in Kahalu'u, Hawaii. Both valleys consist of a mix of forestry, residential and agricultural lots (USACE, 1993). Only Waihe'e Valley was investigated as part of this EE/CA field investigations, because of right of entry could not be coordinated at the time field work was executed. Ka'alaea Valley is addressed in this EE/CA based on past site visits. The western boundary of the Kahalu'u parcel is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet MSL. The eastern portion of the parcel overlaps with residential and agricultural plots and the Waihe'e Nature Preserve. Ulimakoli and Kalahaku Ridge bound the valley to the north and south, respectively.

6.1.2 Pali Training Camp

The Pali Training Camp is comprised of four non-contiguous properties totaling approximately 4,396 acres located near the base of Ko'olau Range primarily within Maunawili Valley (Figure 1, Appendix B3). The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* portion of Maunawili Valley and includes the suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. This parcel ranges in elevation from approximately 200 feet MSL near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second, much smaller parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet MSL (AMEC, 2001). The third parcel, the Maunawili Stream Site, formerly known as Makali'i Valley, is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana. It ranges in elevation from approximately 50 to 200 feet MSL. The fourth and second largest parcel (500 acres), called the Ulumawao site, is located outside the Maunawili

Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

6.2 SPECIFIC INSTITUTIONAL CONTROLS

The Institutional Controls program for the He'eia Combat Training Area and Pali Training Camp includes controls that are designed to minimize the potential for members of the public and workers on site to be injured or killed as a result of encountering MEC. These are signage, informational pamphlets, and annual site visits. Specific Engineering Controls are planned including monitoring of the upkeep of existing fencing and installation of new signs.

6.2.1 Fences

6.2.1.1 Fences are commonly used to restrict public access to a site that poses a threat to human safety. Fences physically restrict access to a site and vary in effectiveness based upon the type of fence installed. Fences are considered for use in areas where MEC is present and where public access would likely result in potential exposures. At sites where the risk of MEC exposure is low, fencing may not be necessary. A barbed-wire fence affixed with warning signs is considered an effective temporary measure to restrict access to MEC sites. This type of fence would prevent individuals from inadvertently accessing an MEC site.

6.2.1.2 Barricades are effective in closing roads or trails that access MEC sites. Forms of barricades include rock or timber barriers. As with fences, barricades are generally more effective when combined with warning signs.

6.2.1.3 As noted during the EE/CA investigation, fences enclose the eastern boundary of the He'eia Kea project site. Locked gates control access to He'eia Kea, Kahalu'u and the Maunawili Valley Impact Area; however, there are paths and trails leading into all three areas.

6.2.2 Signs

6.2.2.1 Warning signs provide notice and information regarding the MEC hazard present at a site. They can be installed at major access points and along perimeter fencing. Given the potential for public access to an area containing MEC, warning signs communicating a hazard to the public are useful and have been proven effective at similar sites. The posted warning signs can inform the public of potential safety hazards and communicate the following information:

- Nature of the MEC hazard at the site;
- Why a safety hazard exists in the context of the history of the military installation or training area;
- How to avoid encountering a MEC item; and
- What to do and whom to contact if a MEC item is encountered.

6.2.2.2 As noted during the EE/CA investigation there are no signs currently in place to warn landowners, visitors and/or unauthorized personnel of the dangers associated with MEC at He'eia Combat Training Area or Pali Training Camp. At the Maunawili Valley Impact Area, warning signs should be placed every 1,000 feet along the trail within the impact area, around the Maunawili Falls (four miles) and at the Luluku Banana Farmer's gate totaling 40 signs (Figure 3,

Appendix B3). The signs should convey the potential presence of UXO. Larger signs or bulletin boards should be placed at the Maunawili Road gate, and the Maunawili Demonstration Trail parking areas (at the Pali Highway and in Waimanalo). The bulletin boards should include the trail segments of concern, pictures of potential UXO present, what to do in case an item is found. At Kahalu'u, warning signs should be placed at the perimeter of the impact area every 1,000 feet (for three miles) totaling 15 signs and a bulletin board at the Kahalu'u gate (at Waihe'e Road). At He'eia Kea signs should be placed along the west side of Kamehameha Highway and a bulletin board at the gates entrance. Once plans for the park and trails have been finalized, signs should be placed every 1,000 feet along the trails, at the perimeter of areas not cleared, and at the base of the Pu'u Ma'eli'eli Mountain, totaling 30 signs. A total of 85 warning signs and five bulletin boards are required.

6.2.2.3 A Memorandum of Agreement (MOA) must be prepared between USACE, the landowners and the City & County of Honolulu identifying the Institutional Controls and detailing their administration and inspection, and enforcement of the program.

6.2.3 Residual Risk Reduction

The hazard that exists from encountering MEC that may exist at the site and from subsequent actions that may cause harm is known as the Residual Risk. The ability of the controls to reduce residual risk is discussed individually in the following sections.

6.2.3.1 Zoning and Planning Controls Risk Reduction

Although no formal planning activities have been undertaken to protect the He'eia Combat Training Area or Pali Training Camp from further development, the lack of such a plan is not seen as problematic, and development of such a formal plan is not seen as immediately necessary. In fact, the City & County of Honolulu plans to develop a portion of He'eia Kea as a nature preserve.

6.2.3.2 Education and Notification Controls

Producing and distributing educational/awareness pamphlets would be a means of describing the types of MEC potentially found within He'eia Combat Training Area or Pali Training Camp, and the actions to be taken upon discovering MEC items. Recognizing the hazard is essential for implementing appropriate responses to contain and dispose of MEC. Distinguishing between MEC and MD that may be encountered at the site will ensure that authorities are notified and actions can be taken to dispose of the MEC without harm to anyone involved. The pamphlets would be made available for distribution to the local residents and schools and for distribution to any person, company, or agency planning to access either area.

6.3 ANNUAL SITE VISIT

The site will be subject to annual review and visited by the DOD in accordance with the FUDS program to monitor the effectiveness of the Institutional Controls program. Consequently, every year, CEPOH will make a visit to the site to ensure that institutional controls are still in place and effective. If the Institutional Controls are determined to be ineffective or not useful, changes can be made. The site visit program will continue indefinitely until it is determined to be unnecessary. The recurrence interval is every year but may be changed, if necessary. A more detailed Recurring Review would take place at maximum intervals of five years.

6.4 AGENCIES INVOLVED WITH INSTITUTIONAL CONTROLS

USACE, the City & County of Honolulu, and current landowners are the principal agencies for effective implementation of Institutional Controls. As the former owner of the property, the DOD has the responsibility to protect the public from MEC hazards for current and future land use. USACE will reproduce the MEC pamphlets and provide them to all agencies and landowners for distribution. Recurring Reviews would be carried out at a minimum of every five years to assess the continued effectiveness of the periodic munitions response activities. Smaller-scale annual reviews with a site visit are recommended for years other than those in which a Recurring Review is scheduled. The annual reviews will be programmed and budgeted by the USACE and performed in cooperation with all concerned agencies.

6.5 INSTITUTIONAL CONTROLS FUNDING

6.5.1 Short-Term Costs

Short-term costs include the design and production of the MEC pamphlets, coordination and approval of the MOA, solicitation of public participation in the EE/CA process, and site visits to distribute the pamphlets. These costs for implementing Institutional Controls are already built into this EE/CA, and are summarized in Appendix F of this EE/CA.

6.5.2 Long-Term Costs

Long-term costs include the costs for reproducing fact sheets, performing annual reviews, and upkeep of signage. These costs are summarized in Appendix F of this EE/CA.

6.5.3 Funding Sources

The Defense Environmental Restoration Account (DERA) funds the FUDS program, and will provide the USACE funding for future annual reviews. The funding is programmed annually and supported by congressional appropriations. Programming is also reviewed annually and can be modified, if necessary. The only identified source of funding is the USACE. Future evaluation of the merit and the physical inspection of the proposed institutional controls will take place during the Recurring Reviews. During the review an assessment of the warning signs and their condition should be carried out. These controls should be implemented immediately upon approval of this EE/CA.

6.6 REQUIREMENTS AND SCHEDULE

The EE/CA schedule includes the tasks of designing and producing a MEC educational/awareness pamphlet, as well as establishing an MOA between all concerned agencies and USACE.

6.7 DURATION OF INSTITUTIONAL CONTROLS

Institutional Controls will remain in effect until an annual review determines that they are no longer necessary.

6.8 PROCEDURES FOR MODIFYING OR TERMINATING INSTITUTIONAL CONTROLS

6.8.1 Modifying or terminating the Institutional Controls for the He'eia Combat Training Area or Pali Training Camp will involve determining the need for changes in this plan during the five-year review process, then implementing them. The smaller-scale annual reviews will be performed by the USACE, who will document the results of their findings in a report. USACE

can recommend changes to the then-current Institutional Controls and provide the opportunity for stakeholder approval and modification.

6.8.2 The MEC pamphlet can be modified to add identification of new hazards or provide different response actions. Distribution of the fact sheet can be ceased at any time it is determined to be unnecessary.

6.8.3 Annual reviews can be discontinued any time that it is determined by the reviewers that a hazard from MEC no longer exists. This may include significant construction activities that uncover any MEC that may exist, or the use of new, currently non-existing technology that can reliably identify the presence or absence of subsurface MEC.

6.9 LAND USE

The land use for the He'eia Combat Training Area and Pali Training Camp sites is occupational, and recreational. Members of the public who participate in recreational activities may be exposed to MEC on the ground surface, but are not exposed to subsurface MEC because recreational activities are not intrusive. Agricultural activies may expose MEC during the tilling of the soil and planting of native vegetation. Construction (including maintenance activities) involving earth moving, however, could potentially expose MEC contained in the subsurface. Land use is expected to remain the same for the next few years with the potential for change in the future when the nature park is constructed.

6.10 RESIDUAL RISK

Institutional controls identified in this plan act as stand alone actions (Kahalu'u) and as supplemental controls for the removal actions (He'eia Kea and Maunawili Valley Impact Area), in order to protect the human environment from suspected MEC remaining within He'eia Combat Training Area or Pali Training Camp from past DOD operations. Overall risk to humans from MEC exposure is moderate in these areas based on the density of MD discoveries on the surface and subsurface, and the possibility that items are present. Effective institutional controls can ensure that future MEC discoveries, if any, would be responded to safely.

TABLE 6-1 HE'EIA COMBAT TRAINING AREA – HE'EIA KEA – LAND USE MATRIX

RESPONSE ALTERNATIVES[a]	LAND USE FACTORS				REUSE POTENTIALS			
	COST	TIME REQUIRED	LAND USE RESTRICTIONS	BENEFIT	WILDLIFE HABITAT	RECREATIONAL	INDUSTRIAL	COMMERCIAL
No DOD Action Indicated (NDAI)	$0	0	No Development, Access Restricted	No Cost	•	○	○	○
Institutional Controls	$28,461	3 days	No Development, Access Restricted	Public Cognizant of Danger	•	○	○	○
Surface Clearance with Institutional Controls	$661,314	6 weeks	Recreational Use, Activities Restricted	Public Cognizant of Danger, Danger Reduced	•	◎	◎	◎
Clearance to Detectable Depth with Institutional Controls	$2,565,332	22 weeks	Residential/Agricultural Use, Access Unrestricted within Cleared Areas	Public Cognizant of Danger, Danger Greatly Reduced	•	•	◎	◎

[a] All Response Alternatives except NDAI include Institutional Controls.

•Most Acceptable

◎Moderately Acceptable

○Least Acceptable

TABLE 6-2 HE'EIA COMBAT TRAINING AREA – KAHALU'U – LAND USE MATRIX

RESPONSE ALTERNATIVES[a]	LAND USE FACTORS				REUSE POTENTIALS			
	COST	TIME REQUIRED	LAND USE RESTRICTIONS	BENEFIT	WILDLIFE HABITAT	RECREATIONAL	INDUSTRIAL	COMMERCIAL
No DOD Action Indicated (NDAI)	$0	0	No Development, Access Restricted	No Cost	•	○	○	○
Institutional Controls	$14,230	2 days	No Development, Access Restricted	Public Cognizant of Danger	•	○	○	○
Surface Clearance with Institutional Controls	$212,380	3 days	Recreational Use, Activities Restricted	Public Cognizant of Danger, Danger Reduced	•	◎	◎	◎
Clearance to Detectable Depth with Institutional Controls	$511,457	6 days	Residential/Agricultural Use, Access Unrestricted within Cleared Areas	Public Cognizant of Danger, Danger Greatly Reduced	•	•	◎	◎

[a] All Response Alternatives except NDAI include Institutional Controls.

•Most Acceptable

◎Moderately Acceptable

○Least Acceptable

TABLE 6-3 PALI TRAINING CAMP – MAUNAWILI VALLEY IMPACT AREA – LAND USE MATRIX

RESPONSE ALTERNATIVES[a]	LAND USE FACTORS				REUSE POTENTIALS			
	COST	TIME REQUIRED	LAND USE RESTRICTIONS	BENEFIT	WILDLIFE HABITAT	RECREATIONAL	INDUSTRIAL	COMMERCIAL
No DOD Action Indicated (NDAI)	$0	0	No Development, Access Restricted	No Cost	•	○	○	○
Institutional Controls	$37,948	4 days	No Development, Access Restricted	Public Cognizant of Danger	•	○	○	○
Surface Clearance with Institutional Controls	$293,573	4 days	Recreational Use, Activities Restricted	Public Cognizant of Danger, Danger Reduced	•	◎	◎	◎
Clearance to Detectable Depth with Institutional Controls	$781,697	10 days	Residential/Agricultural Use, Access Unrestricted within Cleared Areas	Public Cognizant of Danger, Danger Greatly Reduced	•	•	◎	◎

[a] All Response Alternatives except NDAI include Institutional Controls.

•Most Acceptable

◎Moderately Acceptable

○Least Acceptable

7.0 RECOMMENDED MEC RESPONSE ACTION ALTERNATIVES

7.0.1 This chapter presents the recommendations for reducing MEC risk at the He'eia Combat Training Area and Pali Training Camp, Island of Oahu, Hawaii.

7.0.2 The OERIA evaluation criteria developed in Chapter 4.0 to evaluate the level of MEC hazard were used in Chapter 5.0 to compare the effectiveness, implementability (including local agency and community acceptance), and cost of the four MEC response action alternatives identified in this EE/CA report. The MEC hazard level (determined in Chapter 4.0) and the best ranking MEC response action alternative (determined in Chapter 5.0) for each OERIA evaluation area were used to help develop and recommend the most appropriate MEC response actions for the He'eia Combat Training Area and Pali Training Camp. Although in some cases, the best ranking MEC response action alternative in Chapter 5.0 was identified as NDAI, Institutional Controls, or Surface Clearance, professional judgment was employed to determine whether a more protective MEC response action should be recommended (based on the suspected presence of MEC and local agency and community acceptance) for a specific OERIA evaluation area. The OERIA evaluation areas and risk evaluation results are from Chapter 5.0.

7.0.3 The recommended MEC response actions were developed using the following: type, quantity, location, and depth of MEC, MD, and cultural debris recovered during the EE/CA field investigation; documented records of previous MEC recovered at the sites; past, current, and future land use; input from local agencies, stakeholders, and the community (i.e., public meetings, interviews with local agencies, interaction with local communities and stakeholders); and the Institutional Analysis (Chapter 6.0). The primary goals of these recommendations are to provide: (1) the most effective protection to the public and the environment from MEC and (2) a plan for managing risk associated with exposures to and interaction with MEC at the He'eia Combat Training Area and Pali Training Camp. CEPOH will maintain its responsibilities for the residual risk that remains once the recommended MEC response actions have been implemented by performing recurring reviews, which involves returning to the site five years after the recommended MEC response actions have been initiated to assess their effectiveness and reliability. After the initial review has been conducted, recurring reviews will be performed at five-year intervals. The need for recurring reviews will be coordinated with regulators and stakeholders and justified in each recurring review report.

7.0.4 Final recommendations for the sites will be documented in an Action Memorandum. For intrusive actions, a Removal Design will be prepared in accordance with the decisions documented in the Action Memorandum and will provide specific details on how the MEC response actions will be implemented. An Explosives Safety Submission document, which summarizes the Removal Design, will be prepared and submitted to the Department of Defense Explosives Safety Board (DDESB) for their review and approval prior to implementation of any intrusive MEC response actions.

7.1 GENERAL RECOMMENDATIONS

7.1.1 Institutional Controls are recommended for the He'eia Kea, Kahalu'u and Maunawili Valley Impact Area following Clearance to Depth for each area. These institutional controls include the following:

- Numerous warning signs positioned strategically within the area where MEC is suspected, with emphasis near local public gathering areas and primary access points.
- Distribution of informational pamphlets to residents and local businesses.
- Periodic community awareness meetings.
- Letter notifications to landowners.
- Worker/resident MEC safety awareness education by means of a training video.
- Pre-coordinated construction support.

7.1.2 The warning signs, distribution of informational pamphlets, periodic community awareness meetings, letter notifications to landowners, and worker/resident education will provide effective risk management by educating the local community and visitors concerning the dangers associated with MEC at He'eia Combat Training Area and Pali Training Camp. It is recommended that informational pamphlets (detailing the types of ordnance used at each site, the hazards associated with these types of ordnance, and whom to contact if ordnance is found) be distributed to all residents and businesses in and around the He'eia Combat Training Area and Pali Training Camp. Additional copies of the informational pamphlets should be distributed to all local police and fire departments and public libraries, where they will be available to the public. Letter notifications detailing the findings and recommendations of the EE/CA investigation should be mailed to landowners within the sites. It is recommended that community awareness meetings be conducted periodically in the He'eia Kea Valley and Maunawili and that worker education training be given (by means of an MEC safety awareness training video) to all employees of local enterprises (e.g., construction companies) conducting business within each area.

7.1.3 Construction support, as defined in Section 5.1.2.5, is a Clearance to Detectable Depth of limited footprints within which construction would occur. Construction support is only recommended as a pre-coordinated option in areas that have not been recommended for a subsurface clearance. These are areas where there is a very low probability of ordnance being present. The recommended institutional controls (i.e., community outreach programs, educational media, and pre-coordinated construction support) sufficiently address the residual risk in these areas. Details concerning the procedures for pre-coordinated construction support are outlined in Section 5.1.2.5.2.

7.1.4 Data obtained during future construction support activities will be reviewed/evaluated on a continual basis to determine if any further risk management actions are necessary. It is recommended that a map be developed showing the areas where construction support has been implemented and that the map be filed with the City & County of Honolulu.

7.1.5 The estimated cost to implement Institutional Controls is $80,639. The CEPOH will fund the initial set-up, development, and distribution of institutional controls (i.e., display cases, warning signs, informational pamphlets, notification letters, and MEC safety awareness training

video). Long-term implementation of institutional controls (with the exception of construction support) will be the responsibility of landowners and local agencies. Costing assumptions and costing backup for the recommended institutional controls are presented in detail in Appendix F.

7.2 RECOMMENDATIONS FOR HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP

7.2.1 He'eia Kea

It is recommended that a Clearance to Detectable Depth be conducted within He'eia Kea where the park is to be constructed. This is likely to include the 127 acres where slopes are less than 33 percent, and four acres where the slope is greater than 33 percent (for current/future hiking trails) as shown in Figure 3, Appendix B1. If MEC or HE-indicative items are found during clearance of these areas, additional adjacent grids should be cleared in 100x100-ft increments until a grid is reached that is free of MPPEH. In conjunction with the Clearance to Depth, it is recommended that Institutional Controls be established as directed by CEPOH.

7.2.2 Kahalu'u

It is recommended that a Clearance to Detectable Depth be conducted within Kahalu'u within an approximately 100-ft buffer at the base of where the slope changes to less than 33 percent, and a 30 foot buffer around the Ka'alaea Stream bed within the impact area as shown on Figure 3, Appendix B2. This covers approximately 66 acres. If MEC or HE-indicative items are found during clearance of these buffer areas, grids adjacent to the buffers should be cleared in 100x100-ft increments until a grid is reached that is free of MPPEH. In conjunction with the Clearance to Depth, it is recommended that Institutional Controls be established as directed by CEPOH.

7.2.3 Maunawili Valley Impact Area

It is recommended that a Clearance to Detectable Depth be conducted within the Maunawili Valley Impact Area on public hiking trails that pass through the impact area, within an approximately 100-ft at the base of where the slope changes to less than 33 percent, and along stream beds as shown on Figure 10, Appendix B3. This covers approximately 113 acres. If MEC or HE-indicative items are found during clearance of these buffer areas, grids adjacent to the buffers should be cleared in 100x100-ft increments until a grid is reached that is free of MPPEH. In conjunction with the Clearance to Depth, it is recommended that Institutional Controls be established as directed by CEPOH.

7.2.4 Maunawili Site, Maunawili Stream Area, and Ulumawao

NDAI (No DOD Action Indicated) is recommended for the Maunawili site and the Maunawili Stream area of Pali Training Camp as no MEC, MD, and/or evidence of HE ordnance usage was discovered in this area. NDAI is recommended for the Ulumawao parcel of the Pali Training Camp based on historical documentation.

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8.0 QUALITY CONTROL (QC)

8.0.1 ZAPATA was solely responsible for controlling product quality during the execution of this EE/CA. During this project, products met or exceeded contract requirements and were delivered safely, on time, and within budgetary constraints.

8.0.2 The purpose of the Quality Control (QC) Plan was to document the approach and procedures to ensure quality throughout the execution of the EE/CA at the He'eia Combat Training Area and Pali Training Camp. The plan included all aspects involving quality as required in DID OE-005-11.01, Quality Control Plan. Implementation of these polices ensured that ZAPATA followed its Quality Assurance Program (ZAPATA, 2005) and consistently met the quality and performance requirements of the contract.

8.1 QC METHODS USED

ZAPATA maintains a project QC Team in its Charlotte, North Carolina office to provide QC review on this He'eia Combat Training Area and Pali Training Camp EE/CA Report. Copies of the Pre-Draft version of the report were provided to individual reviewers for a peer review. These QC Team members provided comments that were tracked and incorporated into the Draft document for review by our project engineer. Individual reviewers included commentary on the Pre-Draft version of the document provided to them, and signed off on a tracking form. After the QC review, comment tracking forms and copies of the Draft EE/CA Report were again provided to the QC Team for back-check regarding comment incorporation. The comment tracking forms are internal and are not included as part of the final document.

8.1.1 Quality Control Audit Procedures

8.1.1.1 Initial QC Audit

8.1.1.1.1 QC audits were performed periodically on MEC operational sites to ensure systems functioned as planned. By or under direction of the Quality Manager, management surveillance of the QC program ensured that operations were performed in accordance with approved work plans. The audits included a review of procedures, logs, records, etc. Management audits helped determine discrepancies in information collected or if conditions and practices created the potential for QC problems, so that proactive measures could be established.

8.1.1.1.2 ZAPATA conducted QC of the Geophysical Prove-Out (GPO). This QC ensured that Blackhawk was performing the proper procedures outlined in the approved Work Plan and identified opportunities for more effective ways of collecting and processing geophysical data.

8.1.1.2 Schedule

An initial QC and field surveillance audit was performed within ten days following the field investigation mobilization. Field surveillance was concentrated on sensor survey sweep procedures, proper documentation, and checks of survey data for completeness and accuracy. In addition, a daily check of the monitoring records and survey results was conducted.

8.1.1.3 Periodic QC Audit

Periodically, the UXOQC/SO conducted an audit equivalent in scope to the initial QC audit to ensure compliance with work plans and the SOW. If a noncompliance was discovered, it was documented in a report and given to the ZAPATA Project Manager.

8.1.1.4 Field QC Management Audit

The ZAPATA UXOQC/SO conducted unannounced QC audits during field efforts to ensure compliance with QC protocols and field investigation procedures. The audit included a review of procedures, logs, records, etc. Audits resulting in noncompliance were documented and discussed with the ZAPATA Project Manager.

8.1.1.5 Data Recording and Reporting

Reacquisition, Intrusive Investigation, and QC of Intrusive Investigation was recorded on digsheets and daily logs. The data was recorded on paper digsheets for work conducted at the He'eia Combat Training Area and within a digital digsheets (using personal digital assistants) for the Pali Training Camp. The SUXOS and UXOQC/SO reviewed all munitions to confirm accurate identification and classification as UXO, DMM, explosive MC, non-explosive MC, MD, or SA. Representative samples of MD were photographed. No MEC was found during this EE/CA. Paper digsheets were faxed to ZAPATA's Charlotte office while the digital digsheet database was uploaded to ZAPATA's OE Website (oe.zapeng.com). The intrusive results were then reviewed to determine whether the item recovered matched the geophysical response, as detailed below. See Appendix I for Intrusive Investigation results.

8.1.1.6 Inspection of Completed Work

The ZAPATA SUXOS notified the UXOQC/SO when investigative digs were completed. Thereupon, in an initial grid/transect, the UXOQC/SO, using similar type instruments employed during the intrusive investigation, checked for anomalous response that could be caused by the minimum MEC item of interest. This process included 100% of the grids/transects, to include all of the anomalies selected by the Project Geophysicist. The anomaly QC check included excavating a hole to the estimated clearance depth and radius. All excavations were left open by the dig teams for QC inspection. The excavation floor was checked with hand held instruments for an anomalous response below the depth of clearance. Once the ZAPATA UXOQC/SO determined that the target anomalies have been satisfactorily investigated, he documented the QC inspection on the digsheet, and/or UXOQC/SO Log and notified ZAPATA's Project Manager. See Appendix I Intrusive Investigation results containing UXOQC, and Geophysical QC.

8.1.1.7 Comparative Review of Recovered Items and Geophysical Instrument Readings

To verify that excavated anomalies represent the target item(s) identified during interpretation of the geophysical data, ZAPATA's Senior Geophysicist or designee compared the description(s) of recovered items to the associated instrument response obtained during the geophysical survey. This review verified that the recovered item(s) was (were) appropriate in size, shape, weight, composition, depth, and location at which discovered to have generated the survey instrument reading. The geophysicist carefully evaluated the dig sheets and items that did not favorably match the data or vary significantly from the on-site interpretation was recorded and the excavation was revisited and checked once again to ensure no discrepancies existed. Annotated

digsheets can be seen in Appendix I. Several anomalies were reinvestigated as discussed in Section 8.8.

8.1.1.8 Process Modifications

The geophysicist documented whether the collection and interpretation processes needed to be modified, if corrective actions were necessary, or if the processes were being performed to their optimal capabilities. If it was found that the interpretation processes needed to be modified, or corrective actions were identified, all data processed previously was re-evaluated. Processes were modified to reinforce existing processes. See 8.8.1 for specific reinforcements.

8.2 CORRECTIVE/PREVENTIVE ACTION PROCEDURES

Guidelines were established to assure conditions adverse to quality such as malfunctions, deficiencies, deviations and errors were promptly investigated, documented, evaluated and corrected. When a significant condition adverse to quality was noted in the field or at subcontractor locations, the cause of the condition was determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned was documented and reported to the UXOQC/SO, the ZAPATA Project Manager, and involved subcontractor management. Implementation of corrective actions was verified by documented follow-up action. All project personnel had the continuing responsibility to identify problem areas promptly, solicit approved corrective actions, and report any condition adverse to quality. In general terms, corrective/preventive actions were initiated at a minimum:

- When predetermined acceptance standards were not attained,
- When procedures or data compiled were determined to be faulty,
- When equipment or instrumentation was found faulty,
- When quality assurance requirements were violated,
- As a result of system and performance audits, and/or
- As a result of management assessment.

8.3 DATA MANAGEMENT

Data generated during the project was stored in hard copy and electronic form on the ZAPATA on the OE Website (http://oe.zapeng.com). Data deemed critically important were sent back to the corporate office in Charlotte.

8.3.1 Geophysical Data

To ensure the quality of the geophysical data interpretation, ZAPATA performed independent reviews of the processed data. The ZAPATA Senior Geophysicist or designee and UXOQC/SO reviewed selected target anomalies, performed detailed inspections of completed grids/transects and conducted post-excavation comparisons of the recovered items against the output from the geophysical survey instruments. Post-excavation comparisons focused on verifying that the recovered item was appropriate to have generated the survey instrument reading. Items that did not favorably match the data or vary significantly from the on-site interpretation were recorded and reinvestigated to resolve the discrepancy. Several anomalies were reinvestigated because of discrepancies and are detailed further in Section 8.8.1.

8.3.2 Other Field Data

All other data generated in the field (dig sheets, photographs, survey coordinates, etc.) were collected, reviewed for accuracy and maintained by the Project Manager. Pertinent data to be reviewed by USAESCH and CEPOH was posted on the ZAPATA OE Website

8.4 DIGITAL GEOPHYSICAL OPERATIONS

To ensure high-quality geophysical data, the data collection and processing steps were monitored during data collection, with the following steps followed for quality control, as documented in the Geophysical Field Notes, Appendix J (for detail regarding QC failures see Section 8.8.1):

- A warm-up time, typically five minutes, but dependent upon ambient temperatures, was allowed for the geophysical sensors prior to data collection.
- After the warm-up period, data were recorded in a stationary mode for a minimum of three minutes to aid in identifying equipment problems and determining instrument drift. Static noise acceptance criterion was +/- 2.5 mV for the EM61; same for channel 3 of the EM61 Mk II.
- Before and after data collection each day, a metal standard was placed in exactly the same position on or beneath the EM coils and data were recorded. Instrument readings of the standard was within a range of +\- 20 % of the average of all readings taken. This was done before and after data collection each day.
- ZAPATA's Senior Geophysicist conducted an independent evaluation of raw and post-processed geophysical data to ensure the geophysical data met quality standards set forth in the SOW.

8.4.1 Data Processing Quality Control Steps Include:

- Monitoring for time gaps in sensor data, which indicate sensor failure.
- Checking data coverage of areas. Areas with data point gaps greater than 15 feet were resurveyed.

8.4.2 Quality Control (QC)

ZAPATA tracked data processing steps to ensure all data were consistently processed. ZAPATA also performed independent reviews and suggested additional processing (e.g., filtering) which may be useful in data analysis and target identification.

8.5 ANOMALY ACQUISITION AND REACQUISITION

ZAPATA reacquired geophysical anomalies identified on the dig sheets using the same instrumentation type as during the production survey. The anomalies' actual field locations as designated on the dig-sheet were marked with high-visibility stakes or flags. All discrepancies between the mapped anomaly locations and the actual field anomaly locations were recorded and reported. Any anomaly that was not reacquired was reported.

8.6 FIELD OPERATIONS

The ZAPATA Technical Manager, Project Geophysicist, UXOQC/SO, and/or SUXOS were present for all field operations.

8.6.1 Equipment Calibration/Maintenance Program

All equipment used on-site was calibrated and/or used and maintained in accordance with manufacturer's specifications. Records of any repairs performed on equipment are included in the field logbooks with an explanation of problem diagnosis and repair.

8.6.1.1 General Equipment Calibration/Maintenance Requirements

Equipment requiring calibration was calibrated daily or as required by the operation manual. The instruments and general equipment received proper maintenance and care to ensure quality performance. Measurement equipment used on-site was checked at the time of use for operational reliability and calibration before use. Before intrusive activities, instrument manufacturer's specifications were verified for equipment accuracy. Records of these equipment checks were maintained in field notes and daily logs (see Appendix M). If equipment field checks indicated equipment was not operating properly and field repairs could not be made, the equipment was tagged and removed from service. The Project Manager was notified and a request for replacement equipment was expedited. Replacement equipment met the same specifications for accuracy and sensitivity as the equipment removed from service.

8.6.1.2 Geophysical Instruments (Analog)

Analog geophysical instruments were operationally tested on a test plot to ensure adequate settings for their tasks. The geophysical sensors were field checked twice daily on a test site to ensure they were functioning properly and instrument sensitivity was adequate to detect MEC items of interest. Following these checks, settings (i.e., sensitivity) for each applicable analog instrument was recorded in the team logbook and any equipment that was found unsuitable was immediately removed from service. UXO technicians visually verified handheld instrument settings before, during and after an investigation within a grid or transect. The UXOQC/SO conducted unannounced instrument checks in the field to verify the settings on an instrument agreed with the results from the daily operational tests. If an instrument was found to exhibit improper settings, the affected lines were repeated.

8.6.1.3 Site Communication Equipment

Site communication equipment was checked daily for sufficient battery power. If equipment was damaged, it was replaced immediately.

8.6.1.4 Vehicles and Machinery

Vehicles and machinery were used correctly per manufacturer's warranty. All vehicles and machinery operation were checked daily.

8.6.1.5 Air Monitoring Equipment

Air monitoring was not required.

8.6.1.6 Personal Protective Equipment

The UXOQC/SO and Technical Manager were responsible for checking to make sure each employee had appropriate PPE.

8.6.1.7 Post-Operational Checks

Daily, upon completion of field operations, all equipment was inspected to ensure it is was complete and serviceable and shut down in accordance with the procedures identified by the manufacturer. Operators reported any damaged equipment, unusual wear or missing components. Batteries were removed from battery-powered equipment and charged (if rechargeable). Equipment, instruments, tools, gauges, and other items requiring preventative maintenance were serviced in accordance with the manufacturer's recommendations.

8.6.2 Maintenance Procedures

The manufacturer's written maintenance schedule was followed to minimize downtime of the measurement system. It was the operator's responsibility to adhere to this maintenance schedule and to arrange promptly any necessary service. At a minimum, equipment used daily was cleaned at the end of each workday and kept in good operating condition. Service to the equipment, instruments, tools, etc. was performed by qualified personnel.

8.6.2.1 Maintenance Records

Logs were established to record and control maintenance and service procedures and schedules. All maintenance records were documented and traceable to the specific equipment, instruments, tools and gauges. Records produced were reviewed, maintained and filed by the geophysical equipment operators and/or UXO technicians when this equipment was used at the site. The UXOQC/SO audited these records to verify complete adherence to these procedures.

8.6.2.2 Equipment Spare Parts

An extra battery pack for each type of geophysical instrument was on-site at all times. Because of cost considerations, a back-up geophysical instrument was not kept on-site. However, arrangements were made with an equipment vendor so that replacement equipment or any spare parts could have been delivered to the site by overnight delivery or equivalent means.

8.7 PASS/FAIL CRITERIA FOR ALL QUALITY AUDITS

Any nonconformance to the work or to contractual requirements was documented. Nonconformance included, but was not limited to the following:

- Two CARs were issued by USAESCH and are discussed in Section 8.8. The CARs are in Appendix M.
- If an instrument response at an anomaly not selected for intrusive action indicated the presence of an item the size of a MkII grenade or larger during QC or QA, a failure of the Pass/Failure criteria occurred. The Senior Geophysicist and Technical Manager evaluated the data for possible adjustments in target selection or location.
- Horizontally, 95-percent of all excavated items must lie within a one-meter radius of their original surface location as marked on the dig sheet. Horizontally, 95-percent of all excavated items must lie within a 35 cm radius of their mapped surface location as marked in the field after reacquisition. If these goals were not achieved, a re-evaluation of the data and field procedures, detection methods, positioning system and QC was performed. Positional failures were corrected and a written response explaining the reason and corrective actions was submitted.

- Delivery of items or services that did not meet the contractual requirements of ZAPATA or any of its subcontractors.
- Errors made in following work instructions, or improper work instructions.
- Unforeseeable or unplanned circumstances, which resulted in items or services that did not meet quality, contractual, and/or technical requirements.
- Technical modifications to the project by individuals without the requisite responsibility and authority.
- A QA failure was deemed to have occurred if delivery of items or services did not pass ZAPATA's QC pass/fail metrics and a resultant root cause analysis and corrective action assessment would have been performed.

8.8 QC RESULTS

8.8.1 Failures and Corrective Actions

- On 9 August 2006 the PM static/standard test did not meet DID standards. The USAESCH Geophysist was notified of the failure immediately. The cause of the failure was determined to be instrument malfunction. The faulty instrument was replaced on 14 August 2006 and the erroneous data was recollected. The USAESCH Geophysist issued a Corrective Action Request (CAR) on 15 August 2006 to document the Corrective Action. The CAR can be seen in Appendix M. While this failure was identified by ZAPATA during routine QC processes, the action still resulted in closer observation and scrutiny of the static/standard test.
- On 29 September 2006 two grids were identified (1-20 and 1-22) that were mis-positioned because the wrong grid corner was assumed as the origin during data processing. Upon inspection of the geophysical field notes (Appendix J) it was seen that these grids were oriented differently. The grids were correctly reprocessed. As a result, geophysical field notes were rechecked to confirm that all grids were correctly processed and closer attention was paid during future data processing.
- On 25 October 2006, ZAPATA notified the USAESCH Geophysist that several items were flagged for reinvestigation because they did not favorably match their geophysical responses. These items were reinvestigated and their results updated on their respective digsheet in Appendix I. Anomaly 06-07-087 was one of the anomalies selected for reinvestigation. The cause of the mis-identification of the anomaly was miscalculated local coordinates. A CAR was issued on 31 October 2006 indicating that anomaly 06-07-087 (a USAESCH QA Seed Item) was not investigated. See Appendix M for the CAR. In addition to 06-07-087, the following anomalies were reinvestigated:
    - 01-20_268, 06-03_107, 6-03_110, 06-05_126, 06-05_227, 06-06_080, 06-06_105, 06-06_124, 06-06_264, 06-07_087, 06-32B_048

8.8.2 Records Generated

All personnel used bound field logbooks with consecutively numbered pages. Field logbooks were maintained on-site for the duration of the fieldwork. Daily logs can be found in Appendix M. Geophysical Field Notes are in Appendix J.

8.8.3 Daily Logs (see Appendix M)

- Date and recorder of field information
- Start and end time of work activities including breaks, lunch and down-time
- Visitors
- Weather conditions
- Relevant events
- Changes from approved or planned work instructions
- Signature of the ZAPATA Project Manager or UXOQC/SO

8.8.4 Safety Log (see Appendix M)

- Date and recorder of field information
- Daily and tailgate safety briefings (time conducted and by whom)
- Weather conditions
- Significant site events relating to safety
- Accidents
- Stop work because of a safety hazard or deficiency. Documentation will include the hazard or deficiency found, the action taken to correct it and the time lost (if any).
- Safety audits
- Signature of the ZAPATA Project Manager or UXOQC/SO.

8.8.5 Training Log (included in Safety Log)

- Date and recorder of log
- Nature of training
- Visitor training
- Signature of both the ZAPATA UXOQC/SO and the SUXOS.

8.8.6 QC Activity Log (included in Safety Log)

- Date and recorder of log
- Equipment calibration/testing
- Equipment monitoring results
- QC audits
- Nonconformance reports
- Signature of both the ZAPATA UXOQC/SO and the SUXOS.

8.8.7 Ordnance Accountability Log (Not Applicable – No MEC Encountered)

- Date and recorder of log
- Assigned identification number
- Type, condition and location
- Disposition
- Signature of both the ZAPATA UXOQC/SO and the SUXOS.

8.8.8 Meeting Minutes

ZAPATA provided a record of the proceedings of any specified meeting as directed in DID OE-045.01. The minutes included the purpose of the meeting, information covered during the

meeting, specific statements relating to changes or modifications of the project, any actions to be carried out and the names all meeting attendees.

8.8.9 Inventory Forms

There was no Government Furnished Equipment for this project, therefore the Project Manager did not maintained a government property log on-site.

8.9 PROJECT SUMMARY REPORTS

8.9.1 Daily Quality Control Reports

Daily QC Reports were maintained during field activities documenting field measurements, calibration and maintenance of field instruments and management procedures. Corrective actions taken were documented in the Daily QC Reports and the ZAPATA Project Manager was notified immediately.

8.9.2 Weekly Progress Reports

Each week, ZAPATA's Project Manager submitted a progress report, per DID OE-085.01, to the USAESCH identifying accomplishments, noting deficiencies and describing corrective actions associated with the project. Information from the Daily QC Reports was summarized in the Weekly Progress Report. The weekly report summarized ZAPATA's (including subcontractor), schedule, progress, equipment, personnel and demolition information, as described in the DID.

8.9.3 Monthly Progress Reports

Each month, ZAPATA's Project Manager submitted a progress report, per DID OE-080.01, to the USAESCH identifying accomplishments, noting deficiencies and describing corrective actions associated with the project. Information from the Weekly Progress Reports was summarized in the Monthly Progress Reports. The percentage of the contract amount consumed by each task was identified. In case of schedule changes, an updated schedule (in bar chart form) was included.

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10.0 GLOSSARY OF TERMS AND ACRONYMS/ABBREVIATIONS

10.1 GLOSSARY OF TERMS

Anomaly. A significant deviation from the background geophysical response indicative of a buried item that might be MEC.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Federal law (Public Law 96-510 and codified as 42 U.S. Code [U.S.C.] 9601 et. seq.; and 26 U.S.C. 4611, 4612, 4661, 4662, 4671, and 4672) passed on 11 December 1980 that provides a series of programs to address clean up of hazardous waste disposal and spill sites. CERCLA has been modified several times, most significantly in 1986 by the Superfund Amendments and Reauthorization Act (SARA).

Cultural Debris. Debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response that is not related to munitions or range operations. Such debris includes but is not limited to rebar, household items (refrigerators, washing machines, ect.), automobile parts, or automobiles that were not associated with range targets, fence posts, and fence wire. Cultural Debris does not include targets or parts of targets.

Cultural resources. Prehistoric and historic districts, sites, buildings, objects, or any other physical evidence of human activity considered important to a culture, subculture, or a community for scientific, traditional, religious, or any other reason.

Dig team. A team of UXO specialists that search for and excavate geophysical anomaly sources below the ground surface.

Electromagnetic (EM). A geophysical survey instrument that utilizes the rate at which electromagnetic signals in the ground decrease to detect and map metallic objects that are buried near ground level (less than 10 feet below ground surface).

Explosive Ordnance Disposal (EOD). The detection, identification, field evaluation, rendering safe, recovery, evacuation, and disposal of explosive ordnance that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material.

Explosive Soil. Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive: (a) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether the particular explosive is classified as "primary" or "secondary"; (b) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include lead azide, lead styphnate, and mercury fulminate; (c) Secondary explosives are bursting and boostering explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. They are less likely to detonate if struck or when exposed to

friction or to electrical sparks. Examples of secondary explosives include trinitrotoluene (TNT), Composition B, and ammonium picrate (Explosive D); (d) Soil containing 10 percent or more by weight of any secondary explosive or mixture of secondary explosives is considered "explosive soil"; (e) Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosion hazards.

Exposure. An "exposure" to MEC is defined as occurring when the person traversing or working on the site is in "close proximity" to ordnance, whether or not the person knows the ordnance is present (it could be buried). An accident or injury is not necessarily assumed to occur when an exposure takes place. The definition of "close proximity" varies depending on the specific activity.

Fuze. A device with explosive components designed to initiate a train of fire or detonation in an item of ammunition by an action such as hydrostatic pressure, electrical energy, chemical action, impact, mechanical time, or a combination of these.

Inert. Ordnance, or components thereof, that contains no explosives, pyrotechnic, or chemical agents.

Live. A slang term indicating ordnance containing explosives or active chemicals.

Memorandum of Agreement. A record between government agencies agreeing upon a specific action item.

Military munitions. A term used to define all types of both conventional and chemical ammunition products and their components, produced by or for the military for national defense and security.

Minimum Separation Distance (MSD). A safety area surrounding an MEC excavation site from which all but UXO-qualified personnel are excluded while excavation activities are being performed. Excavation operations halt once unauthorized personnel enter the MSD area and resume once those individuals exit the area. The MSD may vary in size depending on the suspected MEC under investigation.

National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The NCP is the Environmental Protection Agency's (EPA's) blueprint for implementing a Superfund law that addresses the legal requirements for responding to a potential hazard at a CERCLA site. The plan defines responsibilities and activities of affected parties within the site (which could include a Superfund site). The NCP is also the process used to address non-Superfund contaminated sites.

Non-MEC. Items that are non-ordnance-related including, but not limited to, wooden boxes, wire, banding material, trash, auto parts, rocks, and nails. Geological and terrain features causing geophysical anomalies are non-MEC items.

Makai. Toward the ocean.

MEC clearance. The Surface or Subsurface Clearance of identified MEWC from a defined area.

Muaka. Toward the mountains.

MEC scrap. Includes those items which are fragments of functioned ordnance, as designed or intentionally destroyed, and which contain no explosive or other items of a dangerous nature. MEC scrap is inert and does not pose a safety risk.

Ordnance and explosives (OE). OE is now referred to as MEC by new terminology. MEC consists of either (1) or (2): (1) Ammunition, ammunition components, chemical or biological warfare material or explosives that have been fired, armed or deployed, or abandoned, expelled from demolition pits or burning pads, lost, discarded, or buried. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any Department of Defense organization or activity; (2) Explosive Soil (see definition under "Explosive Soil").

Risk. Exposures to the chance of injury or loss, or a function of the probability that an accident (or adverse situation) will occur within a certain time, as well as the accident's consequences to people, property, or the environment.

Small arms. Small arms ammunition consists of cartridges and shells used in rifles, pistols, machine guns, and shotguns.

State plane coordinates. A mapping system that measures in distance the position or coordinates of objects north and east of a known position in any given state.

Subsurface MEC investigation. Consists of excavating to a prescribed depth to identify potential subsurface MEC.

Surface clearance. The process in which MEC are visually searched for and removed from the ground surface, without conducting any intrusive activities, and properly disposed of.

Time-Critical Removal Action (TCRA). A TCRA is a clean-up or stabilization action to a release (in this case, MEC) that must be initiated to reduce the risk to public health and/or the environment posed by the release.

Unexploded Ordnance (UXO). Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and remain unexploded either by malfunction, design, or any other cause.

10.2 ACRONYMS/ABBREVIATIONS

A/E	Architect/Engineer
ARAR	Applicable or Relevant and Appropriate Requirement
ARPA	Archaeological Resources Protection Act
bgs	Below Ground Surface

Blackhawk	Blackhawk GeoServices, Inc. (division of ZAPATA)
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CEPOH	US Army Corps of Engineers, Honolulu District, Pacific Ocean Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DDESB	Department of Defense Explosives Safety Board
DERA	Defense Environmental Restoration Act
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DOD	Department of Defense
DMM	Discarded Military Munitions
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
FUDS	Formerly Used Defense Sites
GPS	Global Positioning System
HRS	Hours
INPR	Inventory Project Report
MC	Munitions Constituents
MD	Munitions Debris
MEC	Munitions and Explosives of Concern
Mk	Mark
mm	millimeter
MPM	Most Probable Munition
MPPEH	Material Potential Presenting an Explosive Hazard
MSD	Minimum Separation Distance
MSL	Mean Sea Level
NDAI	No DOD Action Indicated
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
OE	Ordnance and Explosives (now called MEC)
OERIA	Ordnance and Explosives Risk Impact Assessment
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
QC	Quality Control
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SOW	Scope of Work
SUXOS	Senior UXO Supervisor
TBC	To Be Considered
USA	US Army

USACE	US Army Corps of Engineers
USAESCH	US Army Engineering and Support Center, Huntsville
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Services
UXO	Unexploded Ordnance
UXOQC/SO	UXO Quality Control/Safety Officer

APPENDIX A

EE/CA Contractor Scope of Work

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SECTION C - DESCRIPTIONS AND SPECIFICATIONS

SCOPE OF WORK
FOR
ORDNANCE AND EXPLOSIVE (OE)
ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)
AT
HEEIA COMBAT TRAINING AREA
ISLAND OF OAHU, HAWAII
Site No. H09HI011900
Modification 1 – 16 November 2001
Modification 2 – 08 July 2007

1 0 BACKGROUND AND OBJECTIVE

1.1 The objective of this delivery order is for the Contractor to prepare an Engineering Evaluation/Cost Analysis (EE/CA) report. The report shall allow and document meaningful stakeholder participation that

- characterizes ordnance and explosives (OE) nature, location and concentration;
- provides a description of the OE related problems affecting human use of the site;
- that identifies and analyzes reasonable risk management alternatives;
- provides a convenient record of the process for use in final decision making and judicial review, if necessary.

The Contractor is expected to use geophysical techniques to identify anomalies in the subsurface for subsequent OE sampling. The Contractor shall conduct OE sampling and render safe any uncovered UXO and dispose of the UXO and other scrap uncovered during the OE sampling effort.

1.2 OE is a safety hazard and constitutes an imminent and substantial endangerment to site personnel and the local population. This action will be performed in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; the National Contingency Plan (NCP). In addition, all activities involving work in areas potentially containing unexploded ordnance hazards shall be conducted in full compliance with CEHNC, USACE, DA and DoD requirements regarding personnel, equipment and procedures. 29 CFR 1910.120 shall apply to all actions taken at this site.

1.3 The work required under this Scope of Work (SOW) falls under the Defense Environmental Restoration Program (DERP) and the Formerly Used Defense Site (FUDS) program. Ordnance and Explosives (OE) may exist on property that was formerly owned, used or controlled by the Department of Defense. The framework underlying this response is the National Contingency Plan (NCP).

1.4 Others will accomplish the Archeological Survey to identify potential archeological sites. The Government will provide this survey for the Contractor to consider in preparing the Work Plan. The Contractor shall provide awareness training to all personnel involved with fieldwork, as outlined in the approved Work Plan. The archeological survey includes all areas that will be (or potentially could be) subjected to ground disturbing of any form which may require examination by qualified archeologists (provided by the Government). This will ideally take place prior to any ground disturbing taking into consideration safety issues and approval by the USACE OE Safety Specialist. The location of archeological sites is confidential. Site locations will be provided to the Contractor for planning purposes. The Contractor will not disclose locations of archeological sites. A Government Archeologist will provide the Contractor with a briefing on cultural resources related to the project area. No Contractor personnel will remove any artifacts or bones from the property subject to penalties under federal law.

The Government Archeologist will brief the Contractor accordingly. Archeological surveys may be performed in conjunction with field work performed by the A-E. Efforts will be made, if safety allows, to re-locate UXO away from archeological sites. If detonation in-situ is necessary, Government Archeologists will examine the area post-disposal to record any possible damage to archeological sites.

1.5 Others will identify endangered/threatened species of concern. The Government will provide information that identifies areas of concern. The Contractor shall consider this information in preparing the Work Plan. The Contractor shall provide awareness training to all personnel involved with the field investigation.

2.0 INTRODUCTION

2.1 Background. Heeia, Island of Oahu, Hawaii, was actually two separate sites used for training troops during WWII. Currently, private landowners own the sites. All property is remotely accessible through Right-Of-Entry (ROE) permits. Parcel I is the Kahaluu Parcel in the Waihee and Kaalaea Valley. Parcel II is Heeia Kea Parcel near Puu Maelieli. The acreage to be considered under this EE/CA contains some 2,458 acres. The "site" consists of all areas previously under DoD control. Both parcels are situated within the district of Koolaupoko, Island of Oahu, Hawaii. More information is available in the Site Survey Summary Sheet, and previous Site Visit Trip Reports.

2.2 Chemical Warfare Material (CWM). CWM activities were not associated with the training activities at Heeia. The site is not suspected to contain Chemical Warfare Materiel (CWM). However, if suspect CWM is encountered during any phase of site activities the Contractor shall withdraw upwind from the work area, secure the site and contact CEHNC.

2.3 Areas To Be Evaluated. The areas identified below are to be evaluated under this SOW. Evaluation efforts shall be completed in cooperation with project stakeholders, which include the landowners, the Government, interested regulatory agencies, and others that may be identified prior to work plan finalization.

Parcel I – Kahaluu Parcel in the Waihee and Kaalaea Valley contains some 2,254 acres. (see note below)
Parcel II – Heeia Kea Parcel that contains some 203 acres.
Parcel II – Pali Training Camp that contains some 4,378 acres.

Revision: **Parcel I - Kahaluu Parcel is removed from this scope due to the inability for the Government to obtain Rights of Entry and was descoped in July 2007.**

3.0 SPECIFIC REQUIREMENTS

3.1 (Task 1) Project Planning, Site Visit and Records Review & Search, and Base Map Development.

3.1.1 (Task 1a) Site Visit and Records Review & Search. The Contractor shall make a site visit, review pertinent records (see Paragraph 6.0), accomplish an additional historical records search and interview personnel knowledgeable of site conditions. The purpose of this task is to permit the A-E's staff with direct project responsibility to gain necessary information about site conditions. It is intended that this task be an additional "records locating task " where new information will be located or developed. Prior to the site visit (2 Weeks for 3 person) the Contractor must obtain a Government approved abbreviated Site Safety and Health Plan (ASSHP). In addition to safety and health procedures, the ASSHP shall document the proposed agenda, target documents, and proposed interviewees for contact during the Site Visit and Records Search. A qualified UXO specialist must escort site visitors to areas potentially contaminated with OE. The Contractor shall ensure that the site visit is fully coordinated and that all members of the site visit team maintain compliance with the ASSHP. A site visit letter report shall be provided to the Contracting Officer after the site visit, listing the persons who attended the Site Visit, persons interviewed and documents recovered, along with findings and outstanding issues that must be resolved prior to field investigation activities (Tasks 4 through 8).

3.1.2 (Task 1b) Work Task Proposal. The Contractor shall develop a work task proposal (WTP) to describe and plan the accomplishment of the related activities described in this SOW. Prior to initiating work on any task after

this sub-task, the Contractor shall submit, for Government concurrence, a WTP. The proposal shall be submitted for Contracting Officer (CO) for review and concurrence. The WTP shall describe the work to be accomplished, recommendations on approach, coordination, organization, methods, personnel, schedule and estimated budget. The WTP shall identify the various elements of the work plans. The WTP is intended to be a brief description of the A-E's understanding of the proposed work.

3.1.3 (Task 1c) Base Map Development. The Contractor shall develop base mapping information to include topographic information prior to submitting the EE/CA Work Plan (Task 3). This base mapping information shall following the mapping standards set forth in OE DID-OE-005-7, Location Surveys and Mapping Plan. As a minimum the base mapping shall include the surrounding populous areas, boundaries of the Parcels being considered for the EE/CA, sectorization based on Task 1a & 1b, and topographic information to either 5 foot or 2-meter contour resolution. This topographic information shall also highlight areas where the mean slope is greater than 33% or 3 feet horizontal to 1 foot of rise (3:1), and demarking all areas where the slope is 50% (1:1) or greater.

3.2 (Task 2) This task is not used in this delivery order..

3.3 (Task 3) Technical Project Planning . The Contractor shall prepare a technical project-planning document for Heeia in accordance with DID OE-005-01 and OE-005-02 that can be found on the web at **http://www.usace.army.mil/inet/usace-docs/eng-manuals/em.htm**. This effort will be accomplished in four phases. These phases are; Phase I Identify Current Project, Phase II Determine Data Needs, Phase III Develop Data Collection Options, and Phase IV Finalize Data Collection Program. The goal of this effort is to start the project with all stakeholders agreeing on the end goal. This task requires the Contractor to schedule and facilitate meetings and provide project worksheets for project team decision points. The Contractor shall provide the following requirements or seek the appropriate input from others. The Contractor shall consider all stakeholder input when developing the project recommendations. The Government will direct the Contractor on any issues not resolved upon task completion. The Government does not expect the length of this document to exceed 30 pages.

3.3.1 Phase I, Identify Current Project & Develop a Conceptual Site Model. Using whatever past historical information that can be obtained, the Contractor shall identify;

- The decision makers (USACE, land owner(s), regulatory agencies.)
- Project Objectives, which includes the decision makers' perspectives and community needs and interests as it relates or might impact this project.
- Site constraints and dependencies.
- Legal and regulatory constraints.
- Conceptual Site Model (known impact areas, disposal sites, other OE issues; all potential types of UXO expected at the site; geological setting; estimate of maximum probable depth for sampling.)
- Site closeout statement for each land use category or sector as appropriate.

The closeout statement shall consider the current and future land use, current technology can't guarantee a "clean site", incorporate local initiatives, enlist community support, and encourage recurring reviews. The closeout statement may identify more than one process to achieve site closure but must identify decision points associated with each process alternative.

3.3.2 Phase II, Data Needs. The Contractor shall identify the data need requirements, intended use of the data, and appropriate sampling and analysis methods, and identify data quality objectives for each data type. Some general types of site data include; 1- physical nature of the site, 2- nature and extent of UXO, 3- regulatory framework, 4-demographics and land use. The Contractor must define the data needs, evaluate the usability of existing data, and identify the data gaps that must be filled. Generally this phase must document:

- "Who" needs the data?
- "What" data is needed?
- "What" project objectives will the data help to satisfy?
- "What" are the intended data uses?
- "What" number of samples is required to satisfy the intended uses?
- "What" are the performance requirements?
- "Where" is the priority/area/location/depth of interest?

3.3.3 Phase III, Data Collection Options. The Contractor shall develop and document data sampling, gathering and analysis strategies. Items that should be presented include sampling strategy constraints, use of probabilistic or non-probabilistic sampling, and whether we intend to use field screening and analysis techniques. Data types and needs should be categorized as screening data or definitive data. Data quality should be defined for each data type that is based upon the intended use of the data and accepted practices. Once the data "world" is defined for the project each data set shall be classified as "basic" (required data), "optimum" (data would facilitate better decisions and is cost effective to gather), and "excessive" (data would be nice to have but may not be worth the cost to gather the data)

3.3.4 Phase IV, Data Collection Program Design. The Contractor shall present the data collection program requirements as options and schedules with the budget affects for the various options. Other items such as constraints and uncertainties and regulatory factors must be presented. The Contractor must clearly present the "preferred" data collection plan that ties together the data need requirements, data sampling and analysis methods, and the intended use of the data in satisfying the closeout statements established in Phase I.

3.4 (Task 4) - EE/CA Work Plan. The Contractor shall prepare an EE/CA Work Plan in accordance with DID OE-005-001. The Contractor shall include the following aspects in Chapter 10 of the work plan.

Quality Control Plan (QCP) and Quality Assurance, the Contractor shall describe the A-E's Quality Control and the expected Government's Quality Assurance roles and responsibilities for this project. Note that the Contractor is responsible for developing and implementing only the project QCP. The Government will perform Quality Assurance. However, the plan shall describe both activities. The QCP shall specifically address digital data delivered in the OE GIS data standard format with communications, transmissions and receipt by the various participants. A flow chart may be used to identify the data collection, analysis, storage, transfer and QA/QC process to generate the final dig-sheets. The Contractor shall ensure that the corporate quality policy is understood, implemented, and maintained at all levels in the organization. The Contractor shall propose a system to manage, control, and document the performance of these tasks. The Quality Control Plan shall include:

Location Surveying and Mapping QC,
Geophysical QC,
Data QC: digital data (communications; transmissions and receipt), along with all analog data (administrative; contractual; survey and geophysical field notes).
GIS System QC
Anomaly reacquisition QC
Variance of surface & subsurface influence on geophysical data output across the site.

The most critical component in this project is the geophysical data. The Contractor shall perform continuous tracking, checks, representations, adjustments and visualization of the field data daily for quality control and to establish efficient field procedures. In addition a portion (approximately 2 to 4%) of the site shall be resurveyed and analyzed and compared to the previous results by the Government. The methodology to accomplish the quality control shall be proposed in the WP in accordance with DID OE-005-11, which identifies the minimum QC activities. The QC activities shall be documented and included in the final investigation report.

3.5 (Task 5) - Location Surveys and Mapping. The Contractor shall perform topographic and location surveys as described in the approved Work Plan and in accordance with DID OE-005-07.

3.6 (Task 6) - Establishment and Management of GIS. The Contractor shall take the GIS Tri-Service Spatial Data Standard data, manual, file, and database structures from the Huntsville Center Ordnance GIS standard and apply it to this project. The Government will provide a digital copy of the required data structure. The standard will be used to create project-specific GIS for the specific OE investigative needs of this site. The GIS shall be assembled and used to direct the daily geophysical investigative activities and to compile and analyze the daily digital data into the GIS. Any changes from the standard shall be proposed to the contracting officer with fully documented changes and the reason or benefit of the proposed change. The Contractor shall establish and manage the GIS as described in the approved Work Plan and in accordance with DID OE-005-14.

3.7 (Task 7) - Geophysical Equipment Test and Investigation. The Contractor shall implement geophysical investigations as described in the approved Work. The Contractor shall provide all necessary qualified personnel and equipment to perform surface preparation, as well as surface OE identification, removal and disposal on the sampling grids (approximately 50 acres) where subsequent site activities are scheduled to occur under this contract. The Contractor shall perform the minimum amount of work necessary to clear the areas of vegetation, surface OE and OE scrap where these impede the progress, effectiveness or safety of the geophysical investigation team. Trees three inches in diameter or greater shall not be cut unless specifically approved in writing by the Government. All OE-related activities shall be performed in accordance with applicable sections of the approved work plan.

3.7.1 (Task 7a) Geophysical Equipment Test. The Contractor shall design and construct a test plot at the site to test various geophysical methods and equipment in order to establish the methods, equipment and procedures best suited to the site. The Contractor shall test various geophysical methods and equipment in order to establish the methods, equipment and procedures best suited to the site. During prove out, the Contractor shall coordinate with CEHNC to ensure that a CEHNC representative will be on site for verification and quality assurance. The Contractor shall use the information gathered in this phase of work to evaluate the relative efficiencies of potentially appropriate geophysical investigation procedures. Various procedures must be defined such as, but not limited to, daily equipment standardization, data quality checks and data error resolution process. Afterwards, the Contractor shall propose specific geophysical methods, equipment and personnel appropriate and necessary to accomplish the required geophysical investigations. The results of the test shall be documented in a letter report and submitted to the Government for concurrence. The Contractor shall incorporate the appropriate methods and equipment into the work plan once Government concurrence is received.

3.7.2 (Task 7b) Investigation. The total cumulative area to be geophysically investigated and evaluated under this SOW consists of approximately 50 acres, composed of individual grids and random path geophysical investigations. Actual number and location of grids and/or meandering paths may increase or decrease based upon conditions encountered in the field, if so directed by the Contracting Officer. All aspects of anomaly evaluation, selection, and dig-sheet production shall be routinely reported in a weekly field activity report. See section 4.0 for additional reporting requirements and schedule.

3.7.2.1 Evaluation. After the site is Geophysically mapped, the Contractor shall utilize a qualified geophysicist to check and evaluate the geophysical data collected. The geophysicist shall make a professional determination regarding the identification of anomalies at the site. Based on this determination, the Contractor shall provide a "dig-sheet" showing predicted location and character of all suspected anomalies to the CEHNC Project Manager and OE support staff. In addition, the Contractor shall continually compare predicted results with actual results so that the A-E's geophysical evaluation methodology is constantly refined over the life of the project.

3.7.2.2 Anomaly Selection. Note that not all geophysical anomalies meeting the criteria to be considered a potential UXO will be dug. Representative anomalies will be excavated in order to characterize geophysical anomalies and to provide information necessary to estimate location, concentration and nature of UXO present at the site. The Contractor shall propose methodology for selection of anomalies to be excavated. This might be based on UXO calculator, percentages of anomalies, a specific number of excavations, anomaly apparent size, work-days, statistical approaches, or some other approach or combination of approaches. Also, the approach for individual anomalies might differ from the approach used for pits/trenches. Generally the Government expects more anomalies selected for sampling at the beginning of the effort with the amount of samples selected for digging reduced over the duration of the sampling effort. The particular approach for this project shall be described in the work plan. For negotiation purposes the contractor should consider that an average of 7 anomalies per grid or transect shall be investigated. Differences between this number and the actual totals number, once geophysical mapping is complete, will be addressed at a future project planning meeting, and modified through amendment at that time.

3.7.2.3 Data Format and Storage. The Contractor shall utilize an appropriate data format and storage system for geophysical mapping data that is consistent with CEHNC computer/CADD systems in accordance with DID OE-005-05 and as described in the approved Work Plan. In addition the Contractor shall maintain the data in such a way that the Government can remotely access any individual file or multiple files as necessary without day or time restrictions. See Section 4.0 for additional data requirements.

3.8 (Task 8) Intrusive Investigations (OE Sampling). The Contractor shall, utilizing qualified personnel, implement site OE sampling as specified in the approved work plan. The Contractor shall provide all necessary qualified personnel and equipment to perform surface and subsurface OE access, evaluation and management. All aspects of the activities related to this task shall be reported in a weekly field activity report including DRMO turn in forms. This task shall be accomplished as follows:

3.8.1 Accessing Anomalies. The Contractor shall investigate anomalies identified by the geophysical investigations and as directed by the Contracting Officer. The Contractor shall, using qualified UXO personnel, determine whether the OE can be moved or destroyed in-place. This is a safety-driven decision that will be based solely on DoD munitions safety standards and requirements.

3.8.2 OE Destruction. The Contractor shall be responsible for the destruction, if required, of all OE including UXO and scrap encountered during site investigations and characterizations utilizing qualified personnel and in accordance with all aspects of the project Work Plan. The Contractor shall establish in the Work Plan a method of disposal, if required, for all OE.

3.8.3 Backfilling Excavations. All access/excavation/detonation holes shall be back-filled by the A-E. The Contractor shall restore such areas to their prior condition.

3.8.4 OE Accountability. The Contractor shall maintain a detailed accounting of all OE items/components encountered. This accounting shall include the amounts of OE, the identification and condition, depth located, disposition and location. The accounting system shall also account for all demolition materials utilized to detonate OE on-site. This accounting shall be a part of an appendix to the EE/CA report.
3.8.4.1 DD Form 1348-1. The Contractor shall complete a DD Form 1348-1A as turn-in documentation. Instructions for completing this form are contained in the Defense Utilization and Disposal Manual, DoD 4160.21-M. The Senior UXO Supervisor shall sign a certificate as follows:

"I certify that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature."

DRMO turn-in documentation receipts shall be submitted as an appendix to the EE/CA Report.

3.8.4.2 UXO Quality Control (QC) Specialist. UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC Specialist shall meet the minimum prerequisites of an UXO Supervisor and have the training, knowledge and experience necessary to implement the A-E's QC plan as outlined in DID OE-025. The Contracting Officer must approve any exceptions.

3.8.4.3 Quality Assurance Sampling Areas. In order to evaluate the effectiveness of the geophysical investigation and evaluation methods utilized by the A-E, the Contracting Officer may direct an independent contractor provided by the government or may provide Government personnel to independently map, locate and access some detected subsurface anomalies as deemed necessary.

3.9 (Task 9) Prepare Institutional Analysis, Impact Analysis and EE/CA Report.

(Task 9a) Institutional Analysis. The Contractor shall perform an institutional analysis, using as much of the existing data collected for the TPP process, in accordance with DID OE-100. This report, which should be submitted in draft form for review by the Government, with the final report included in the EE/CA Report, will be a brief report presenting site conditions, in relation to ownership, zoning, future development plans (including replenishment) and Local and State participation in planning activities.

3.9.2 (Task 9b) Impact Analysis. The Contractor shall refine the Qualitative Impact Analysis (QIA) model CEHNC developed for the Jefferson Proving Ground EE/CA to determine the base line public exposure and the predicted risk reduction for the selected risk reduction option for any areas recommended for removal action as a result of the EE/CA. These refinements may be include but are not limited to developing numerical scales (i.e., rather than using qualitative terms) and adapting the QIA model to address site-specific conditions at the site. These

refinements will be provided CEHNC for approval before use. Although OECert will not be used for this task, the Contractor shall write a risk report in accordance with the OECert Standing Operating Procedure that supports the EE/CA report and that determines the base line public exposure and the resultant public exposure for each alternative under consideration.

3.10 (Task 10) Performance of an OE Risk Assessment. The Contractor shall utilize a CEHNC computer program, OECert, to determine the baseline public risk and the predicted risk reduction for each removal alternative evaluated in the EE/CA. The Contractor shall write a risk report in accordance with the OECert Standing Operating Procedure that supports the EE/CA report and that determines the baseline public risk and the resultant public risk for each alternative under consideration. The Risk Report shall also discuss the Contractor quality control checks that ensures reliable data for determining the relative risks. The Risk report shall also discuss the success of reacquiring selected anomalies for investigating and process improvements that improved the efficiency of reacquiring the anomalies. The Contractor shall ensure that qualified personnel collect the required data, operate the computer model and write the risk report in accordance with CEHNC 1115-3-86, "Ordnance and Explosives Cost-Estimating Risk Tool (OECert) Standing Operating Procedure (SOP)".

3.10.1 Site UXO Statistical Report. As part of the risk evaluation report the Contractor shall write a statistical report that shows how the UXO densities were determined. The Contractor shall use the UXO Calculator methodology for determining a range of sector densities unless the Government has approved an alternate statistical method.

3.11 (Task 11) Prepare EE/CA Report. The Contractor shall prepare and submit an EE/CA report fully documenting the field work and subsequent evaluations and recommendations made by the A-E. The textual portions of the report shall be fully supported with accompanying maps, charts, and tables as necessary to fully describe and document all work performed and all conclusions and recommendations presented.

3.12 (Task 12) Prepare Action Memorandum. The Contractor shall, based upon close consultation with the Contracting Officer, prepare an Action Memorandum in accordance with applicable CEHNC guidance documents.

3.13 (Task 13) Community Relations Support. The Contractor shall attend and participate in public meetings as directed by the Contract Officer. The support shall include preparation and delivery of briefings, graphics and presentations, and participation in site visits. The actions are independent of the field activities that involve interaction with the community.

3.14 (Task 14) Meetings and Project Management. The Contractor shall perform project management functions, as necessary to maintain project control and to meet required reporting requirements. See the schedule for the number of meetings that are planned.

3.15 (Task 15) Pali Training Camp – Addition. The Contractor shall perform an OE investigation in the Pali Training Camp area. This task and associated sub-tasks will be lump sum additives to address additional cost associated with Task 1 through Task 14, for the additive of the Pali Training Camp. Part of Task 1 (Initial Site Visit) will have been conducted as part of the field activities for Heeia. A copy of the current DERP-FUDS Inventory Project Report (INPR) has been provided to the Contractor, and shall be used to prepare the proposal for the following additives. Pali Training Camp is in the immediate area of the Heeia and Kahaluu parcels for which this original SOW and proposal were developed to cover.

3.15.1 (Task 15a) Phase I Additive – This will cover Task 1 through Task 4, and Task 13 & 14, to develop TPP and get through Work Plan development, plus Meetings, Community Relations Support and Project Management.

3.15.2 (Task 15b) Phase II Additive - Field Work Effort - If justified by the TPP Process, the Contractor will sample an additional 10 acres as required by Task 5 through Task 8. This task may or may not be required, based on the finding in the TPP Process. Little is known about this existing parcel of land, and the future proposed use of this property. The TPP will justify the requirement for this task. NOTE: Pali will required significant travel time into the site, and therefore will impact the

productivity of the crews during daily activities. This will impact only the field activites at Pali, therefore lower productivity than the Heeia parcels can be expected. Two trails are available for access the area, but a minimum number of roads actually access this area. Any field investigation will have to be transects or grids placed off of these three access trails/roads or productivity will be severely impacted, even more than normal.

3.15.3 (Task 15c) Phase III Additive - EE/CA Report and Action Memorandum. This additive will cover tasks 9 through Task 12 for the Pali Training Camp.

4.0 SUBMITTALS AND CORRESPONDENCE

4.1 Format and Content of Engineering Reports. Engineering Reports presenting all data, analyses, and recommendations shall be prepared and submitted by the A-E. All drawings shall be of engineering quality in drafted form with sufficient detail to show interrelations of major features. The contents and format of the engineering reports shall be arranged in accordance with all pertinent guidance documents. When drawings are required, data may be combined to reduce the number of drawings. Reports shall consist of 8-1/2 inch by 11-inch pages with drawings other than the construction drawing folded, if necessary, to this size. A decimal paragraphing system shall be used, with each section and paragraph of the reports having a unique decimal designation. The report covers for each submittal shall consist of durable 3-ring binders and shall hold pages firmly while allowing easy removal, addition, or replacement of pages. A report title page shall identify the site, the A-E, the local Corps of Engineers District, Huntsville Center, and the date. The Contractor identification shall not dominate the title page. All data, including raw analytical and electronic data, generated under this delivery order are the property of the DoD and the government has unlimited rights regarding its use.

4.2 Computer Files. All final text files generated by the Contractor under this contract shall be furnished to the Contract Officer in MS Word 6.0 or higher software, IBM PC compatible format. All final CADD/GIS data, design drawings and survey data generated by the Contractor under this delivery order shall be submitted in the proper format and media that will permit their loading, storage, and use without modification or additional software on the Huntsville Center CADD/GIS workstations.

4.3 HTML Deliverables. In addition to the paper and digital copies of submittals identified above, the final version of the EE/CA and the Action Memorandum shall be submitted, uncompressed, on one floppy disk or CD ROM in hypertext markup language (HTML) along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures included and suitable for viewing on the Internet.

4.4 Review Comments. Various reviewers will have the opportunity to review submittals made by the Contractor under this contract. The Contractor shall review all comments received through the CEHNC Project Manager and evaluate their appropriateness based upon their merit and the requirements of the SOW. The Contractor shall issue to the Project Manager a formal, annotated response to each in accordance with the schedule in paragraph 4.13

4.5 Draft Reports. Each page of draft reports shall be stamped "DRAFT". Submittals shall include incorporation and notation of all previous review comments accepted by the A-E.

4.6 Identification of Responsible Personnel. Each report shall identify the specific members and title of the A-E's staff and subcontractors that had significant, specific input into the reports' preparation or review. All final submittals shall be sealed by the registered Professional Engineer-In-Charge.

4.7 Project Control and Reporting. The Contractor shall prepare and submit a master network schedule (using Microsoft "Project" software), cost and manpower plan, monthly progress reports, technical progress reports, monthly individual performance reports and cost/schedule variance report, work task proposal plan, and a program control plan.

4.8 Monthly Progress Report. The monthly progress report shall describe the work performed since the previous report, work currently underway and work anticipated. This report shall show the earned value curves for the

amount of funds obligated, planned and actually spent to date on the project. This will allow the continuous tracking of the actual cost versus the proposed cost at the beginning of the project. The report shall state whether current work is on schedule. If the work is not on schedule, the Contractor shall state what actions are anticipated in order to get back on-schedule. A summary of the phone conversations, minutes of meetings, and written correspondence shall be provided in accordance with DIDs OE-045 and OE-055, and submitted with the monthly progress report. The report shall be submitted in accordance with DID OE-080.

4.9 Weekly Status Report. Weekly status reports shall be submitted in accordance with DID OE-080, starting when the Contractor mobilizes for field work and ending with demobilization.

4.10 Public Affairs. The Contractor shall not publicly disclose any data generated or reviewed under this contract. The Contractor shall refer all requests for information concerning site conditions to the local Corps District's Public Affairs Office, with a copy furnished to the CEHNC Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the A-E, unless authorized by the Contract Officer, is prohibited.

4.11 Addresses. The following addresses shall be used in mailing submittals:

ADDRESSEE	QUANTITY
Commander US Army Corps of Engineers, Huntsville Center ATTN: CEHNC-PM-OT (Mr. Chad Berthelson) P.O. Box 1600 Huntsville, Alabama 35807-4301	4
Commander US Army Corps of Engineers, Honolulu District ATTN: CEPOH-PM, Mr. Chuck Streck Bldg. 230 Fort Shafter, HI 96858-5440	4

4.13 Schedule and Submittals. The Contractor shall submit all deliverable data to the Contracting Officer and other reviewers shown in Paragraph 4.12 in accordance with the following schedule. All submittals shall be delivered to all addressees no later than the close of business on the day indicated in this paragraph. In addition, registered mail or other method where a signed receipt is obtained indicating the date received and the individual accepting the submittal shall be used to ship submittals to regulatory reviewers.

DOCUMENT	DATE DUE
Targeted date of award	02 Apr 01
WTP	October 2001
ASSHP	Prior to site visit
Site Visit Letter Report	3 working days after site visit
Draft Geophysical Test Plot Plan	9 December 2001
Final Geophysical Test Plot Plan	9 February 2001
TPP Phase I & II Partnering Meeting	TBD
TPP Phase I Worksheet(s)	13 December 2001
TPP Phase II Worksheet(s)	13 December 2001
TPP Phase III & IV Partnering meeting	TBD
TPP Phase III Summary Table(s)	3 March 2002
TPP Phase IV Data Collection Program Design	3 March 2002
TPP Final Meeting	TBD
EE/CA Work Plan, Draft	25 February 2002
EE/CA Work Plan, Draft Final	15 March 2002
Geophysical Equipment Test Report	30 April 2002

EE/CA Work Plan, Final	30 April 2002
Government approval to commence field work.	8 May 2002
Weekly Field Report *	Every Monday for the previous week
Monthly Progress Report	NLT 10th of the following month
EE/CA Report, Draft	***1 July 2007***
EE/CA Report, Draft Final	***30 Days after receiving Government Comments***
Public Meeting	TBD
Draft Action Memorandum	***TBD***
EE/CA Report, Final	***30 Days after receiving Government Comments***
Final Action Memo & Responsiveness Summary	***30 Days after EE/CA final report***
Project Meeting, Alabama	TBD
Project Meeting, Contractor Office	TBD
Minutes of Meetings	NLT 10 days after each meeting

The overall completion date of this delivery order is 30 September 2008.

5.0 SAFETY AND HEALTH PROGRAM

The Contractor shall develop and maintain a Health and Safety Program (HSP) in compliance with the requirements of OSHA standards 29CFR1910.120(b)(1) through (b) (4). The Contractor shall provide written certification the HSP has been submitted to the CO and make the HSP available upon request by the Government. The SSHP required by 29CFR1910.120(b)/29CFR1926.65(b)(4), and as defined by DID OE-005-06, shall be prepared and submitted with the Work Plan for approval. On-site activities shall not commence until the plan has been reviewed and accepted. The A-E's Site Safety and Health Officer (SSHO) shall have the training, knowledge and experience necessary to implement the SSHP and have the same minimum qualifications as an UXO Supervisor.

6.0 REFERENCES.

6.1 National Contingency Plan, 40 CFR 300.
6.2 Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.
6.3 Army Corps of Engineers Safety and Health Requirements Manual,
6.4 EM-385-1-1, 3 September 1996.
6.5 Army Corps of Engineers, ER-385-1-92, Appendix B, Safety and Occupational Health Document Requirements for Hazardous Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities, 1 September 2000.
6..6 Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 196.120/29CFR1926.65-"Hazardous Waste Site Operations and Emergency Response."
6.7 NIOSH/OSHA/USCG/EPA, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October 1985. (DHHS(NIOSH) Publication No. 85-115).
6.8 CEHNC 1115-3-86, "Ordnance and Explosives Cost-Estimating Risk Tool (OECert) Standing Operating Procedure (SOP)", November 1996.
6.9 Explosives Safety Submission format, CEHNC, October 1998.

The following CEHNC Data Item Description references are available on the CEHNC Web Page at http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html

6.10 OE-005-001 Type I Work Plan
6.11 OE-005-02 Technical Management Plan
6.12 OE-005-03 Explosives Management Plan
6.13 OE-005-04 Explosives Siting Plan
6.14 OE-005-05 Geophysical Mapping Plan
6.15 OE-005-06 Site Safety and Health Plan
6.16 OE-005-07 Location Surveys and Mapping Plan
6.17 OE-005-08 Work, Data, and Cost Management
6.18 OE-005-09 Property Management Plan
6.19 OE-005-11 Quality Control Plan

6.20 OE-005-12 Environmental Protection Plan
6.21 OE-005-14 Geographical Information System Plan
6.22 OE-010 Engineering Evaluation/Cost Analysis (EE/CA) Report
6.23 OE-015 Accidents/Incidents Reports
6.24 OE-025 Personnel/Work Standards
6.25 OE-045 Report/Minutes, Record of Meetings
6.26 OE-055 Telephone Conversation/Correspondence Records
6.27 OE-060 Conventional Explosives Safety Submission
6.28 OE-080 Monthly Status Report
6.29 OE-085 Weekly Status Report
6.30 OE-100 Analysis of Institutional Controls

7.0 GOVERNMENT-FURNISHED.
7.1 Inventory Project Report for Site No. H09HI011900, Heeia Combat Training Area, Heeia Kea and Kahaluu, Island of Oahu, Hawaii, dated 20 May 1993.
7.2 Inventory Project Report for Site No. H09HI027700, Pali Training Camp, Kailua, Island of Oahu, Hawaii, dated 20 May 1994.

SECTION F - DELIVERIES OR PERFORMANCE

The following Delivery Schedule item for CLIN 0008 has been changed from:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
31-MAR-2007	1	N/A FOB: Destination	

To:

DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
30-SEP-2008	1	US ARMY ENGINEERING & SUPPORT CENTER WANDA H HAMPTON CEHNC-CT 4820 UNIVERSITY SQUARE HUNTSVILLE AL 35816-1822 256-895-1168 FOB: Destination	W912DY

SECTION G - CONTRACT ADMINISTRATION DATA

Accounting and Appropriation

Summary for the Payment Office

As a result of this modification, the total funded amount for this document was decreased by $219,151.41 from $1,244,142.00 to $1,024,990.59.

DACA87-00-D-0034
000505
Page 15 of 15

CLIN 0008:

AB: 21 NA 2002 2020.0000 A0 2002 08 8130 49300822000 01110 2514 LHB8[illegible] was decreased by $219,151.41 from $830,066.00 to $610,914.59

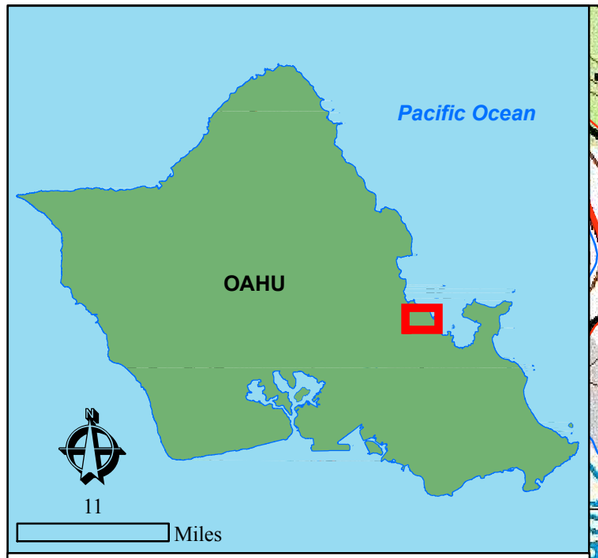
(End of Summary of Changes)

APPENDIX B

Figures

APPENDIX B1

He'eia Combat Training Area, He'eia Kea



Area Overview

KEY

- He'eia Kea
- Major Road
- Stream
- Street

800 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

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He'eia Combat Training Area
Oahu, HI
He'eia Kea
Site Location Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	1

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Oahu, HI
He'eia Kea
Site Investigation Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	2

KAM HWY

KEY

- Targets/Digs
- 2.36-inch Rocket Motor
- 2.36-inch Rocket Parts
- 2.36-inch Rocket, Practice
- MKII Frag
- MKII, Practice
- DGM Transects
- DGM Grids
- Clearance Area -127 acres
- He'eia Kea
- 0 - 33% Slope
- 33 - 43% Slope
- 43 - 53% Slope
- 53 - 73% Slope
- >73% Slope
- Stream
- Street
- Major Road

500 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

Recommended Clearance Areas are based on a Digital Elevation Model that has an accuarcy of 30ft. The actual location of the clearance area near the base of the slope should be determined in the field. Clearance should also be conducted over future hiking trails associated with the park, approximately four acres.

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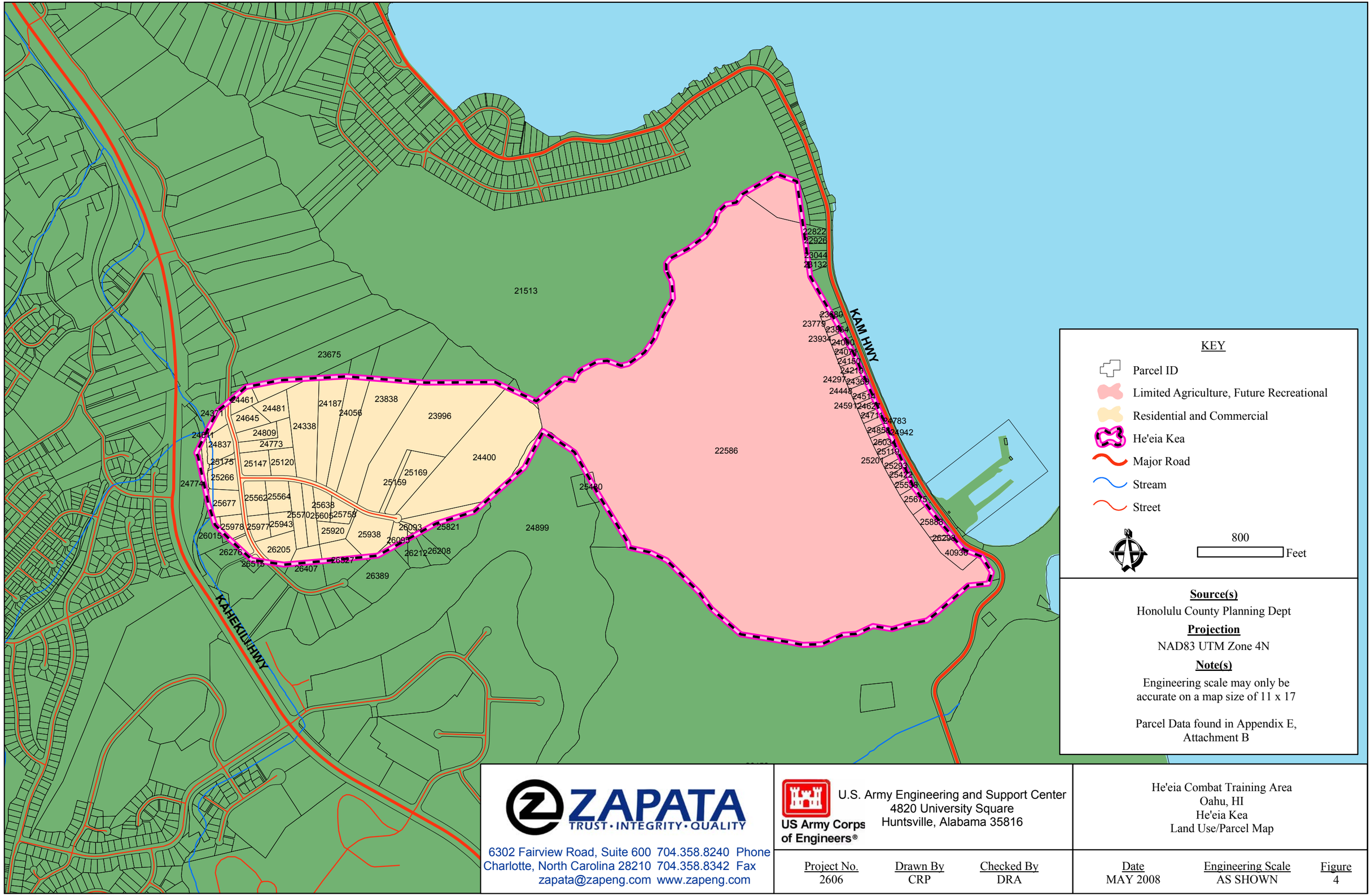
He'eia Kea
Clearance Areas and Intrusive Investigation Locations

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	3



KEY

- Parcel ID
- Limited Agriculture, Future Recreational
- Residential and Commercial
- He'eia Kea
- Major Road
- Stream
- Street

800 Feet

Source(s)

Honolulu County Planning Dept

Projection

NAD83 UTM Zone 4N

Note(s)

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Parcel Data found in Appendix E, Attachment B

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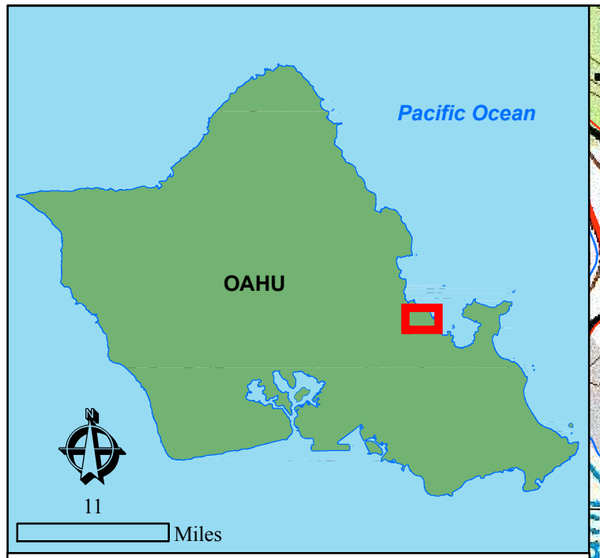
He'eia Kea
Land Use/Parcel Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	4



Area Overview

KEY

- He'eia Kea MRS
- He'eia Training Sites
- Major Road
- Stream
- Street

800 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

MRS - Munitions Response Site
MRA - Munitions Response Area

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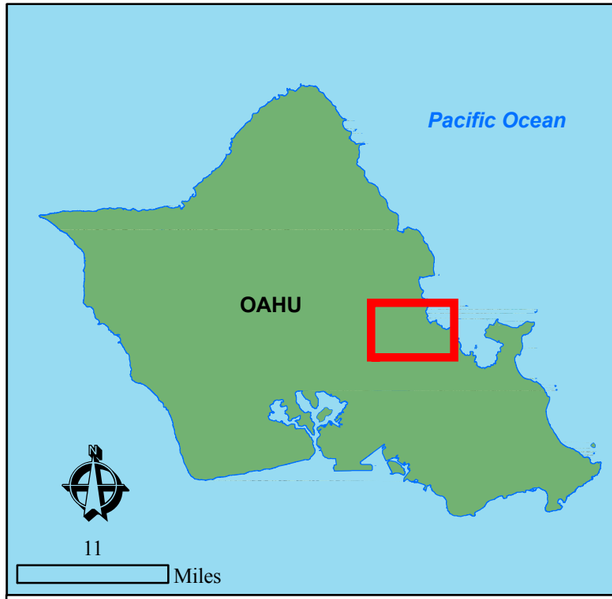
He'eia Combat Training Area MRA
Oahu, HI
He'eia Kea MRS
Site Location Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	5

APPENDIX B2

He'eia Combat Training Area, Kahalu'u



Area Overview

KEY

- Impact Area
- Kahalu'u
- Stream
- Street
- Major Road

2,000 Feet

Source(s)

Honolulu County Planning Dept

Projection

NAD83 UTM Zone 4N

Note(s)

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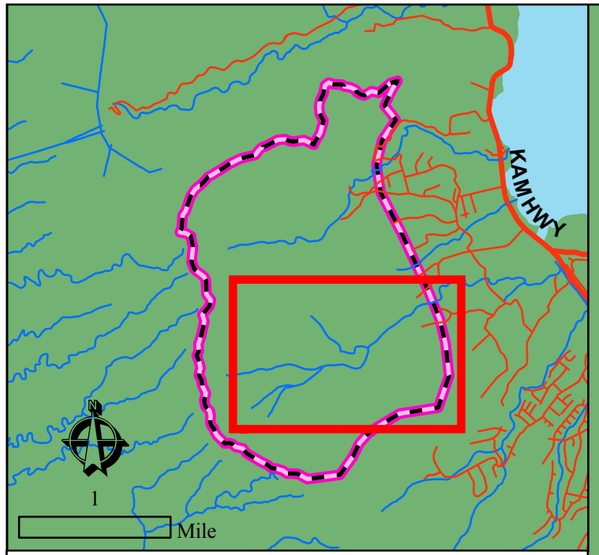
Oahu, HI
Kahalu'u
Site Location Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	1



Area Overview

KAH18G
KAH4T
Recon Grid
KAH1G
KAH2G
KAH4G
KAH3G
KAH17G
KAH5G
KAH6G
KAH7G
KAH1T
KAH15G
KAH8G
KAH2T
KAH16G
KAH9G
KAH3T
KAH10G
KAH11G
KAH14G
KAH12G
KAH13G

KEY

- Reconnaissance Path
- DGM Super Transects
- DGM Grids
- Reconnaissance Grid
- Kahalu'u
- Stream
- Street

N
500
Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

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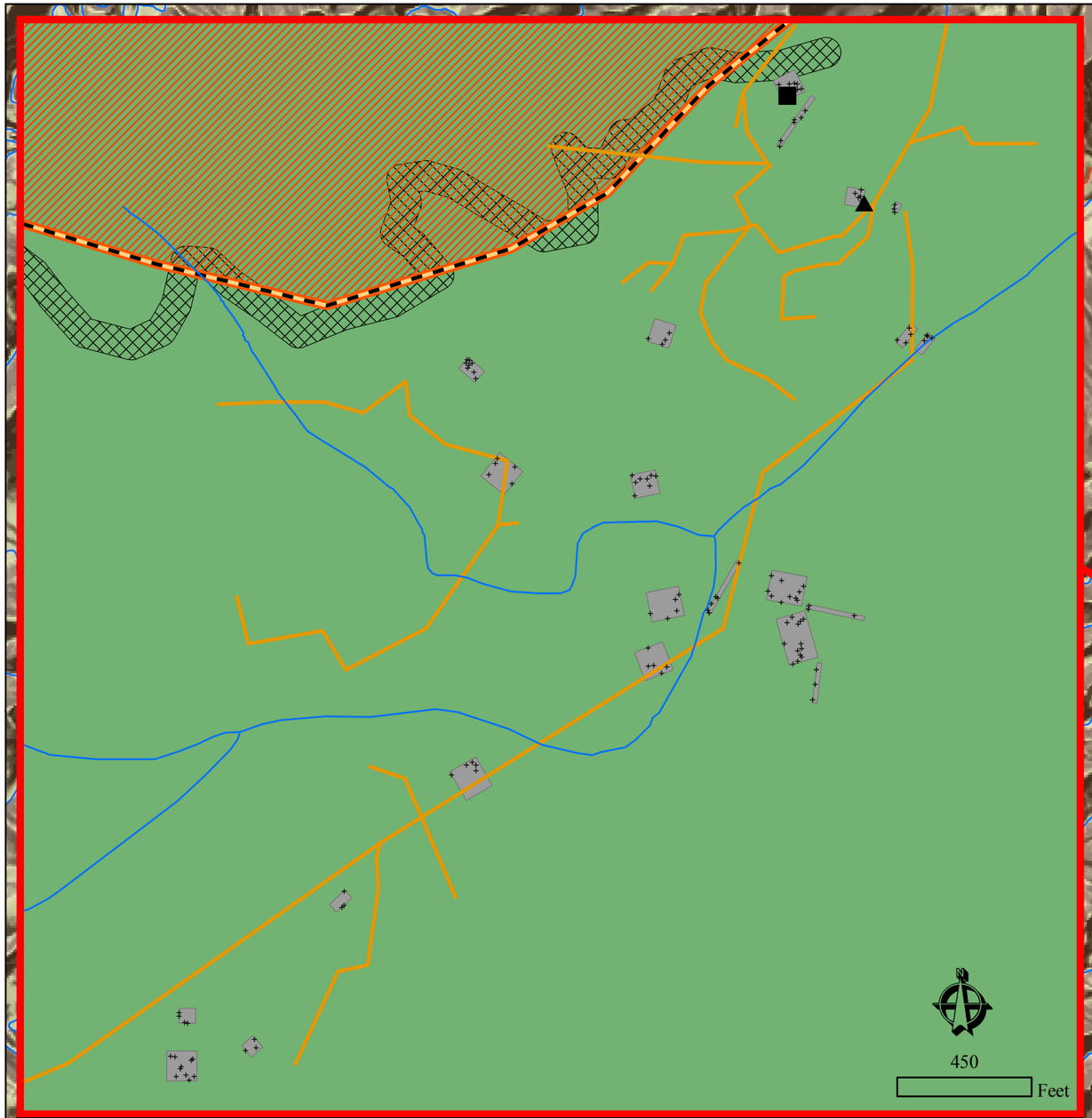
Kahalu'u
Site Investigation Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	2



Area Detail

Mortar Fuze and Target Location (Approximate)

KEY

- Targets/Digs
- 2.36-inch Rocket, Practice
- 37mm, Practice
- Reconnaissance Path
- DGM Super Transects
- DGM Grids
- Reconnaissance Grid
- Clearance Area - 66ac
- Impact Area
- Kahalu'u
- Stream
- Street
- Major Road

2,000 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

Recommended Clearance Areas are approximate 100-ft and 60-ft buffer-widths. The 100-ft buffer-width is at the base of the slope (<33%) within the impact area and the 60-ft buffer-width is around Kaalaea Stream within the impact area. The source data that buffers are based on (a Digital Elevation Model) has an accuarcy of 30ft. The actual location should be determined in the field.

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Kahalu'u
Clearance Areas and Intrusive Investigation Locations

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	3

Area Detail

700 Feet

Area Detail

300 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

Parcel Data found in Appendix E, Attachment B

Senator Fong's Plantaion and Gardens is the area where the right-of-entry did not coincide with field efforts

KEY

- Parcel ID
- Forest/Recreational
- Residential/Agricultural Mix
- Senator Fong's Plantation and Gardens
- Kahalu'u
- Stream
- Street
- Major Road

2,000 Feet

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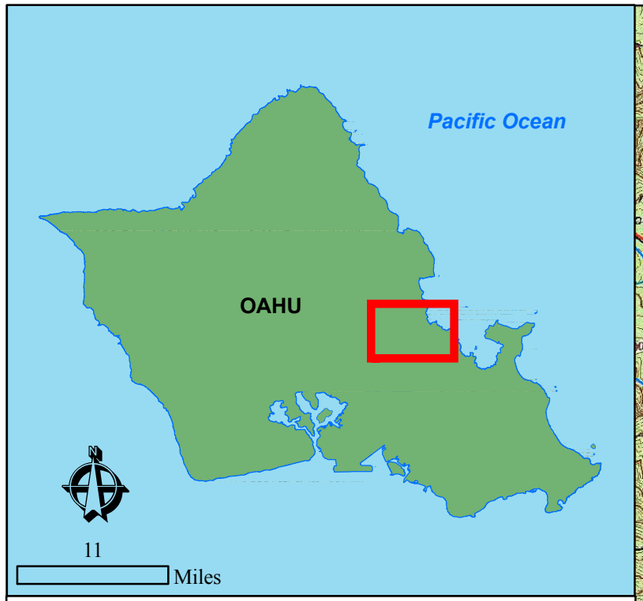
Kahalu'u
Land Use/Parcel Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	4



Area Overview

KEY

- Impact Area
- Kahalu'u MRS
- Stream
- Street
- Major Road

2,000 Feet

Source(s)

Honolulu County Planning Dept

Projection

NAD83 UTM Zone 4N

Note(s)

Engineering scale may only be accurate on a map size of 11 x 17

MRS - Munitions Response Site
MRA - Munitions Response Area

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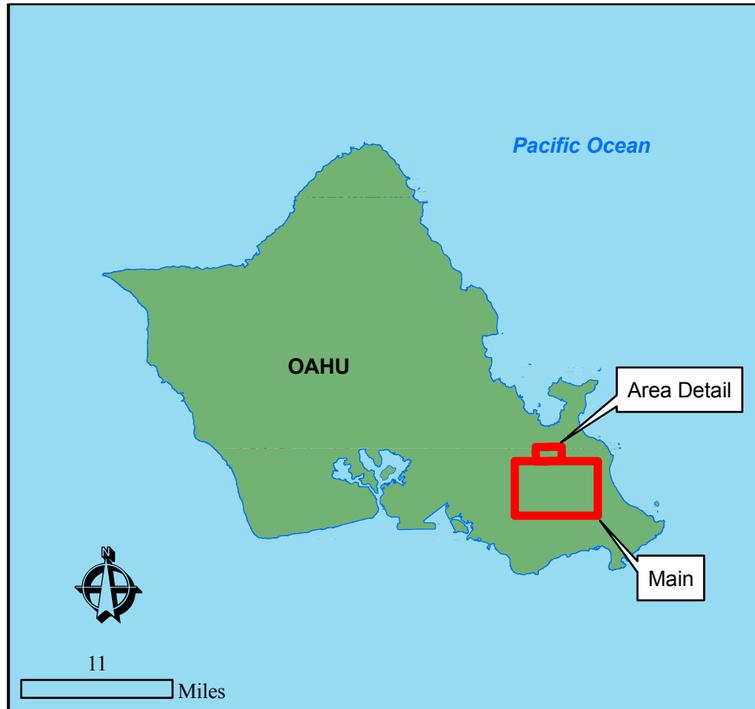
Oahu, HI
Kahalu'u MRS
Site Location Map

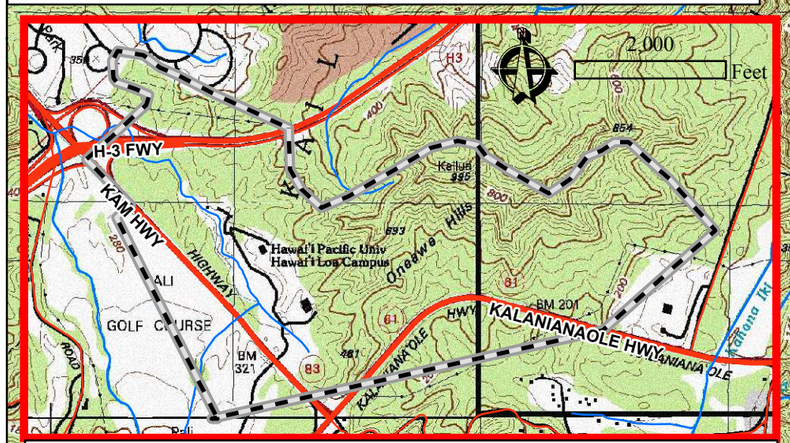
Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	5

APPENDIX B3

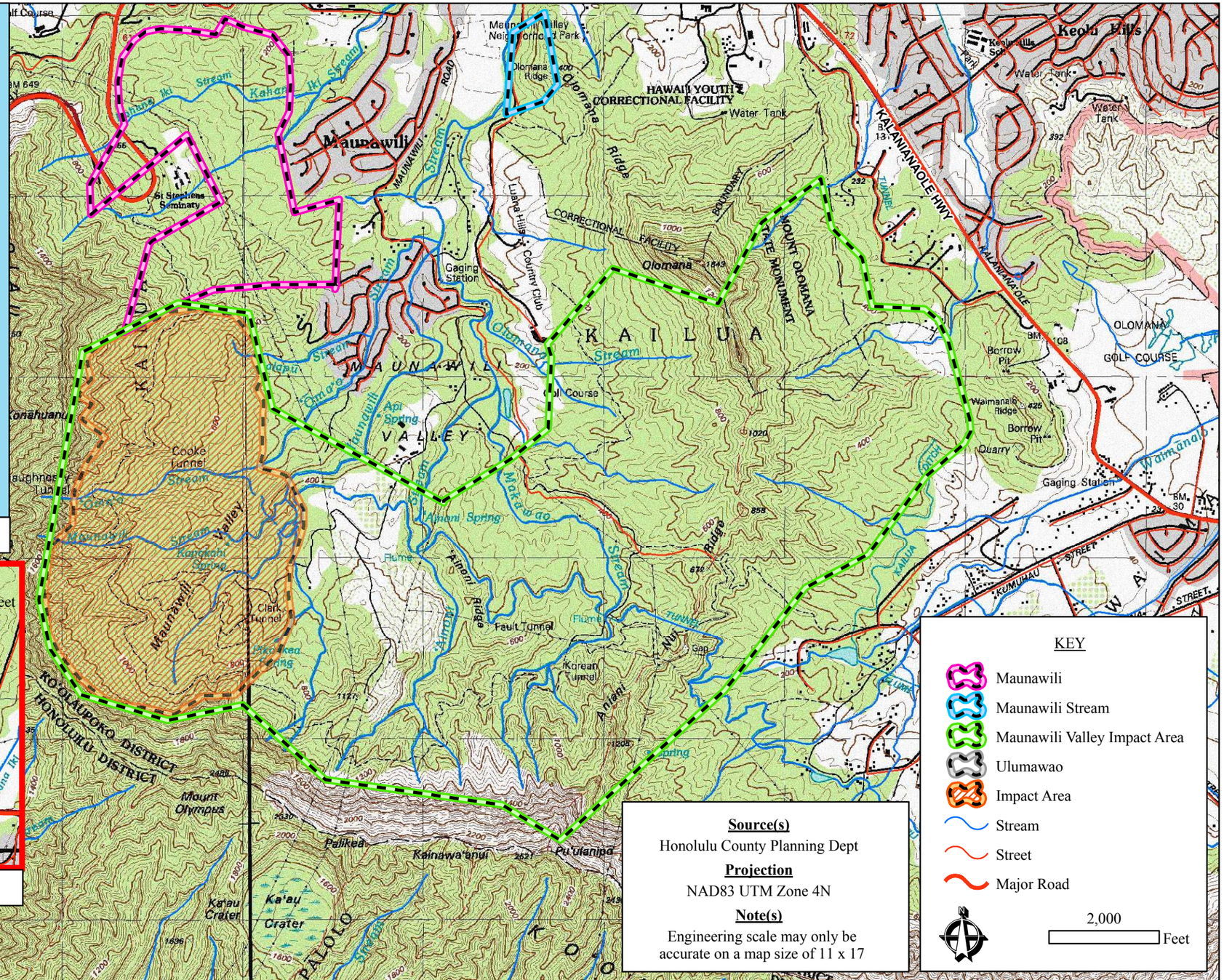
Pali Training Camp



Area Overview



Area Detail



KEY

- Maunawili
- Maunawili Stream
- Maunawili Valley Impact Area
- Ulumawao
- Impact Area
- Stream
- Street
- Major Road

2,000 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

Note(s)
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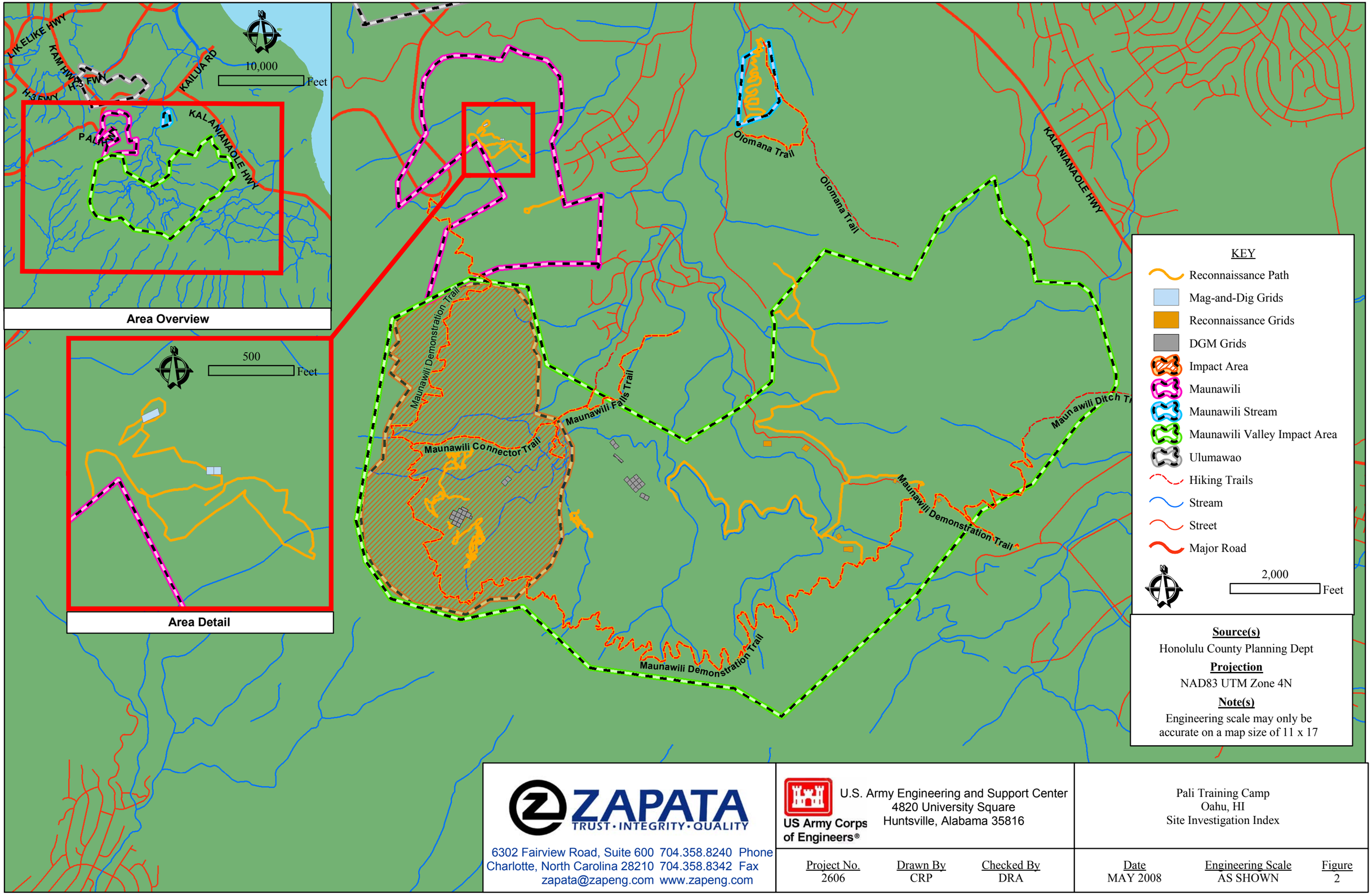
Pali Training Camp
Oahu, HI
Site Location Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	1



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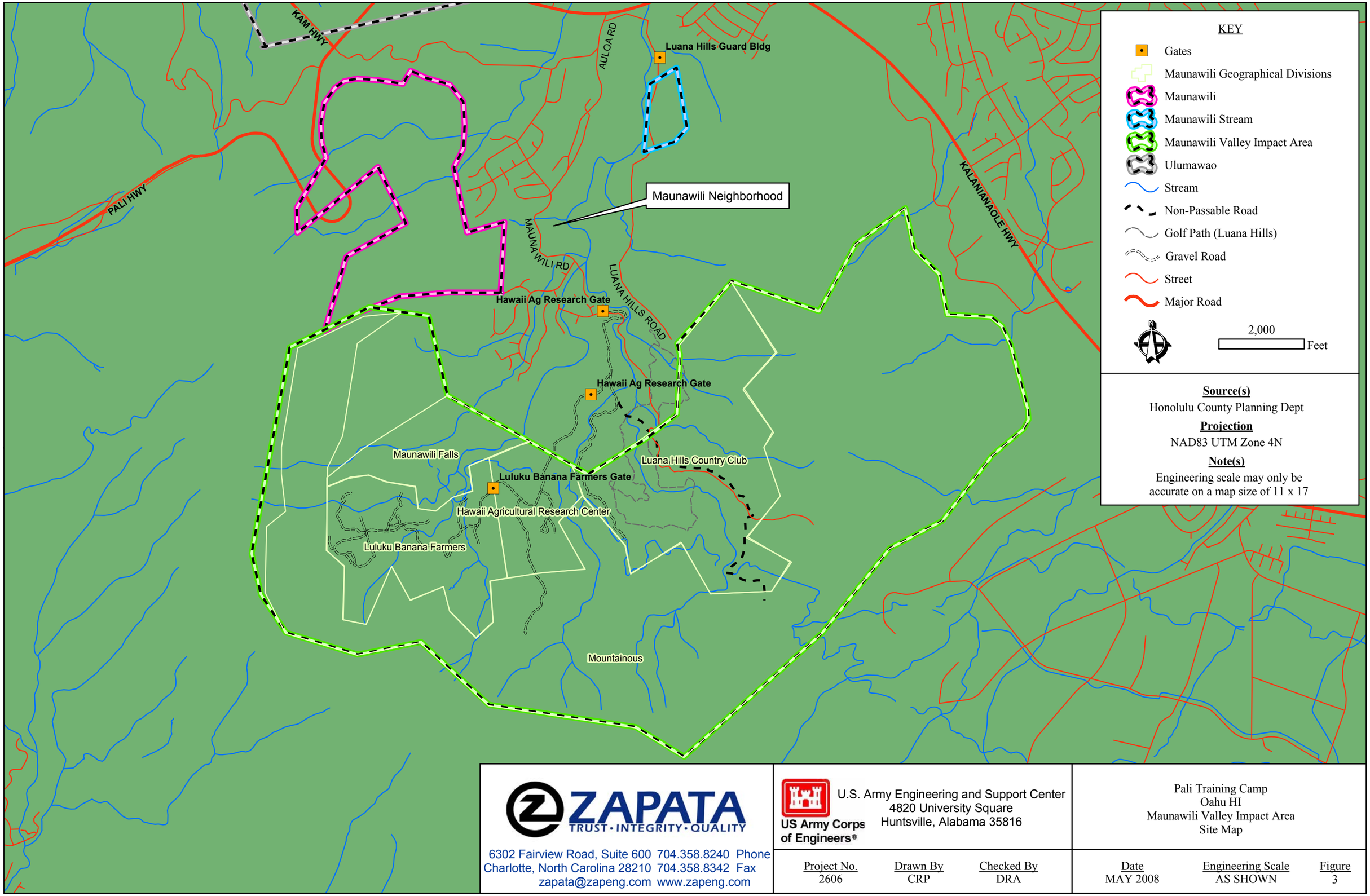
Pali Training Camp
Oahu, HI
Site Investigation Index

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	2



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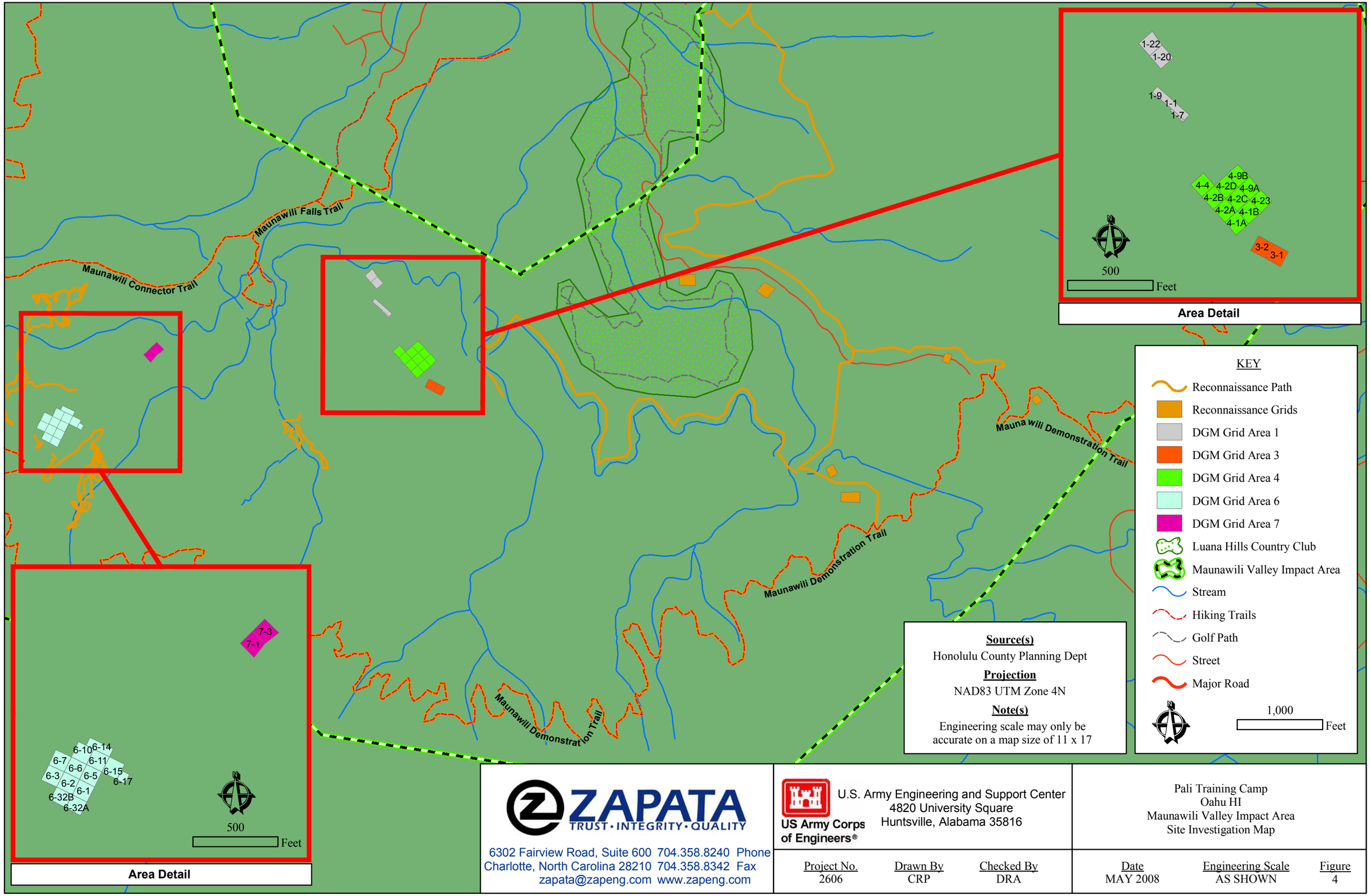
Pali Training Camp
Oahu HI
Maunawili Valley Impact Area
Site Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	3



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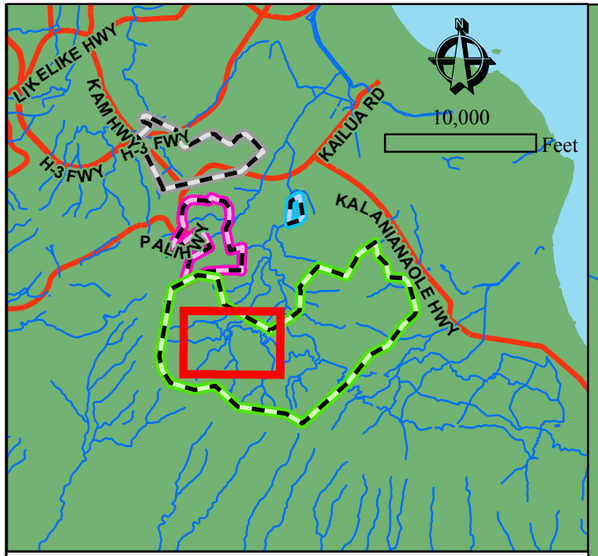
Pali Training Camp
Oahu HI
Maunawili Valley Impact Area
Site Investigation Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	4



Area Overview

KEY

- Targets/Digs
- 37mm AP-T
- 75mm HE Projectile
- 75mm Part
- 75mm Shrapnel Projectile
- Fuze Portion
- HE Fragment
- DGM Grid Area 1
- DGM Grid Area 3
- DGM Grid Area 4
- DGM Grid Area 6
- DGM Grid Area 7
- Maunawili
- Maunawili Stream
- Maunawili Valley Impact Area
- Ulumawao
- Stream
- Gravel Road
- Major Road

400 Feet

Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

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Pali Training Camp
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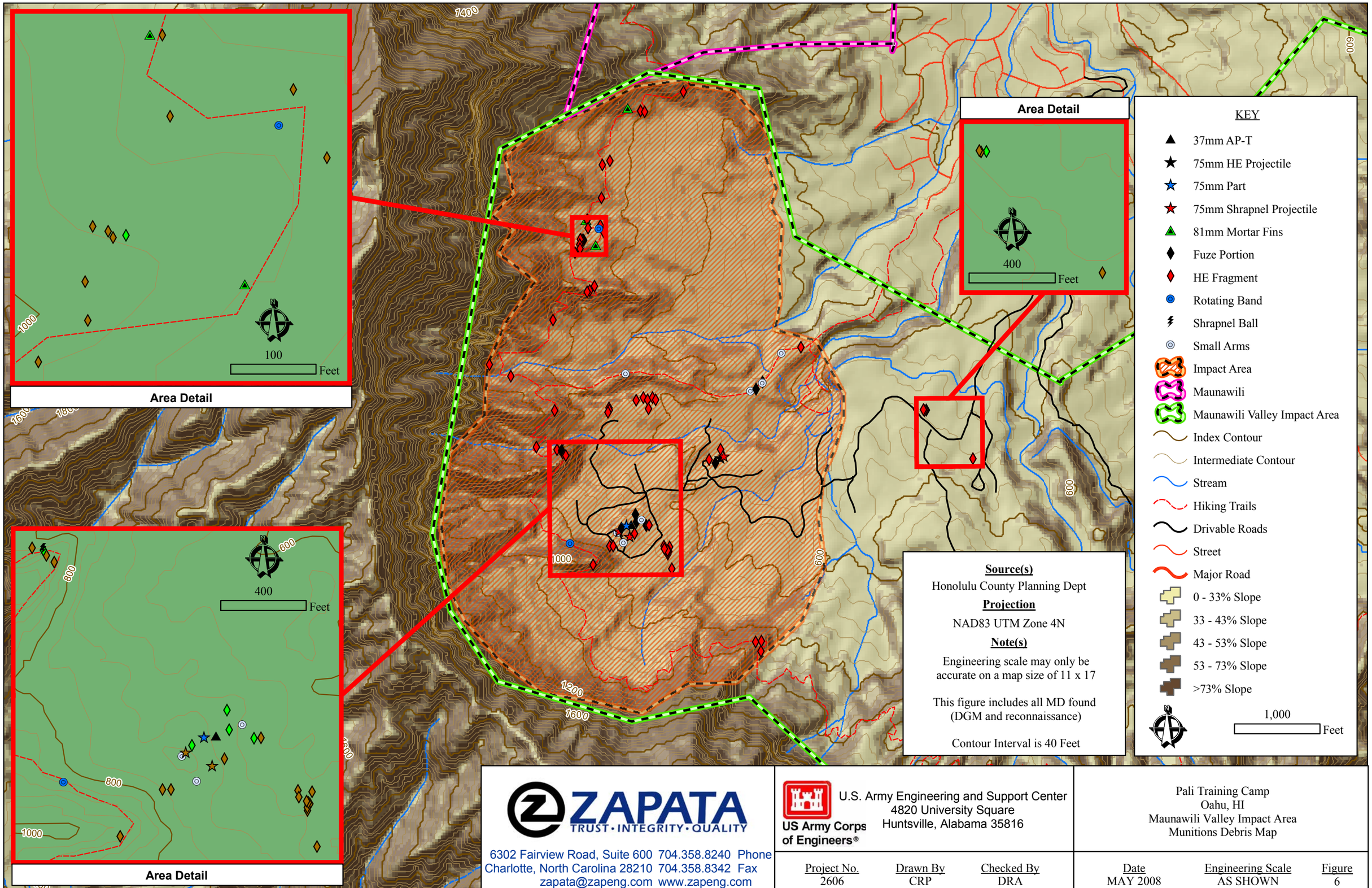
Maunawili Valley Impact Area
Intrusive Investigation Locations

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	5



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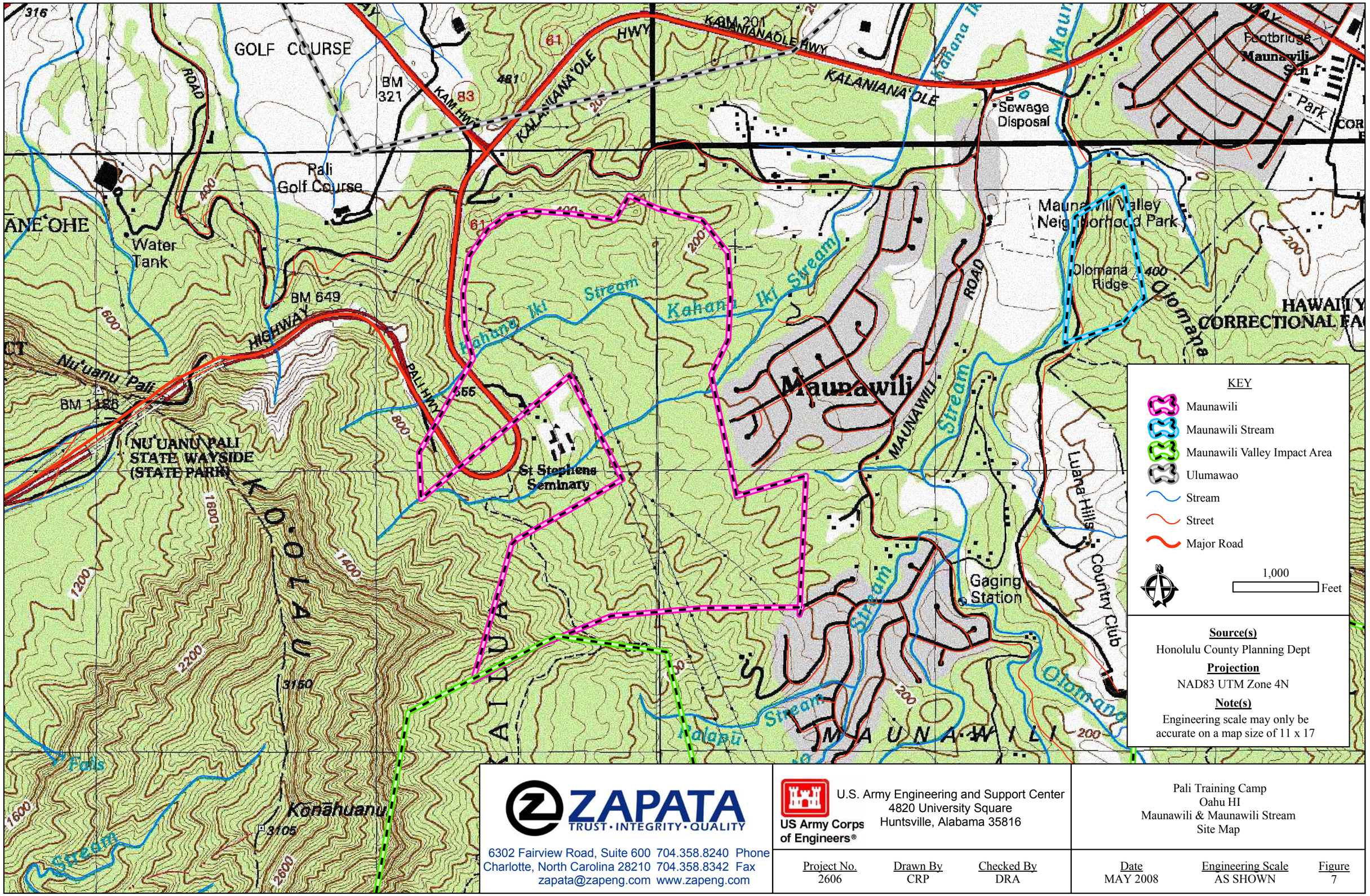
Maunawili Valley Impact Area
Munitions Debris Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	6



Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

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Pali Training Camp
Oahu HI
Maunawili & Maunawili Stream
Site Map

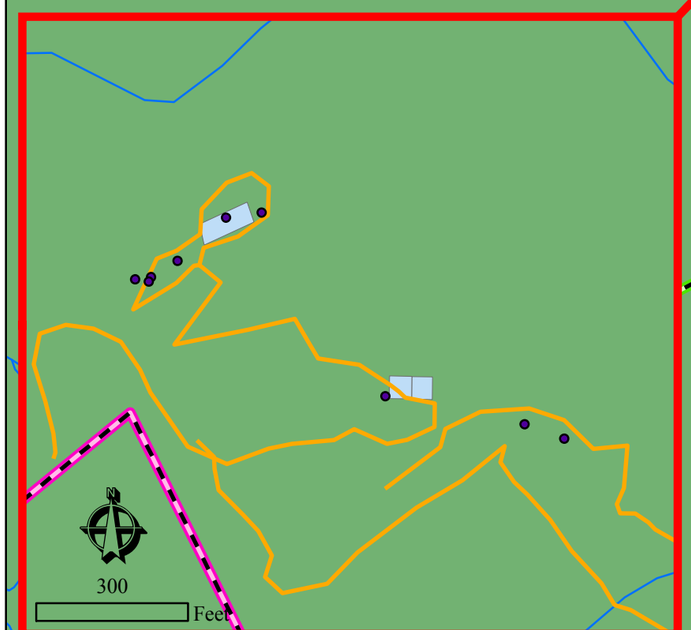
Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	7

KALANIANAOLE HWY

KAM HWY

KALANIANAOLE HWY

PALI HWY



Area Detail

KEY

- Foxhole
- Potential Observation Point
- Reconnaissance Path
- Mag-and-Dig Grids
- Maunawili
- Maunawili Stream
- Maunawili Valley Impact Area
- Ulumawao
- Stream
- Street
- Major Road

1,000 Feet

Source(s)

Honolulu County Planning Dept

Projection

NAD83 UTM Zone 4N

Note(s)

Engineering scale may only be accurate on a map size of 11 x 17

Only small arms and CD were found in Mag-and-Dig Grids

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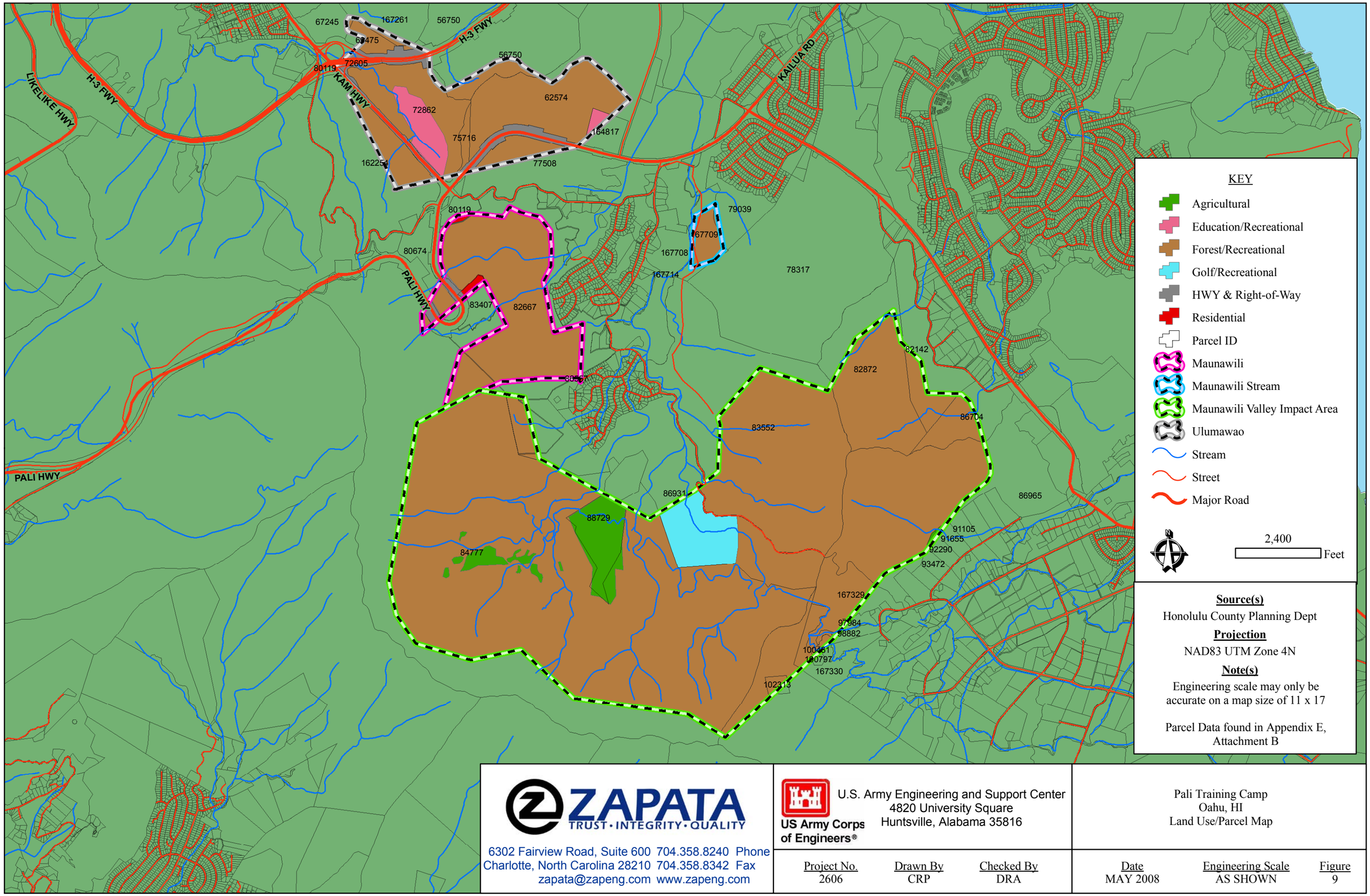
Site Investigation Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	8



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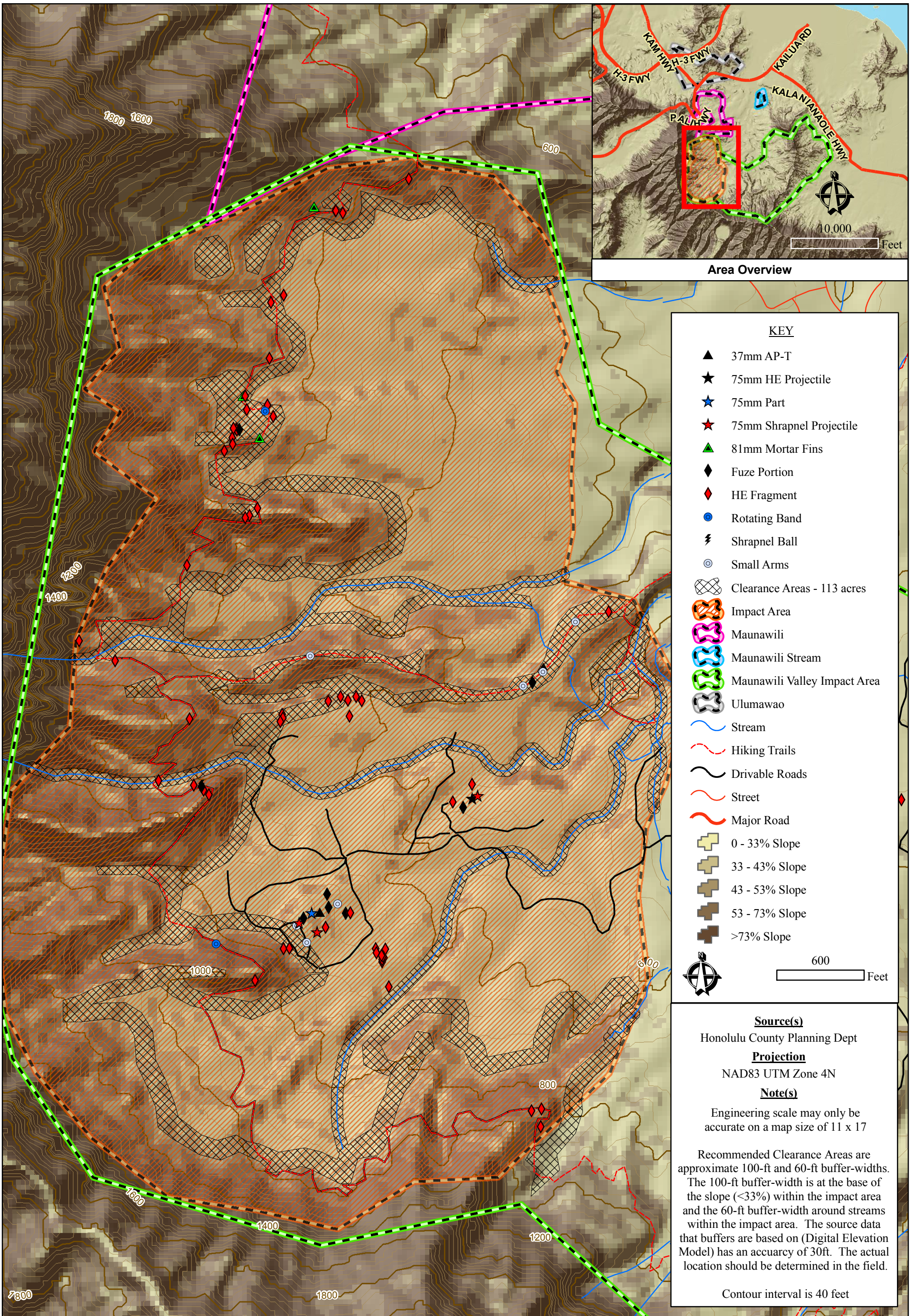
Pali Training Camp
Oahu, HI
Land Use/Parcel Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	9



Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

Recommended Clearance Areas are approximate 100-ft and 60-ft buffer-widths. The 100-ft buffer-width is at the base of the slope (<33%) within the impact area and the 60-ft buffer-width around streams within the impact area. The source data that buffers are based on (Digital Elevation Model) has an accuarcy of 30ft. The actual location should be determined in the field.

Contour interval is 40 feet

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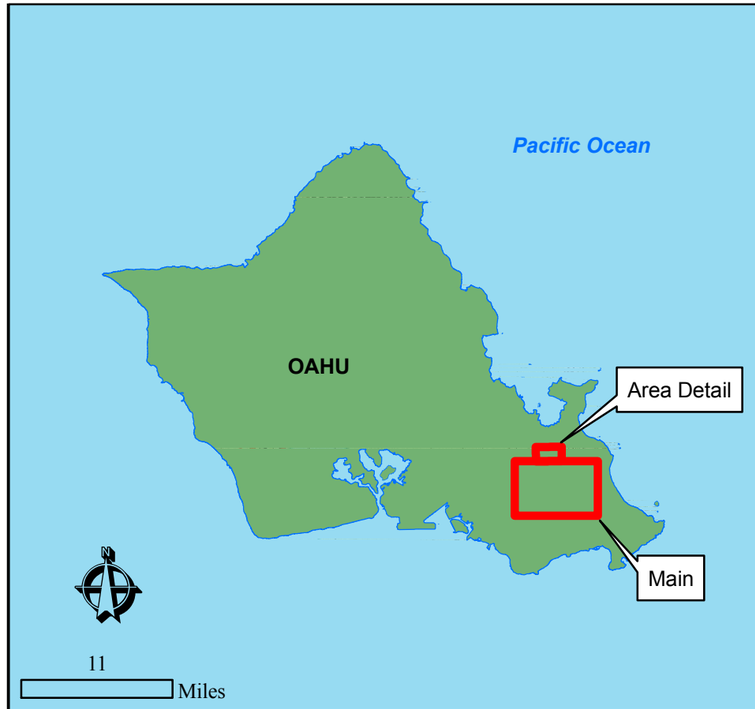
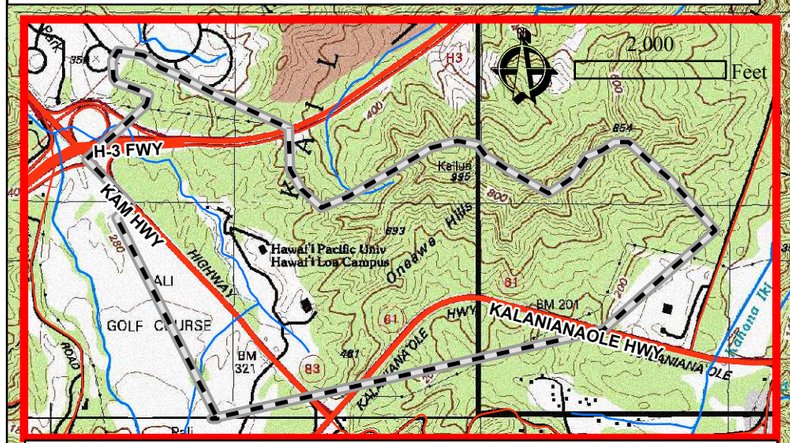
Pali Training Camp
Oahu, HI
Maunawili Valley Impact Area
Clearance Areas

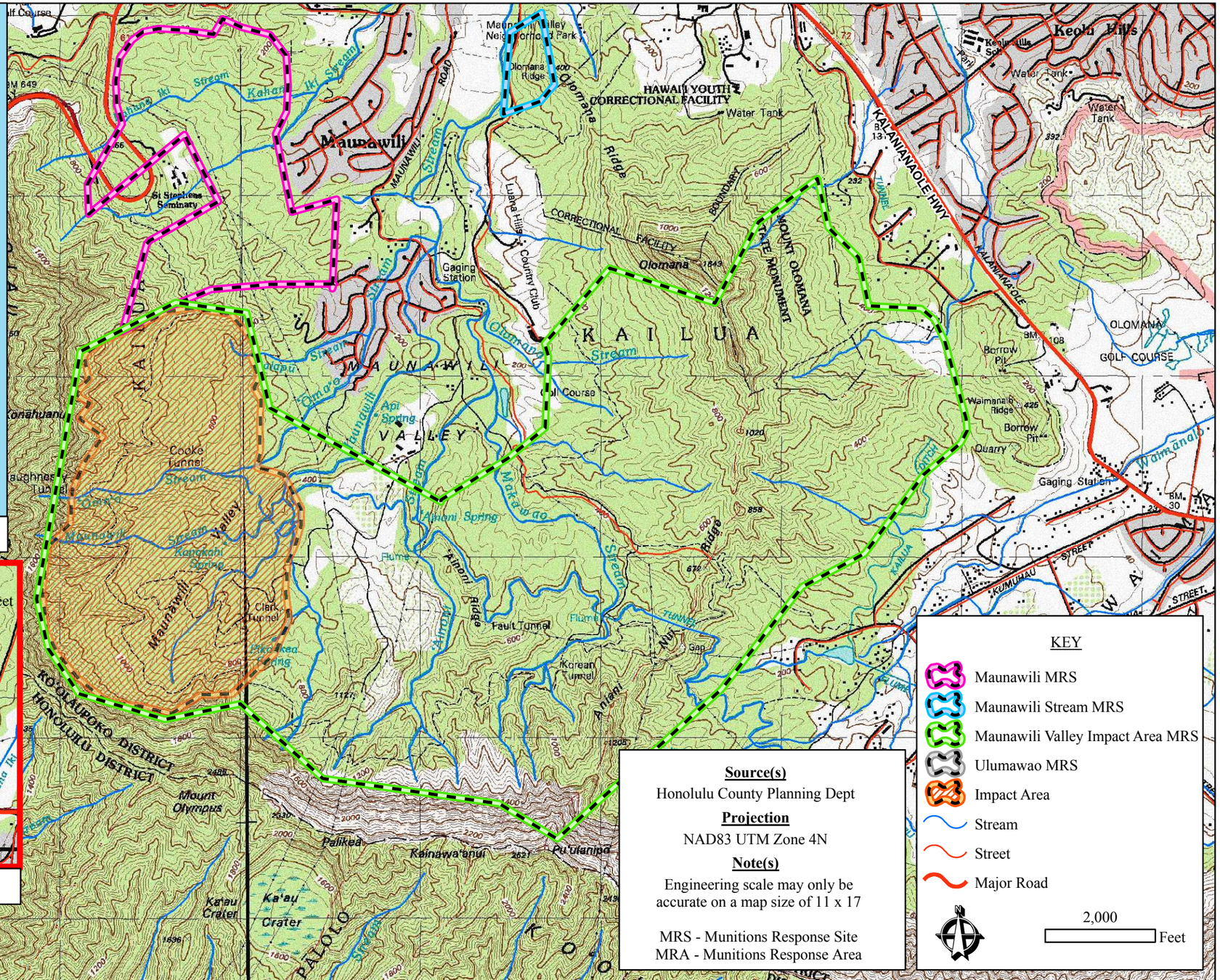
Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	10



Area Overview



Area Detail



Source(s)
Honolulu County Planning Dept

Projection
NAD83 UTM Zone 4N

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

MRS - Munitions Response Site
MRA - Munitions Response Area

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Pali Training Camp MRA
Oahu, HI
Site Location Map

Project No.	Drawn By	Checked By	Date	Engineering Scale	Figure
2606	CRP	DRA	MAY 2008	AS SHOWN	11

APPENDIX C

Scrap Disposition Documentation

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Scrap Disposition Documentation for the He'eia Combat Training Area

Approximately four pounds of munitions debris was recovered during EE/CA field operations between the He'eia Combat Training Area parcels He'eia Kea and Kahalu'u. The munitions debris was physically inspected and certified to be free of explosive hazard and turned over to a scrap dealer on July 2003. However, the scrap disposal certificate could not be located at the time of this report.

Scrap Disposition Documentation for the Pali Training Camp

Zapata Engineering
Pali Training Camp
Munitions Debris Disposition

October 23, 2006

I certify that the approximately 35 lbs of Munitions Debris discovered and collected during the Intrusive Phase of Pali of the Heeia-Pali EE/CA (September 2006) have been physically inspected and are Certified to be Free of Explosive Hazards. Subsequently, this scrap is to be turned over to Zapata's Schofield Barracks Project for inclusion into that project's Scrap Collection and Turn-In.

Chris Rose
Quality Control Officer
Zapata Engineering

I certify that the above referenced Scrap has been received and is Free of Explosive Hazards.

Schofield Project Representative
Damon Austin

10-23-2006
Date

APPENDIX D

Demolition Activity Summation Tables

(No Demolition Activities were Conducted)

APPENDIX E

Institutional Analysis Report

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INSTITUTIONAL ANALYSIS REPORT
HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP

1.0 PURPOSE OF STUDY

This Institutional Analysis Report has been prepared to support the recommendations presented in the Engineering Evaluation/Costs Analysis (EE/CA) addressing the He'eia Combat Training Area and Pali Training Camp, Oahu, Hawaii. This analysis presents the opportunities to implement an institutional control program and identifies parties that may be available to assist with implementation and/or maintenance of the Institutional Control Program. This report identifies the agencies having jurisdiction over ordnance-contaminated land and assesses their appropriateness, willingness and capability to assert this control.

1.1 INSTITUTIONAL CONTROLS

As presented in the EE/CA, the proposed recommendations for He'eia Kea, Kahalu'u and Pali Maunawili Valley Impact Area include additional signs and continued restricted access, where appropriate. Current controls already in place include restricted access through locked gates, fences and natural barriers to some of the sites. Institutional controls such as signage and letters of notice/educational pamphlets were recommended because they provided the most effective controls available to limit public exposure to the possible ordnance that may be located within the areas identified during the EE/CA site characterization.

1.2 STUDY APPROACH

This report has been prepared by Zapata Incorporated (ZAPATA) to detail the institutional controls in accordance with the guidance developed by the United States Army and Engineering Support Center Huntsville (USAESCH). Local and private interests' cooperation is required for these institutional controls to be effective. The US Army Corps of Engineers, Honolulu District (CEPOH) has developed a whole suite of institutional controls for Hawaii properties which can be built upon to accommodate the He'eia Combat Training Area and Pali Training Camp and, as such, no State or Federal agencies were interviewed as to their concerns and capabilities to exercise these institutional controls over the property.

1.3 STUDY OVERVIEW

This study generally outlines which agencies have jurisdiction over the He'eia Combat Training Area and Pali Training Camp and assesses their capabilities and willingness to support and enforce the institutional controls set forth in the EE/CA.

2.0 SITE LOCATION

The He'eia Combat Training Area and the Pali Training Camp consist of six separate parcels on the windward side of the Island of Oahu, Hawaii. The He'eia Kea tract consists of an approximate 204-acre parcel situated in He'eia Kea, while the larger Kahalu'u tract covers approximately 2,254 acres. Both parcels are situated within the district of Ko'olau Poko near Kane'ohe Bay northwest of He'eia. The Pali Training Camp consists of four non-contiguous parcels near Kailua, in portions of Makali'i and Maunawili Valleys.

2.1 PHYSICAL DESCRIPTION

2.1.1 He'eia Combat Training Area

2.1.1.1 He'eia Kea

The hourglass-shaped He'eia Kea parcel covers approximately 204 acres located on the coastal plain adjacent to and on the slopes of Pu'u Ma'eli'eli, near the He'eia small boat harbor. The site is bordered to the east (makai – toward the ocean) by the Kamehameha Highway to the west (mauka – toward the mountains) by Kahekili Highway and the residential areas. (Figure 1, Appendix B1). The parcel's northern boundary follows the crest of the ridge down slope past the sewage disposal plant, and both the northern and the southern boundary generally follow ridges to the Kamehameha Highway. Most of this parcel is covered with dense vegetation including the densely forested coastal plain and thick grasses and shrubs in the higher elevations. There are several gulches throughout the parcel as well as areas with steep slopes. Elevations within the He'eia Kea parcel range from approximately 20 feet above mean sea level (MSL) to over 700 feet above MSL.

2.1.1.2 Kahalu'u

The Kahalu'u parcel covers approximately 2,254 acres, much consisting of densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys in Kahalu'u, Hawaii (Figure 1, Appendix B2). Both valleys consist of a mix of residential and agricultural lots (USACE, 1993). The western boundary is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet above MSL. The eastern portion of the site overlaps with residential and agricultural plots along the edge of the Waiahole Forest Reserve (AMEC, 2001). Pu'u Kuolani and Kalahaku Ridge bound the parcel to the north and south, respectively. Portions of the site within both valleys contain permanent streams that are subject to flash flooding during storms (AMEC, 2001).

2.1.2 Pali Training Camp

The Pali Training Camp is comprised of four non-contiguous properties totaling approximately 4,396 acres located near the base of Ko'olau Range primarily within Maunawili Valley (Figure 1, Appendix B3). The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* portion of Maunawili Valley and includes the suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. This parcel ranges in elevation from approximately 200 feet MSL near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second, much smaller parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet MSL (AMEC, 2001). The third parcel, the Maunawili Stream Site, formerly known as Makali'i Valley, is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana. It ranges in elevation from approximately 50 to 200 feet MSL. The fourth and second largest parcel (500 acres), called the Ulumawao site, is located outside the Maunawili Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

2.2 SITE HISTORY

2.2.1 He'eia Combat Training Area

2.2.1.1 Property Ownership

The He'eia Combat Training Area consisted of two parcels which were acquired in 1943 by lease, license, or owner permission of the Bernice Pauahi Bishop Estate, Sing Chong Company, Ltd., and numerous other private landowners. The camp was dismantled in 1945 and the impact area was cleared of ordnance by the Army. Per the DERP-FUDS Inventory Project Report, "Documents could not be located evidencing acquisition of the two parcels for use by the U.S. Armed Forces" (USACE, 1993). Likewise, such documentation was not found during historical research conducted during development of the EE/CA work plan.

2.2.1.1.1 He'eia Kea

The City & County of Honolulu currently owns the majority (eastern portion) of the He'eia Kea parcel with plans of developing a park (as seen on Figure 4, Appendix B1). The western portion of He'eia Kea has a mix of residential and commercial owners.

2.2.1.1.2 Kahalu'u

The Kahalu'u parcel is composed of two valleys, the Waihe'e and Ka'alaea Valleys. The majority of the Ka'alaea Valley (over 80 percent) is owned by the Fong Family and operated as Senator Fong's Plantation and Gardens. The Ka'alaea Valley is the location of the live fire impact area. The majority of the Waihe'e Valley (approximately 90 percent) is owned by the City & County of Honolulu. The remainder is a mix of farming and residential property and

2.2.1.1.2.1 Senator Fong's Plantation and Gardens

Senator Fong's Plantation and Gardens account for over 700 acres of the Ka'alaea Valley and rise from 80 feet above sea level to 2,600 feet at the top of the Ko'olau Mountains. The land was purchased by Hiram L. Fong in 1950; Hiram Fong (1906-2004) served in the US Senate from 1959 to 1977. After retirement, Mr. Fong and his wife managed the gardens, which were opened to the public in 1988. Senator Fong's Plantation and Gardens give guided tours of various gardens, hosts special events (e.g. weddings and receptions), and conducts workshops, such as lei making. There are five different tour areas ranging from low valley to high ridgeline; i.e. Eisenhower Plateau, Ford Plateau, Johnson Plateau, Kennedy Valley, Lunalilo Heights, and Nixon Valley.

2.2.1.2 Military Activity

An encampment supporting 4,500 personnel compromising up to four infantry battalions was constructed in October 1943 including barracks, a mess hall, an open-air theater, a motor pool, and an ammunition storage shed on the He'eia Kea parcel. The He'eia Kea parcel supported the US Army's 98th Regimental Combat Team. Training facilities included several small arms ranges, a hand-grenade range, an infiltration course, two bayonet courses, two obstacle courses, a shipside platform, and a maneuver area (Hawaiian HQ, Department of Army, 1943). The (larger) Kahalu'u tract was reportedly utilized as maneuver and impact areas for jungle and assault training. An impact area is suspected for the firing of field artillery pieces, mortar, bazooka, and other assault weapons using live and practice rounds (INRP, 1993). By the end of 1945, structures and training facilities at both parcels were dismantled..

2.2.2 Pali Training Camp

2.2.2.1 Property Ownership

The training camp was opened in 1943 on property owned by Harold K. Castle (doing business as [dba] Kane'ohe Ranch). Documentation evidencing property acquisition could not be located following research at several locales. The municipal Pali Golf Course, privately owned Ko'olau Golf Course, and Hawaii Pacific University presently occupy the parcel previously supporting the primary troop encampment at the base of Nu'uanu Pali (Ulumawao). Other portions of the former artillery impact area at Maunawili and Makali'i Valleys (Maunawili Valley Impact Area and Stream Area) are presently owned by the Luana Hills Country Club, the Hawaii Agricultural Research Center (formerly Hawaii Sugar Growers Association) and multiple private landowners.

2.2.2.2 Military Activity

In 1943, Pali was established as a regimental combat team training center, emphasizing the use of and familiarity with modern arms and field weapons. In addition, the camp provided rugged terrain for jungle and Ranger training. Several military structures were erected for use, but by 1946, all were dismantled and removed from the property. Valley residents report that artillery rounds were fired into Maunawili Valley from firing points at the mouth of the valley or from other locations within Kailua. Although the 212th Ordnance Disposal Squad conducted ordnance clearance in 1945, a public warning was issued in June 1948 by the Commanding Officer of the Army Ordnance Services to exercise caution when entering former training areas (Maunawili Valley). A ranch manager reported a "155mm round" in the Maunawili Valley (USACE, 1995) and a few claims have been made by local residents about finding duds and .30 caliber blanks. No reports of MPPEH in Maunawili or Makali'i Valleys have been substantiated (USACE, 1995). It is also reported by local residents that mortar rounds and machine gun bullets were frequently turned over in plowed fields (USACE, 1995). During the Geophysical Prove-Out conducted in March 2002, it was reported by a worker on a movie set within the Maunawili Valley Impact Area that a 20mm projectile was recently found.

3.0 METHODOLOGY

3.1 RESPONSE STRATEGIES

Three general response categories for ordnance remaining on former training sites include:

- Removal
- Access Control
- Behavior Modification.

The removal of all ordnance from a former training site is the ultimate goal; however, on certain sites this cannot be guaranteed. Some sites many be too large to identify all the possible ordnance. Ordnance depth, soil type/ground cover (e.g.: hardened lava), and terrain may contribute difficulty in removing all ordnance. Site access may be another issue for some sites.

When the complete removal of all ordnance cannot be carried out, Access Control and Behavior Modification become necessary. Access Controls and Behavior Modification are also known as institutional controls. Institutional Controls can be implemented as simply as placing signs around an area to warn of the possible dangers, to restricting access to the area of concern, to

deed restrictions. Institutional Controls must be performed with a joint effort of the property owner(s), and local and/or state officials. Institutional Controls are not effective if there is not the complete participation from all parties.

Like all response plans, institutional controls must start with data collection, including obtaining responses to questions within the Institutional Control Survey, as seen in 4.3.1.

3.2 ANALYSIS METHODOLOGY

In order to determine the correct institutional controls for the He'eia Combat Training Area and Pali Training Camp, the following issues were considered:

- Future land use
- Possible Public Access to the Site
- Restricting Personnel on Site.

After these issues have been dealt with, the proper institutional controls can be implemented with the cooperation of the landowner, local and/or state officials.

4.0 SCOPE OF EFFORT

4.1 INTERVIEW SELECTION

Interviews with the CEPOH have occurred through electronic mailing (emails) and telephone conversations. CEPOH has developed an extensive suite of institutional controls for Hawaii properties and will perform the Institutional Control Survey to obtain the needed information from these contacts. Therefore surveys are not attached to this report.

4.2 INTERVIEW CATEGORIES

CEPOH will identify individuals and agencies that identified that best represent the He'eia Combat Training Area and Pali Training Camp and conduct interviews. During the interviews, additional agencies may become relevant for the institutional controls to work. These agencies will also be contacted by CEPOH for future interviews.

4.3 INTERVIEW SUMMARY

4.3.1 Interview Questions

Twelve questions concerning the interviewees are represented on the Institutional Control Survey. The following are included for each interview (see Attachment A):

- Date survey was taken.
- Agency survey was given to.
- Point of Contact
- Phone Number
- Agency Authority and Basis of Authority
- Origin of Agency
- Agency's Mission
- Sunset Provision
- Geographical Jurisdiction
- Public Safety Function (if applicable)

- Land use Control Function (knowledge of current controls)
- Desire to Participate in the Institutional Control Program
- Ability to Partner with other Agencies (which ones)
- Desire to Participate in Institutional Control Program
- Financial Capability
- Constraints to Institutional Effectiveness

4.3.2 Interview Results

None. CEPOH will conduct interviews.

5.0 SELECTION CRITERIA

The selection criteria include jurisdiction, authority and mission.

6.0 ACCEPTANCE OF JOINT RESPONSIBILITY

CEPOH will provide the names of the agencies interviewed that expressed interest in participating in the Institutional Controls Program.

7.0 TECHNICAL CAPABILITY

Based on the site recommendations, the most technically complex aspect is placement of signs. Current controls in place require no additional technical capability.

8.0 INTERGOVERNMENTAL RELATIONSHIPS

Applicable intergovernmental relationships exist between the Hawaii Department of Natural Resources, USFWS, and USACE.

9.0 STABILITY

CEPOH will interview all parties to determine stability.

10.0 FUNDING SOURCES

The Defense Environmental Restoration Account (DERA) funds the FUDS program, and will provide funding. The funding is programmed annually and supported by congressional appropriations. Programming is also reviewed annually and can be modified, if necessary.

11.0 RECOMMENDATIONS

CEPOH will determine recommendations.

12.0 INSTITUTIONAL CONTROL ALTERNATIVES ANALYSIS

Managing risks related to an ordnance hazard can be accomplished through conventional removal, access control, public education or a combination of these strategies. Three causative factors to avoid and understand that help prevent any ordnance-related accidents:

- Presence of Ordnance
- Access to Ordnance
- Behavior with Ordnance.

If there is no ordnance on a site, there is no possibility for an ordnance-related accident and, conversely, if there is ordnance present, there is the risk of an ordnance-related accident. If access to the ordnance site is restricted and people are educated about the risk of ordnance, the chance of an ordnance-related accident could be reduced.

Institutional Control Alternatives and recommendations presented in this report are based on the assumption that public access to specific areas within the He'eia Combat Training Area and Pali Training Camp sites will be restricted to authorized personnel only. Access to hiking trails and recreational areas are assumed unrestricted.

12.1 INSTITUTIONAL CONTROL BREAKDOWN

There are many ways to protect the public from ordnance related accidents. The institutional controls provided in the EE/CA are the best way to protect the public and other personnel, while still maintaining each site's day-to-day operations. The following sections break down and briefly describe the proposed actions and controls for the He'eia Combat Training Area and Pali Training Camp.

12.1.1 Warning Signs

Signs are an effective way to inform personnel of the hazards in the area. They can also keep unauthorized personnel from entering a hazardous area. Warning Signs should be placed on the outer boundary of the site warning the public of the possible danger if they come closer to the site. The cost of this alternative can be found in the EE/CA report in Appendix F.

12.1.2 Educational Programs

The use of educational programs is an effective means to reduce risk from public exposure to munitions and explosives of concern (MEC). Education can be tailored to meet site-specific needs. Examples of educational programs include public notices and formal education sessions. Educating the local community is an important aspect of any institutional control program. Public awareness of the hazards associated with a site will encourage the public to take the necessary precautions to avoid exposure. Educational programs may be audience specific and can be performed as often as necessary to educate those with the greatest risk for exposure to MEC; e.g., local homeowners, farmers, children, and developers. Educational efforts can be a stand-alone institutional control, but can also improve the effectiveness of other controls.

12.1.2.1 Public Notices

The local community can be educated through implementation of a public-notice campaign that may include mailings of informational pamphlets, installation of display cases, public service announcements, or recurrent notices in local newspapers. These educational media can serve to educate the local community and visitors to the area. A method that can be used at sites with a high public turnover rate is to notify any new residents to the area once they have contacted the local utility to start a new service. Once the utility company has received the request for the new service, they can provide (in their initial mailing to new customers) a brochure outlining the site-specific hazards and what should be done in the event of an emergency. The following paragraphs provide details concerning various types of public notices that can be used to educate and inform local communities.

12.1.2.2 Community Awareness Meetings

Community awareness meetings are normally held when significant site remediation documents are released to the public and provide information regarding:

- How this information was evaluated in the EE/CA report;
- MEC previously recovered at the site;
- Options available to remove ordnance (if required) and enhance public safety; and
- Recommendations being made to address a particular site.

12.1.2.3 Letter Notifications, Informational Pamphlets, and Fact Sheets

Letter notifications (US certified mail) are an effective means of informing local property owners of the results of the EE/CA investigation and the types of ordnance that have been found. Letter notifications can be mailed to each landowner within or adjacent to an MEC site to inform them of the EE/CA investigation results and the proposed recommendations for the area.

12.1.2.3.1 Informational pamphlets and fact sheets can be developed and distributed to support safety briefings and/or speaking engagements and can be effective as stand-alone educational materials. Informational pamphlets and fact sheets can warn the public of the hazards of MEC and provide information relating to the former military operations that occurred at a site. Informational pamphlets and fact sheets can be mailed to residents in the vicinity of a MEC site or they can be distributed from central locations such as libraries, or posted at strategic locations (e.g., US Post Office). Effective pamphlets or fact sheets contain photographs and/or drawings of typical ordnance items that the public might encounter and previously recovered MEC locations shown on a map. A telephone number for the appropriate local authority should be included in the informational pamphlet or fact sheet.

12.1.2.4 Formal Education Sessions

Formal education sessions may include community education classes. The classes can be given to a variety of audiences including public forums, local government, emergency response personnel, property owners, developers and real estate agents, and children at the local schools. The training sessions can be tailored to meet the specific interests/concerns of the audience, and can be an effective method to communicate the nature and extent of the hazards associated with MEC and the precautions to be taken in the event a person comes into contact with MEC. The training sessions may either be provided live by personnel knowledgeable in the site-specific conditions or through the distribution of MEC safety awareness training pamphlets or videos to local organizations and public libraries. To be effective, educational sessions need to be recurrent (e.g., every six months) so the public does not become complacent about the hazards associated with MEC. Formal education sessions that are consistently performed are also successful in educating new homeowners and visitors to the area.

12.2 COST

The cost for each of these institutional controls can vary greatly. The cost analysis of the proposed institutional controls (signage and meetings) is provided in detail in Appendix F of the EE/CA report.

13.0 RECOMMENDATIONS

Local agencies have expressed concern with potential ordnance on the site. The parties have agreed to cooperate with the applicable institutional controls that ZAPATA has suggested in this report, where applicable. This section summarizes recommended institutional control recommendations and describes each individually.

13.1 WARNING SIGNS

13.1.1 Additional warning signs posted on the outer perimeter of a site will contribute to educating the public of the potential exposure at a site. This can be one of the least expensive controls to implement. It is also the most ineffective control especially when used alone. The ultimate effectiveness of institutional controls depends entirely on local agencies and private landowner support, involvement, and willingness to enforce and maintain institutional controls implemented to eliminate public interaction with MEC. Long-term implementation of institutional controls will be the responsibility of landowners and CEPOH.

13.1.2 As noted during the EE/CA investigation, there are no signs currently in place to warn landowners, visitors and/or unauthorized personnel of the dangers associated with MEC at He'eia Combat Training Area or Pali Training Camp. At the Pali Maunawili Valley Impact Area, warning signs should be placed every 1,000 feet along the trail within the impact area, around the Maunawili Falls (4 miles) and at the Luluku Banana Farmer's gate totaling 40 signs. The signs should convey the potential presence of UXO. Larger signs or bulletin boards should be placed at the Maunawili Road gate, and the Maunawili Demonstration Trail parking areas (at the Pali Highway and in Waimanalo). The bulletin boards should include the trail segments of concern, pictures of potential UXO present, what to do in case an item is found. At Kahalu'u warning signs should be placed at the perimeter of the impact area every 1,000 feet (1 mile) totaling five signs and a bulletin board at the Kahalu'u gate (at Waihe'e Road). At He'eia Kea, signs should be placed along the west side of Kamehameha Highway and a bulletin board at the gated entrance. Once plans for the park and trails have been finalized, signs should be placed every 1,000 feet along the trails, at the perimeter of areas not cleared, and at the base of the He'eia Mountain, totaling 30 signs. A total of 75 warning signs and five bulletin boards are required.

13.2 EDUCATIONAL PAMPHLETS

13.2.1 Producing and distributing an educational/awareness pamphlet would be a means of educating individuals in the recognition of MEC, describing the types of suspected MEC at the He'eia Combat Training Area and Pali Training Camp, and the actions to be taken upon discovering MEC items. Recognizing the hazard is essential for implementing appropriate responses to contain and dispose of MEC. Distinguishing between MEC and other debris that may be encountered at the site will ensure that authorities are notified and actions can be taken to dispose of the MEC without harm to anyone involved.

13.2.2 The pamphlets will be distributed to any person, company, or agency planning to work within the He'eia Combat Training Area or Pali Training Camp. In addition, the pamphlets would be available to anyone upon request. The cost analysis of each institutional control is provided in detail in Appendix F of the EE/CA report.

ATTACHMENT A
INSTITUTIONAL ANALYSIS SURVEY SAMPLE

INSTITUTIONAL CONTROLS ANALYSIS SURVEY
HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP

Date:

Agency:

Point of Contact:

Phone:

Agency Authority and Basis of Authority:

Agency Origin:

Agency Mission:

Sunset Provision:

Geographic Jurisdiction:

Public Safety Function:

Land Use Control Function (knowledge of current controls):

Ability to partner with other agencies (which ones):

Financial Capability:

Desire to participate in institutional control program:

Constraints to Institutional Effectiveness:

ATTACHMENT B
PROPERTY OWNERS

EECA Area	POI	AREA	PERIMETER	TAX_	TAX_ID	TMK	PDZONE	PDSECTION	PDPLAT	PDPARCEL	ZS	ZSP	SPP	ZSPP	LOADDATE	ACRES	owner
Kahaluu	13150	43865646.333	43748.064	276	12697	48013001	4	8	13	1	48	48013	8013001	48013001	12/23/2005	1007.017	STATE OF HAWAII
Kahaluu	14069	3124723.808	10344.940	484	72720	48007002	4	8	7	2	48	48007	8007002	48007002	12/23/2005	71.734	STATE OF HAWAII
Kahaluu	14343	194875618.580	71890.600	287	13811	96006001	9	6	6	1	96	96006	6006001	96006001	12/23/2005	4473.733	B P BISHOP TRUST ESTATE
Kahaluu	15372	4445147.739	9118.791	18	14831	47007010	4	7	7	10	47	47007	7007010	47007010	12/23/2005	102.047	GUSHI,MERIE-ELLEN F TRUST
Kahaluu	15388	926331.334	5707.099	20	14847	47015013	4	7	15	13	47	47015	7015013	47015013	12/23/2005	21.266	MAGOON,JOHN H SR TRUST ESTATE
Kahaluu	15449	74187.253	4743.492	28	14908	47007013	4	7	7	13	47	47007	7007013	47007013	12/23/2005	1.703	VARIOUS OWNERS
Kahaluu	15483	87121.806	1218.094	669	14942	47007032	4	7	7	32	47	47007	7007032	47007032	12/23/2005	2.000	WONG,ALLEN K F
Kahaluu	15789	21707696.394	19163.316	66	15246	47008001	4	7	8	1	47	47008	7008001	47008001	12/23/2005	498.340	FONG,HIRAM L JR TRS
Kahaluu	16262	2563240.907	10306.950	668	17154	47007009	4	7	7	9	47	47007	7007009	47007009	12/23/2005	59.303	4J FARMS, LLC
Kahaluu	16308	159197.219	7311.123	125	15755	47042026	4	7	42	26	47	47042	7042026	47042026	12/23/2005	3.655	MCKEAGUE,BERNARD H
Kahaluu	16438	577771.625	4784.840	137	15885	47015014	4	7	15	14	47	47015	7015014	47015014	12/23/2005	13.264	C. OSHIRO FARMS INC
Kahaluu	16770	44689.465	1000.591	163	16216	47042018	4	7	42	18	47	47042	7042018	47042018	12/23/2005	1.026	BOYER,NANCY E
Kahaluu	16832	44112.653	995.434	171	16278	47042019	4	7	42	19	47	47042	7042019	47042019	12/23/2005	1.013	LESTER,NORMAN R
Kahaluu	16978	45896.612	889.166	183	16424	47042020	4	7	42	20	47	47042	7042020	47042020	12/23/2005	1.054	TOLENTINO,NATIVIDAD
Kahaluu	17102	42910.962	878.416	194	16548	47042021	4	7	42	21	47	47042	7042021	47042021	12/23/2005	0.985	BARADI,ABRAHAM A
Kahaluu	17132	46984.540	939.710	195	16578	47042006	4	7	42	6	47	47042	7042006	47042006	12/23/2005	1.079	KASHIWABARA,PAUL T TR
Kahaluu	17178	43297.711	1033.263	197	16623	47042022	4	7	42	22	47	47042	7042022	47042022	12/23/2005	0.994	BATLLE,FLORENCE TR
Kahaluu	17215	67057.778	1134.777	200	16660	47042023	4	7	42	23	47	47042	7042023	47042023	12/23/2005	1.539	G BOTELHO/D-L NAKANO TR
Kahaluu	17315	45381.855	1039.491	208	16760	47042005	4	7	42	5	47	47042	7042005	47042005	12/23/2005	1.042	MATSUDA,TONI K
Kahaluu	17317	46037.323	920.407	207	16762	47042004	4	7	42	4	47	47042	7042004	47042004	12/23/2005	1.057	HA,DIEU THI
Kahaluu	17364	11057.450	492.284	216	16809	47015002	4	7	15	2	47	47015	7015002	47015002	12/23/2005	0.254	NAGLE,CHARLOTTE K
Kahaluu	17444	82760.881	1604.406	225	16888	47042025	4	7	42	25	47	47042	7042025	47042025	12/23/2005	1.900	MIRANDA,STANLEY TR
Kahaluu	17535	187423.921	8502.128	239	16978	47007012	4	7	7	12	47	47007	7007012	47007012	12/23/2005	4.303	VARIOUS OWNERS
Kahaluu	17577	1262044.717	5743.431	246	17018	47007016	4	7	7	16	47	47007	7007016	47007016	12/23/2005	28.973	MELLO,AGNES G TR
Kahaluu	17632	302280.348	2589.993	254	17072	47047033	4	7	47	33	47	47047	7047033	47047033	12/23/2005	6.939	MILLER,FLOYD A JR TR
Kahaluu	17791	31455.750	829.271	277	17227	47007024	4	7	7	24	47	47007	7007024	47007024	12/23/2005	0.722	CAMBRA FAMILY TR
Kahaluu	18251	68097.537	1359.394	331	17679	47047016	4	7	47	16	47	47047	7047016	47047016	12/23/2005	1.563	CHANG,KENNETH/JOSEPHINE TRS
Kahaluu	18541	43660.312	856.281	362	17960	47047015	4	7	47	15	47	47047	7047015	47047015	12/23/2005	1.002	SERIKAKU,THOMAS I
Kahaluu	18579	106681.687	4927.213	366	17998	47047034	4	7	47	34	47	47047	7047034	47047034	12/23/2005	2.449	VARIOUS OWNERS
Kahaluu	18756	64954.067	1462.570	385	18173	47047010	4	7	47	10	47	47047	7047010	47047010	12/23/2005	1.491	BURKE,THOMAS E
Kahaluu	18782	43866.334	883.645	389	18199	47047014	4	7	47	14	47	47047	7047014	47047014	12/23/2005	1.007	TAKANISHI,GLENN K TR
Kahaluu	18870	44828.836	894.017	398	18286	47047012	4	7	47	12	47	47047	7047012	47047012	12/23/2005	1.029	EMERY,KEVIN G
Kahaluu	18872	60886.696	1996.551	675	18288	47047013	4	7	47	13	47	47047	7047013	47047013	12/23/2005	1.398	CITY AND COUNTY OF HONOLULU
Kahaluu	18917	709991.600	4914.284	689	18333	47007005	4	7	7	5	47	47007	7007005	47007005	12/23/2005	16.299	TANOUYE,PERRY F
Kahaluu	19090	480196.540	3409.170	676	18502	47033036	4	7	33	36	47	47033	7033036	47033036	12/23/2005	11.024	SHIMABUKURO,SEIKO PROP TR
Kahaluu	19343	1726577.397	5779.792	424	18749	47006001	4	7	6	1	47	47006	7006001	47006001	12/23/2005	39.637	RENOIR,JEAN-PAUL
Kahaluu	19494	240471.290	2160.539	435	18898	47033023	4	7	33	23	47	47033	7033023	47033023	12/23/2005	5.520	ROBINSON,GRACE P TR EST
Kahaluu	19724	146569.736	1576.080	455	19126	47033011	4	7	33	11	47	47033	7033011	47033011	12/23/2005	3.365	CHING,THOMAS K L TR
Kahaluu	19872	462933.589	2696.914	460	19273	47033010	4	7	33	10	47	47033	7033010	47033010	12/23/2005	10.627	CHANG,WILLIAM L Y A TRUST
Kahaluu	20250	50995197.867	46819.529	14	19649	97026002	9	7	26	2	97	97026	7026002	97026002	12/23/2005	1170.689	MANANA VALLEY FARM LLC
Kahaluu	20253	49643376.415	37487.183	487	19652	47008002	4	7	8	2	47	47008	7008002	47008002	12/23/2005	1139.655	CITY AND COUNTY OF HONOLULU
Kahaluu	20413	60826.027	974.376	500	19812	47033009	4	7	33	9	47	47033	7033009	47033009	12/23/2005	1.396	MEDEIROS,HAROLD C SR TR
Kahaluu	20509	87037.058	1854.080	505	19907	47033032	4	7	33	32	47	47033	7033032	47033032	12/23/2005	1.998	CHING,WINIFRED K O
Kahaluu	20557	53807.029	1003.905	508	19954	47033029	4	7	33	29	47	47033	7033029	47033029	12/23/2005	1.235	MEDEIROS,HAROLD C SR TR
Kahaluu	20584	120287.728	1971.698	509	19981	47006024	4	7	6	24	47	47006	7006024	47006024	12/23/2005	2.761	BURKE,JUDY J
Kahaluu	20589	243662.342	3255.155	510	19986	47006040	4	7	6	40	47	47006	7006040	47006040	12/23/2005	5.593	TOWILL,RICHARD S
Kahaluu	20746	546353.943	2919.281	516	20142	47006008	4	7	6	8	47	47006	7006008	47006008	12/23/2005	12.543	KINOSHITA,TERRY K TR
Kahaluu	20916	71002.479	1483.353	534	20343	47033033	4	7	33	33	47	47033	7033033	47033033	12/23/2005	1.630	TOWILL,RICHARD S
Kahaluu	20973	10182.458	611.729	536	20364	47064026	4	7	64	26	47	47064	7064026	47064026	12/23/2005	0.234	GESTEUYALA,TY H TR
Kahaluu	21022	9576.366	599.128	538	20413	47064022	4	7	64	22	47	47064	7064022	47064022	12/23/2005	0.220	RAPOZO,RONALD J TR
Kahaluu	21044	33132.876	860.465	542	20435	47064019	4	7	64	19	47	47064	7064019	47064019	12/23/2005	0.761	GESTEUYALA,ALICE K TR
Kahaluu	21046	123735.569	2293.316	543	20437	47006039	4	7	6	39	47	47006	7006039	47006039	12/23/2005	2.841	HIGA,ALICE MIYOKO TR
Kahaluu	21118	5927.648	327.479	547	20506	47064023	4	7	64	23	47	47064	7064023	47064023	12/23/2005	0.136	NICOLAI,TALIA R
Kahaluu	21144	59521.954	1220.572	550	20532	47006021	4	7	6	21	47	47006	7006021	47006021	12/23/2005	1.366	HIGA,BRIAN S TR
Kahaluu	21176	5878.119	327.759	553	20564	47064021	4	7	64	21	47	47064	7064021	47064021	12/23/2005	0.135	WOO,DWAINE J
Kahaluu	21189	125357.305	1769.491	555	20576	47064014	4	7	64	14	47	47064	7064014	47064014	12/23/2005	2.878	K-4 ENTERPRISES INC

EECA Area	POI	AREA	PERIMETER	TAX_	TAX_ID	TMK	PDZONE	PDSECTION	PDPLAT	PDPARCEL	ZS	ZSP	SPP	ZSPP	LOADDATE	ACRES	owner
Kahaluu	21210	5901.885	329.181	556	20597	47064020	4	7	64	20	47	47064	7064020	47064020	12/23/2005	0.135	SHIROMA,HERBERT H TRUST
Kahaluu	21235	3871498.065	11351.585	685	20622	47006010	4	7	6	10	47	47006	7006010	47006010	12/23/2005	88.877	CITY AND COUNTY OF HONOLULU
Kahaluu	21310	6099.250	323.023	559	20696	47006028	4	7	6	28	47	47006	7006028	47006028	12/23/2005	0.140	EVANS,DAVID M III
Kahaluu	21312	4790.137	299.000	560	20698	47064011	4	7	64	11	47	47064	7064011	47064011	12/23/2005	0.110	SCHROEDER,WALTER R
Kahaluu	21351	9132.062	578.676	562	20736	47064012	4	7	64	12	47	47064	7064012	47064012	12/23/2005	0.210	POWELL,MICHAEL G V
Kahaluu	21355	5935.135	318.075	563	20740	47006029	4	7	6	29	47	47006	7006029	47006029	12/23/2005	0.136	OSTROWSKI,ANTHONY C
Kahaluu	21361	123446.016	1699.892	686	20746	47006038	4	7	6	38	47	47006	7006038	47006038	12/23/2005	2.834	HIGA,ALICE MIYOKO TR
Kahaluu	21362	11654.302	637.686	565	20747	47064010	4	7	64	10	47	47064	7064010	47064010	12/23/2005	0.268	GRAY,JANE P
Kahaluu	21375	8183.970	365.909	567	20760	47064009	4	7	64	9	47	47064	7064009	47064009	12/23/2005	0.188	KAHALUU COUNTRY
Kahaluu	21413	6009.828	320.060	569	20798	47006030	4	7	6	30	47	47006	7006030	47006030	12/23/2005	0.138	PERRY,KARL P
Kahaluu	21431	49681314.247	49727.317	15	20816	97026001	9	7	26	1	97	97026	7026001	97026001	12/23/2005	1140.526	STATE OF HAWAII
Kahaluu	21450	5214.785	303.073	571	20835	47064008	4	7	64	8	47	47064	7064008	47064008	12/23/2005	0.120	YAMAMOTO,ROSS R
Kahaluu	21472	6317.485	317.417	572	20857	47006031	4	7	6	31	47	47006	7006031	47006031	12/23/2005	0.145	HIGA,THOMAS S
Kahaluu	21496	12315.117	648.404	574	20881	47064007	4	7	64	7	47	47064	7064007	47064007	12/23/2005	0.283	VALENTINE,KENNETH J
Kahaluu	21511	329320.299	4241.095	687	20896	47064001	4	7	64	1	47	47064	7064001	47064001	12/23/2005	7.560	ISHIDA,AKIRA TR
Kahaluu	21558	8367.167	450.706	579	20943	47064006	4	7	64	6	47	47064	7064006	47064006	12/23/2005	0.192	PASCUAL,GEORGE
Kahaluu	21594	8597.500	454.253	580	20978	47064005	4	7	64	5	47	47064	7064005	47064005	12/23/2005	0.197	PAVICH,EMMA M
Kahaluu	21638	7674.733	406.456	582	21021	47064004	4	7	64	4	47	47064	7064004	47064004	12/23/2005	0.176	BOYD,JOHNNY W
Kahaluu	21666	7126.013	387.596	585	21049	47064003	4	7	64	3	47	47064	7064003	47064003	12/23/2005	0.164	BRENNAN,JEFFREY D
Kahaluu	21697	8298.408	419.125	586	21077	47064002	4	7	64	2	47	47064	7064002	47064002	12/23/2005	0.191	FARIS,COLETTE M
Kahaluu	21837	10186.434	406.580	593	21215	47064013	4	7	64	13	47	47064	7064013	47064013	12/23/2005	0.234	ROSEHILL,MARCUS D E
Kahaluu	22113	2622957.222	9004.692	597	21488	47006022	4	7	6	22	47	47006	7006022	47006022	12/23/2005	60.215	CITY AND COUNTY OF HONOLULU
Kahaluu	22170	91802.585	1285.835	601	21543	47005077	4	7	5	77	47	47005	7005077	47005077	12/23/2005	2.107	SEAMAN,ANNE T
Kahaluu	22188	87604.866	1275.787	604	21559	47005078	4	7	5	78	47	47005	7005078	47005078	12/23/2005	2.011	HEU,HERBERT D
Kahaluu	22215	119124.225	1426.060	605	21585	47005079	4	7	5	79	47	47005	7005079	47005079	12/23/2005	2.735	WAINWRIGHT,RICHARD R
Kahaluu	22304	55538.782	2620.809	607	21671	47005010	4	7	5	10	47	47005	7005010	47005010	12/23/2005	1.275	LE,QUANG NHIEU
Kahaluu	22319	852374.392	6776.478	609	21686	47005020	4	7	5	20	47	47005	7005020	47005020	12/23/2005	19.568	FROST,JACK R
Kahaluu	22331	129650.989	2002.932	610	21697	47005085	4	7	5	85	47	47005	7005085	47005085	12/23/2005	2.976	PREBLE,JEFFREY
Kahaluu	22409	89663.414	1206.222	611	21775	47005080	4	7	5	80	47	47005	7005080	47005080	12/23/2005	2.058	NAIPO,GEORGE E K
Kahaluu	22629	92202.215	1259.665	614	21990	47005083	4	7	5	83	47	47005	7005083	47005083	12/23/2005	2.117	ARDO,DONALD E/CAROLYN M TR
Kahaluu	22693	218415.584	2389.157	616	22053	47005081	4	7	5	81	47	47005	7005081	47005081	12/23/2005	5.014	BRADLEY,SONNY H K
Kahaluu	22718	435893.895	2811.027	617	22074	47005041	4	7	5	41	47	47005	7005041	47005041	12/23/2005	10.007	TONG,JULIET M
Kahaluu	22944	1597910.746	7090.621	696	22889	47005008	4	7	5	8	47	47005	7005008	47005008	12/23/2005	36.683	YAMASHIRO,BYRON K TRUST
Kahaluu	22968	508991.720	3844.864	621	22343	47006023	4	7	6	23	47	47006	7006023	47006023	12/23/2005	11.685	CITY AND COUNTY OF HONOLULU
Kahaluu	23070	3305.914	230.391	625	22448	47006018	4	7	6	18	47	47006	7006018	47006018	12/23/2005	0.076	CITY AND COUNTY OF HONOLULU
Kahaluu	23726	68802843.224	52416.125	16	23101	98001008	9	8	1	8	98	98001	8001008	98001008	12/23/2005	1579.496	B P BISHOP TRUST ESTATE
Kahaluu	26104	360436.899	3059.567	501	72669	47048015	4	7	48	15	47	47048	7048015	47048015	12/23/2005	8.274	RICHARDSON,JOHN D
Kahaluu	27210	61097202.099	59690.830	17	26528	98001007	9	8	1	7	98	98001	8001007	98001007	12/23/2005	1402.599	AUSTIN,INCOME TRUST 1971
Kahaluu	28693	74673658.640	63622.839	19	27996	98001003	9	8	1	3	98	98001	8001003	98001003	12/23/2005	1714.271	STACK,ELIZABETH M
Kahaluu	167859	4780070.105	10727.519	489	72721	47007015	4	7	7	15	47	47007	7007015	47007015	12/23/2005	109.735	FONG,HIRAM L TRS
Kahaluu	167860	56687.117	4599.295	485	14908	47007013	4	7	7	13	47	47007	7007013	47007013	12/23/2005	1.301	VARIOUS OWNERS
Kahaluu	167861	2897489.092	8988.706	486	72722	47007025	4	7	7	25	47	47007	7007025	47007025	12/23/2005	66.517	KO,SEUNG K
Kahaluu	169463	98194.879	1315.234	681	22016	47005082	4	7	5	82	47	47005	7005082	47005082	12/23/2005	2.254	BOUCHAKIAN,GAY C
Kahaluu	169464	442489.162	3634.332	682	21988	47005084	4	7	5	84	47	47005	7005084	47005084	12/23/2005	10.158	WILLIAMS,PAUL
Kahaluu	170128	996237.010	7764.655	695	72686	47005096	4	7	5	96	47	47005	7005096	47005096	12/23/2005	22.870	TRANQUILITREE LLC
Kea	21513	5700050.686	13376.244	324	20898	47001002	4	7	1	2	47	47001	7001002	47001002	12/23/2005	130.856	KAWAMOTO,GENSIRO
Kea	22586	8907080.781	14437.070	595	21948	46016032	4	6	16	32	46	46016	6016032	46016032	12/23/2005	204.478	CITY AND COUNTY OF HONOLULU
Kea	22822	19234.453	603.277	604	22186	46006007	4	6	6	7	46	46006	6006007	46006007	12/23/2005	0.442	CITY AND COUNTY OF HONOLULU
Kea	22926	13589.930	541.975	606	22298	46006009	4	6	6	9	46	46006	6006009	46006009	12/23/2005	0.312	CITY AND COUNTY OF HONOLULU
Kea	22982	13504.496	541.125	607	22358	46006011	4	6	6	11	46	46006	6006011	46006011	12/23/2005	0.310	CITY AND COUNTY OF HONOLULU
Kea	23044	16600.569	571.965	608	22423	46006013	4	6	6	13	46	46006	6006013	46006013	12/23/2005	0.381	CITY AND COUNTY OF HONOLULU
Kea	23132	18751.943	591.314	610	22509	46006015	4	6	6	15	46	46006	6006015	46006015	12/23/2005	0.430	CITY AND COUNTY OF HONOLULU
Kea	23675	425284.939	4299.722	617	23049	47037023	4	7	37	23	47	47037	7037023	47037023	12/23/2005	9.763	FOTI,JOHN P
Kea	23680	15337.945	557.173	618	23055	46006022	4	6	6	22	46	46006	6006022	46006022	12/23/2005	0.352	CITY AND COUNTY OF HONOLULU
Kea	23779	15310.970	557.037	620	23151	46006023	4	6	6	23	46	46006	6006023	46006023	12/23/2005	0.351	CITY AND COUNTY OF HONOLULU
Kea	23838	600490.451	4170.269	623	23210	47038004	4	7	38	4	47	47038	7038004	47038004	12/23/2005	13.785	LAU,HOWARD K S TR EST

EECA Area	POI	AREA	PERIMETER	TAX_	TAX_ID	TMK	PDZONE	PDSECTION	PDPLAT	PDPARCEL	ZS	ZSP	SPP	ZSPP	LOADDATE	ACRES	owner
Kea	23854	15336.477	557.620	624	23226	46006024	4	6	6	24	46	46006	6006024	46006024	12/23/2005	0.352	CITY AND COUNTY OF HONOLULU
Kea	23934	15050.702	554.527	625	23305	46006025	4	6	6	25	46	46006	6006025	46006025	12/23/2005	0.346	CITY AND COUNTY OF HONOLULU
Kea	23996	840220.713	4739.069	627	23365	47038003	4	7	38	3	47	47038	7038003	47038003	12/23/2005	19.289	SILVA,RICHARD R SR
Kea	24000	15154.156	555.122	628	23369	46006026	4	6	6	26	46	46006	6006026	46006026	12/23/2005	0.348	CITY AND COUNTY OF HONOLULU
Kea	24056	220366.258	3042.959	630	23424	47038014	4	7	38	14	47	47038	7038014	47038014	12/23/2005	5.059	MILLER,PATSY T TRUST
Kea	24071	15300.129	556.630	631	23439	46006027	4	6	6	27	46	46006	6006027	46006027	12/23/2005	0.351	CITY AND COUNTY OF HONOLULU
Kea	24150	15252.103	556.345	632	23515	46006028	4	6	6	28	46	46006	6006028	46006028	12/23/2005	0.350	CITY AND COUNTY OF HONOLULU
Kea	24187	210574.776	2659.085	633	23551	47038005	4	7	38	5	47	47038	7038005	47038005	12/23/2005	4.834	LATHAM,DAVID E TR
Kea	24219	15189.136	555.984	634	23583	46006029	4	6	6	29	46	46006	6006029	46006029	12/23/2005	0.349	CITY AND COUNTY OF HONOLULU
Kea	24297	15126.987	555.241	636	23661	46006030	4	6	6	30	46	46006	6006030	46006030	12/23/2005	0.347	CITY AND COUNTY OF HONOLULU
Kea	24338	225205.282	2362.699	638	23701	47038006	4	7	38	6	47	47038	7038006	47038006	12/23/2005	5.170	47-045 AND 47-047 OKANA PLACE
Kea	24369	15295.330	556.359	640	23732	46006031	4	6	6	31	46	46006	6006031	46006031	12/23/2005	0.351	CITY AND COUNTY OF HONOLULU
Kea	24371	96502.278	1736.665	641	23734	47037020	4	7	37	20	47	47037	7037020	47037020	12/23/2005	2.215	HASEGAWA,ROY K
Kea	24400	728416.295	4013.287	643	23763	47038001	4	7	38	1	47	47038	7038001	47038001	12/23/2005	16.722	YEE,MICHAEL Y T
Kea	24448	15200.333	554.474	644	23810	46006032	4	6	6	32	46	46006	6006032	46006032	12/23/2005	0.349	CITY AND COUNTY OF HONOLULU
Kea	24461	42666.020	845.196	645	23823	47037001	4	7	37	1	47	47037	7037001	47037001	12/23/2005	0.979	TOKORO,SHELDON Y
Kea	24481	63529.330	1046.139	646	23843	47038009	4	7	38	9	47	47038	7038009	47038009	12/23/2005	1.458	LOOK,DURMOND K M TRS
Kea	24514	15313.064	555.608	647	23876	46006033	4	6	6	33	46	46006	6006033	46006033	12/23/2005	0.352	CITY AND COUNTY OF HONOLULU
Kea	24591	7992.483	483.920	648	23952	46006001	4	6	6	1	46	46006	6006001	46006001	12/23/2005	0.183	CITY AND COUNTY OF HONOLULU
Kea	24611	69794.194	3555.612	649	23972	47004040	4	7	4	40	47	47004	7004040	47004040	12/23/2005	1.602	CITY AND COUNTY OF HONOLULU
Kea	24627	15469.494	558.413	651	23988	46006034	4	6	6	34	46	46006	6006034	46006034	12/23/2005	0.355	CITY AND COUNTY OF HONOLULU
Kea	24645	53920.021	974.523	652	24006	47038015	4	7	38	15	47	47038	7038015	47038015	12/23/2005	1.238	MARIMED FDN FOR ISLE HEALTH
Kea	24711	15513.122	559.612	653	24069	46006035	4	6	6	35	46	46006	6006035	46006035	12/23/2005	0.356	CITY AND COUNTY OF HONOLULU
Kea	24773	73453.806	1546.291	654	24130	47038011	4	7	38	11	47	47038	7038011	47038011	12/23/2005	1.686	CHUN-HOON,MYRNA P TRUST
Kea	24774	222244.555	3054.394	655	24131	47004006	4	7	4	6	47	47004	7004006	47004006	12/23/2005	5.102	CITY AND COUNTY OF HONOLULU
Kea	24783	15318.188	558.505	656	24139	46006036	4	6	6	36	46	46006	6006036	46006036	12/23/2005	0.352	CITY AND COUNTY OF HONOLULU
Kea	24809	46293.179	1011.031	657	24164	47038008	4	7	38	8	47	47038	7038008	47038008	12/23/2005	1.063	HOO,VERNON JOY CHO
Kea	24837	65786.327	1049.187	658	24192	47038010	4	7	38	10	47	47038	7038010	47038010	12/23/2005	1.510	ALLEN,CAROL A TR
Kea	24858	15409.847	559.340	660	24211	46006037	4	6	6	37	46	46006	6006037	46006037	12/23/2005	0.354	CITY AND COUNTY OF HONOLULU
Kea	24899	3321507.141	16529.295	661	24249	47004039	4	7	4	39	47	47004	7004039	47004039	12/23/2005	76.251	SABRIE,WILLIAM J JR
Kea	24942	14428.260	549.069	662	24292	46006038	4	6	6	38	46	46006	6006038	46006038	12/23/2005	0.331	CITY AND COUNTY OF HONOLULU
Kea	25034	14583.714	547.098	663	24375	46006039	4	6	6	39	46	46006	6006039	46006039	12/23/2005	0.335	CITY AND COUNTY OF HONOLULU
Kea	25119	14421.481	542.908	665	24458	46006040	4	6	6	40	46	46006	6006040	46006040	12/23/2005	0.331	CITY AND COUNTY OF HONOLULU
Kea	25120	60107.214	993.213	666	24459	47038012	4	7	38	12	47	47038	7038012	47038012	12/23/2005	1.380	SPENCER,JOHN E
Kea	25147	61118.791	984.585	667	24486	47038007	4	7	38	7	47	47038	7038007	47038007	12/23/2005	1.403	MALO,THERESA P
Kea	25159	27221.730	1390.776	668	24498	47038002	4	7	38	2	47	47038	7038002	47038002	12/23/2005	0.625	SILVA,RICHARD R SR
Kea	25169	133909.887	1773.400	669	24508	47038013	4	7	38	13	47	47038	7038013	47038013	12/23/2005	3.074	TOKORO,WADE E
Kea	25175	13215.767	669.125	670	24514	47039030	4	7	39	30	47	47039	7039030	47039030	12/23/2005	0.303	HAWAIIAN ELECTRIC CO INC
Kea	25201	14477.107	544.572	671	24540	46006041	4	6	6	41	46	46006	6006041	46006041	12/23/2005	0.332	CITY AND COUNTY OF HONOLULU
Kea	25266	64064.375	1026.213	672	24604	47039012	4	7	39	12	47	47039	7039012	47039012	12/23/2005	1.471	YEE,DANIEL J W TR
Kea	25293	18793.930	589.117	673	24630	46006042	4	6	6	42	46	46006	6006042	46006042	12/23/2005	0.431	CITY AND COUNTY OF HONOLULU
Kea	25422	20221.614	605.135	675	24757	46006043	4	6	6	43	46	46006	6006043	46006043	12/23/2005	0.464	CITY AND COUNTY OF HONOLULU
Kea	25480	23189.227	708.177	676	24814	46016030	4	6	16	30	46	46016	6016030	46016030	12/23/2005	0.532	CITY AND COUNTY OF HONOLULU
Kea	25538	22295.386	624.708	678	24872	46006044	4	6	6	44	46	46006	6006044	46006044	12/23/2005	0.512	CITY AND COUNTY OF HONOLULU
Kea	25562	65166.943	1034.000	679	24896	47039011	4	7	39	11	47	47039	7039011	47039011	12/23/2005	1.496	WONG,IRVING M TR
Kea	25564	64267.479	1025.023	680	24898	47039010	4	7	39	10	47	47039	7039010	47039010	12/23/2005	1.475	FRIAS FAMILY 2004 TR
Kea	25570	71496.804	1472.902	681	24904	47039007	4	7	39	7	47	47039	7039007	47039007	12/23/2005	1.641	TOM,CHARLES K Y TR
Kea	25605	60238.320	1361.012	682	24936	47039037	4	7	39	37	47	47039	7039037	47039037	12/23/2005	1.383	SHIGEMOTO,MITCHELL M TRUST
Kea	25638	43220.560	894.628	683	24968	47039027	4	7	39	27	47	47039	7039027	47039027	12/23/2005	0.992	AKAMINE,SOJIRO
Kea	25675	42473.457	825.410	684	25005	46006048	4	6	6	48	46	46006	6006048	46006048	12/23/2005	0.975	CITY AND COUNTY OF HONOLULU
Kea	25677	74718.855	1132.481	685	25007	47039013	4	7	39	13	47	47039	7039013	47039013	12/23/2005	1.715	BRETTHAUER,ERIC J
Kea	25758	41367.350	826.082	686	25087	47039038	4	7	39	38	47	47039	7039038	47039038	12/23/2005	0.950	TOMIHAMA,ROY S JR
Kea	25821	220641.379	2176.387	687	25150	47039024	4	7	39	24	47	47039	7039024	47039024	12/23/2005	5.065	HAYES,SALLY
Kea	25888	63051.867	1050.543	688	25216	46006049	4	6	6	49	46	46006	6006049	46006049	12/23/2005	1.447	CITY AND COUNTY OF HONOLULU
Kea	25920	53704.714	1250.299	689	25248	47039005	4	7	39	5	47	47039	7039005	47039005	12/23/2005	1.233	MATSUSHIGE,CARY S
Kea	25938	128021.159	1415.995	690	25266	47039003	4	7	39	3	47	47039	7039003	47039003	12/23/2005	2.939	GIESBRECHT,MARY J L

EECA Area	POI	AREA	PERIMETER	TAX_	TAX_ID	TMK	PDZONE	PDSECTION	PDPLAT	PDPARCEL	ZS	ZSP	SPP	ZSPP	LOADDATE	ACRES	owner
Kea	25943	44409.908	847.115	691	25271	47039022	4	7	39	22	47	47039	7039022	47039022	12/23/2005	1.020	RAMIREZ,WILSON GST EXEMPT TR
Kea	25977	43676.839	827.649	692	25305	47039009	4	7	39	9	47	47039	7039009	47039009	12/23/2005	1.003	ABREW,ROBERT W
Kea	25978	45926.873	872.188	693	25306	47039039	4	7	39	39	47	47039	7039039	47039039	12/23/2005	1.054	SINGLEHURST,THOMAS G II TR
Kea	26015	67466.856	1501.999	695	25342	47039014	4	7	39	14	47	47039	7039014	47039014	12/23/2005	1.549	SILVA,GLENN P
Kea	26093	7594.273	438.343	696	25420	47039001	4	7	39	1	47	47039	7039001	47039001	12/23/2005	0.174	VARIOUS OWNERS
Kea	26095	45281.443	971.895	697	25422	47039036	4	7	39	36	47	47039	7039036	47039036	12/23/2005	1.040	FURUKAWA,GLENN K
Kea	26205	87400.463	1231.200	698	25530	47039008	4	7	39	8	47	47039	7039008	47039008	12/23/2005	2.006	BRIGGS,GLENN C
Kea	26208	43931.420	1012.659	699	25533	47039034	4	7	39	34	47	47039	7039034	47039034	12/23/2005	1.009	AHN,HENRY T S K
Kea	26212	44626.846	963.877	700	25537	47039035	4	7	39	35	47	47039	7039035	47039035	12/23/2005	1.024	DELA CRUZ,ELLIOT K TR
Kea	26276	71248.115	1168.206	702	25600	47039015	4	7	39	15	47	47039	7039015	47039015	12/23/2005	1.636	JOHNSTON,GERRY M
Kea	26298	10026.340	648.972	703	25621	46006050	4	6	6	50	46	46006	6006050	46006050	12/23/2005	0.230	CITY AND COUNTY OF HONOLULU
Kea	26327	124566.503	1420.742	705	25649	47039004	4	7	39	4	47	47039	7039004	47039004	12/23/2005	2.860	HARRIS,MADELINE C
Kea	26389	170366.989	1680.407	707	25710	47039002	4	7	39	2	47	47039	7039002	47039002	12/23/2005	3.911	PANG,EVERETT C H TR
Kea	26407	116101.968	1317.647	708	25728	47039006	4	7	39	6	47	47039	7039006	47039006	12/23/2005	2.665	DUNCAN,DOROTHY M TR
Kea	26452	16762482.992	32183.500	1	25773	46016001	4	6	16	1	46	46016	6016001	46016001	12/23/2005	384.814	HAWAII COMM DEV AUTHORITY
Kea	26515	19854.956	574.531	711	25835	47039016	4	7	39	16	47	47039	7039016	47039016	12/23/2005	0.456	HIGA,FAMILY TR
Kea	40936	64080.187	1119.957	706	25704	46006051	4	6	6	51	46	46006	6006051	46006051	12/23/2005	1.471	CITY AND COUNTY OF HONOLULU
Pali	56750	16689475.384	32908.559	195	55083	42015001	4	2	15	1	42	42015	2015001	42015001	12/23/2005	383.138	
Pali	62574	13627521.583	23594.518	453	61357	42014002	4	2	14	2	42	42014	2014002	42014002	12/23/2005	312.845	
Pali	67245	1226660.705	5097.066	657	65953	45035008	4	5	35	8	45	45035	5035008	45035008	12/23/2005	28.160	
Pali	69475	848981.250	5779.928	658	68147	45035002	4	5	35	2	45	45035	5035002	45035002	12/23/2005	19.490	
Pali	72605	305542.349	4450.787	356	71249	45035014	4	5	35	14	45	45035	5035014	45035014	12/23/2005	7.014	
Pali	72862	5825439.817	11329.987	366	71504	45035010	4	5	35	10	45	45035	5035010	45035010	12/23/2005	133.734	
Pali	75716	352096.726	4379.249	443	74324	45035012	4	5	35	12	45	45035	5035012	45035012	12/23/2005	8.083	
Pali	77508	5065429.721	15830.103	519	76076	42014001	4	2	14	1	42	42014	2014001	42014001	12/23/2005	116.286	
Pali	78317	18966331.338	18743.557	137	76874	42006002	4	2	6	2	42	42006	2006002	42006002	12/23/2005	435.453	
Pali	79039	1993280.001	7454.611	221	77587	42006001	4	2	6	1	42	42006	2006001	42006001	12/23/2005	45.759	
Pali	80119	775459.072	5678.032	637	70837	42011020	4	2	11	20	42	42011	2011020	42011020	12/23/2005	17.802	
Pali	80674	1558946.048	8864.650	532	79168	42011019	4	2	11	19	42	42011	2011019	42011019	12/23/2005	35.788	
Pali	82142	4236069.577	12938.201	357	80612	42005007	4	2	5	7	42	42005	2005007	42005007	12/23/2005	97.247	
Pali	82667	18009779.072	33630.288	638	78305	42011001	4	2	11	1	42	42011	2011001	42011001	12/23/2005	413.448	
Pali	82872	9123859.272	14242.184	363	81328	42005001	4	2	5	1	42	42005	2005001	42005001	12/23/2005	209.456	
Pali	83407	910947.377	4885.609	165	81854	42011004	4	2	11	4	42	42011	2011004	42011004	12/23/2005	20.912	
Pali	83552	24578978.122	23962.854	418	81997	42008005	4	2	8	5	42	42008	2008005	42008005	12/23/2005	564.256	
Pali	84777	83818044.169	55984.782	558	81281	42010001	4	2	10	1	42	42010	2010001	42010001	12/23/2005	1924.198	
Pali	86505	6982.629	364.822	329	84905	42063055	4	2	63	55	42	42063	2063055	42063055	12/23/2005	0.160	
Pali	86520	8629.599	397.977	332	84920	42063054	4	2	63	54	42	42063	2063054	42063054	12/23/2005	0.198	
Pali	86557	11994.458	468.960	339	84956	42063053	4	2	63	53	42	42063	2063053	42063053	12/23/2005	0.275	
Pali	86704	2735429.965	8203.682	415	85099	42005006	4	2	5	6	42	42005	2005006	42005006	12/23/2005	62.797	
Pali	86931	12993442.577	30267.747	1	85323	42009001	4	2	9	1	42	42009	2009001	42009001	12/23/2005	298.288	
Pali	86965	16149832.854	25308.020	2	85596	41008013	4	1	8	13	41	41008	1008013	41008013	12/23/2005	370.749	
Pali	88729	3497484.059	10926.988	513	87105	42010004	4	2	10	4	42	42010	2010004	42010004	12/23/2005	80.291	
Pali	91105	447545.706	2951.889	17	89463	41035006	4	1	35	6	41	41035	1035006	41035006	12/23/2005	10.274	
Pali	91655	438641.549	2912.620	30	90010	41035005	4	1	35	5	41	41035	1035005	41035005	12/23/2005	10.070	
Pali	92290	441077.138	2849.663	62	90646	41035004	4	1	35	4	41	41035	1035004	41035004	12/23/2005	10.126	
Pali	93472	365957.690	2555.650	183	91822	41035003	4	1	35	3	41	41035	1035003	41035003	12/23/2005	8.401	
Pali	96456	55823919.119	64977.545	351	94746	41011001	4	1	11	1	41	41011	1011001	41011001	12/23/2005	1281.541	
Pali	97984	389275.105	5322.462	394	96222	41010064	4	1	10	64	41	41010	1010064	41010064	12/23/2005	8.937	
Pali	98882	443487.120	4486.279	420	97076	41010099	4	1	10	99	41	41010	1010099	41010099	12/23/2005	10.181	
Pali	100431	58750.696	1127.223	461	98551	41010063	4	1	10	63	41	41010	1010063	41010063	12/23/2005	1.349	
Pali	100797	92579.594	1155.005	481	98902	41010094	4	1	10	94	41	41010	1010094	41010094	12/23/2005	2.125	
Pali	102313	298316.038	2196.267	516	100398	41011002	4	1	11	2	41	41011	1011002	41011002	12/23/2005	6.848	
Pali	162254	9404443.950	16081.416	572	72301	45035001	4	5	35	1	45	45035	5035001	45035001	12/23/2005	215.896	
Pali	164817	1047519.621	4171.316	444	77034	42014004	4	2	14	4	42	42014	2014004	42014004	12/23/2005	24.048	
Pali	167261	5554056.891	10022.172	666	61652	45033002	4	5	33	2	45	45033	5033002	45033002	12/23/2005	127.504	
Pali	167329	2769366.585	11517.211	624	107775	41010093	4	1	10	93	41	41010	1010093	41010093	12/23/2005	63.576	

EECA Area	POI	AREA	PERIMETER	TAX_	TAX_ID	TMK	PDZONE	PDSECTION	PDPLAT	PDPARCEL	ZS	ZSP	SPP	ZSPP	LOADDATE	ACRES	owner
Pali	167330	2062037.249	13215.456	625	107776	41010074	4	1	10	74	41	41010	1010074	41010074	12/23/2005	47.338	
Pali	167708	2207093.896	11191.352	422	85100	42007001	4	2	7	1	42	42007	2007001	42007001	12/23/2005	50.668	
Pali	167709	2385609.307	11562.399	430	85112	42006008	4	2	6	8	42	42006	2006008	42006008	12/23/2005	54.766	
Pali	167714	167900.892	14484.386	423	85106	42000000	4	2	0	0	42	42000	2000000	42000000	12/23/2005	3.854	

APPENDIX F

Cost Breakdowns and Assumptions

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COST ESTIMATE SUMMARY

1.0 INTRODUCTION

1.0.1 Under the Task Order for this EE/CA, a field investigation was conducted on less than two percent (2%) of each area. As such, Zapata Incorporated (ZAPATA) based its evaluation on the limited data collected during the field activities, archival data, and information gathered during the Technical Project Planning (TPP) Process. ZAPATA then prepared a qualitative MEC risk evaluation based on this available information. The ZAPATA project team encouraged, promoted, and documented stakeholder involvement throughout the EE/CA process.

1.0.2 In the absence of additional field data, the costs provided by ZAPATA in this EE/CA represent rough-order-of-magnitude estimates prepared using results from previous site visits, best professional judgment, and experience with similar projects.

1.0.3 Due to the size of the He'eia Combat Training Area and Pali Training Camp, varying terrain, accessibility by the public and future development potential, ZAPATA proposes using various alternatives for parcels within the each training area.

1.0.4 Alternative 1, No Department of Defense (DOD) Action Indicated (NDAI) is being proposed for approximately 946 acres of the Pali Training Camp, which includes the Ulumawao, Maunawili, and Maunawili Stream parcels. NDAI is recommended because no MEC, MD or evidence of MEC was encountered during the EE/CA investigation and/or historical documentation.

1.0.5 Alternative 2, Institutional Controls (IC) is being proposed for approximately 1,700 acres of the He'eia Combat Training Area and 3,450 acres of the Pali Training Camp. This includes the Kahalu'u, and He'eia Kea parcels at the He'eia Combat Training Area and the Maunawili Valley Impact Area at the Pali Training Camp. IC is recommended because evidence or suggestions of high explosives was found during field investigations and/or historical documentation.

1.0.6 Alternative 3, Comprehensive Surface Clearance with Alternative 2, Institutional Controls (IC) is an alternative for approximately 131 acres of the He'eia Kea and 66 acres at the Kahalu'u parcel at the He'eia Combat Training Area and 113 acres within the Maunawili Valley Impact Area at the Pali Training Camp. He'eia Kea is assumed to have 75 surface anomalies per acre and Maunawili Valley Impact Area and Kahalu'u parcel are assumed to have 12 surface anomalies per acre. Vegetation removal will be required for 50 percent of each area.

1.0.7 Alternative 4, One-Time Clearance to Detectable Depth, with Alternative 2 Institutional Controls is proposed for approximately 131 acres of the He'eia Kea parcel and 66 acres at the Kahalu'u parcel at the He'eia Combat Training Area and 113 acres within the Maunawili Valley Impact Area at the Pali Training Camp (same areas mentioned above in Alternative 3). The public hiking trails within Maunawili Valley are heavily used and the Maunawili Falls is a significant public attraction. Access to the He'eia Kea parcel is currently restricted, but the City-County of Honolulu has a master plan for developing this area as a nature park.

1.0.8 Rights-of-entry were secured to coincide with the field schedule for approximately 1,188 acres of He'eia's Kahalu'u parcel. The Kahalu'u parcel is composed of two valleys, the Waihe'e and Ka'alaea Valleys. The Ka'alaea Valley is the area where field investigations did not occur as part of this EE/CA. Ka'alaea Valley is addressed based on prior site visits and its past use as a live-fire impact area.

1.0.9 The cost estimates for Alternative 4 assume an accessibility of 100% throughout the entire project area. Clearance to Detectable Depth assumes the use of digital geophysical surveying techniques for gridded areas within He'eia Kea, while mag-and-dig techniques are assumed along hiking trails and the base of remote slopes and streams within Kahalu'u and Maunawili Valley Impact Area. Digital geophysics should be conducted on 127 acres within the He'eia Kea parcel or 554 grids (100 feet x 100 feet). Mag-and-dig should be conducted on four acres of hiking trails at He'eia Kea (average ten-ft path width) and 113 acres at the Pali Maunawili Valley Impact Area. Brush clearing of vegetation will be required prior to DGM or mag-and-dig.

1.0.10 Upon completion of the digital geophysical survey conducted for Alternative 4, Clearance to Detectable Depth, ZAPATA assumes that 271 subsurface anomalies per acre (34,417 subsurface anomalies) are present within the He'eia Kea parcel. ZAPATA estimates that the initial subsurface clearance could address approximately two acres per day containing 542 subsurface anomalies (62 per grid). For Clearance to Detectable Depth using mag-and-dig techniques, ZAPATA assumes an equivalent level of effort as intrusive activities for digital geophysics because of the remoteness of trails within the He'eia Kea parcel (four acres). The equivalent totals 1,084 anomalies over four acres at two acres per day containing 542 subsurface anomalies. ZAPATA estimates 39 anomalies per acre at the Maunawili Valley Impact Area (113 acres) and at the Kahalu'u parcel (66 acres). This result is an estimated total of 4,407 anomalies and 2,574 anomalies for the Maunawili Impact Area and Kahalu'u, respectively. Subsurface anomaly concentrations are based on actual concentrations encountered while in the field.

1.0.11 If MEC is found, road closure and evacuation of individuals will occur in areas falling within the minimum separation distance (MSD) for the Most Probable Munition (MPM), which is a 105mm projectile for the Pali Training Camp and a Mk II grenade for the He'eia Combat Training Area. Over 120 MD items have been recovered at the He'eia Combat Training Area and Pali Training Camp; however, as no MEC has been found, evacuation will be contingent on discovery of MEC items. Evacuation areas may be reduced by employing engineering controls (e.g., sand bag enclosures) during demolition (intentional detonation) activities.

2.0 ALTERNATIVE 1 – NO DEPARTMENT OF DEFENSE (DOD) ACTION INDICATED

2.1 HE'EIA KEA, KAHALU'U, AND MAUNAWILI VALLEY IMPACT AREA

There are no actions and therefore no costs associated with implementation of this alternative.

TABLE 2-1 ALTERNATIVE 1, NO DOD ACTION INDICATED

Item	Unit	Rate	Quantity	Cost
No work associated with this task				$ 0
TOTAL				$ 0

3.0 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS (IC)

For efficiency with respect to mobilization and administrative costs, Institutional Controls for He'eia Kea, Kahalu'u, and Maunawili Valley Impact Area will be conducted under the same mobilization.

3.1 ALTERNATIVE 2 – HE'EIA KEA, KAHALU'U, AND MAUNAWILI VALLEY IMPACT AREA

The estimated cost to implement Alternative 2 is $980,639, including recurring reviews. Institutional Control costs ($80,639) are in the basic part of this alternative. To present an inclusive financial commitment, a line item representing the cost ($300,000) of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) is added to the cost of Institutional Controls in Table 3-1. In addition, a line item is included representing the cost of 24 (smaller-scale) annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). This assumes a cost of $50,000 per Recurring Review and $25,000 per Annual Review. The Recurring Review and Annual Review processes, however, are not Institutional Controls. The cost estimate is based on the following assumptions.

- This effort will represent site/project-wide Institutional Controls for He'eia Kea, Kahalu'u, and the Pali Training Camp and for efficiency, assumes IC for all three will be completed under one mobilization.
- The project design will be conducted by a Task Manager and is estimated to take approximately 56 man-hours for fieldwork, coordination with landowners and meetings.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 80 man-hours (48 for public meeting and travel and 32 for project coordination).
- A Project Manager will provide approximately 24 man-hours of project oversight.
- A Contracting Officer will use approximately 16 man-hours to generate any necessary contractual agreements.
- A UXO Safety Officer will supervise project site work and provide anomaly avoidance support using an estimated 104 man-hours (64 hours at 4%), which includes four eight-hour travel days and eight, eight-hour workdays, plus participation in a one-day public meeting.
- Mobilization, demobilization and subsistence costs include;
  - Fieldwork – one airfare, ten days of a rental vehicle with fuel, twelve days at a hotel and an 11.5 per diem allowances (two 75% travel days and ten full days) for the UXO Safety Officer.
  - Public Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated five days per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment totaling $765 includes a digital camera ($200), a hand-held metal detector for ten days @ $9 day plus $75 shipping and prep ($165), two hand-held radios at $125 each ($250), and other small miscellaneous hand tools and equipment ($150).
- Cost for the equipment assumes no Government-Furnished Equipment (GFE).

- Under UXO escort, 85 each 7" x 10" and 5 each 18" x 24" custom warning signs will be posted in selected locations by two local laborers (ZAPATA laborer rate of $21.12 per man-hour). Sign establishment will take 64 man-hours per laborer.
- A hand-held metal detector will be used by the on-site UXO technician to assist in safe installation of the signposts.
- Estimated annual cost for sign maintenance is $1,212 per year, assuming replacement of ten signs per year. This cost is based on four hours coordination time for a Task Manager, ten replacement signs, and 24 hours of local labor for inspection, repairs and replacement of signs. The cost of this expenditure over a 30-year period is $36,360.
- Cost for producing and distributing an educational/awareness pamphlet that describes the types of MEC found at the site and details the actions to take upon discovering them is $8,000.

TABLE 3-1 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS (IC)

Item	Unit	Rate	Quantity	Cost
Project Design - Task Manager	Man-hours	$55.70	56	$3,119
Project Implementation - Task Manager	Man-hours	$55.70	80	$4,456
Project Oversight - Project Manager	Man-hours	$103.60	24	$2,486
Contract Management - Contracting Officer	Man-hours	$99.01	16	$1,584
UXO Safety Officer (4% differential)	Man-hours	$52.73	64	$3,375
UXO Safety Officer (no differential)	Man-hours	$50.86	40	$2,034
Airfare – Charlotte, NC to Honolulu, HI	Round trip	$1,200.00	3	$3,600
Rental Vehicle	Day	$75.00	13	$975
Hotel Stay (including tax)	Day	$196.47	16	$3,144
Per Diem	Day	$112.00	16.5	$1,848
Field Equipment	Lump sum	$765.00	1	$765
Custom Warning Signs (7"x10")[1]	Each	$68.55	85	$5,827
Custom Warning Signs (18"x24")[1]	Each	$72.55	5	$363
Sign Establishment – (Two local laborers)	Man-hours	$21.12	128	$2,703
Annual Sign Maintenance for 30 Years [2]	Year	$1,212.00	30	$36,360
Produce and distribute awareness pamphlet	Each	$1.00	8000	$8,000
			Subtotal	$80,639
5-Yr. Recurring Reviews Over 30 Years	LS	$50,000	6	$300,000
Annual Reviews	NA	$25,000	24	$600,000
TOTAL				$980,639

[1] R.S. Means 02890/700/0900
[2] $1,212 per year is estimated for maintenance of signs.

For ease of comparison of IC from site to site, total IC costs ($80,639) are proportioned based on the number of signs each area requires.

- $28,461 – He'eia Kea (30 signs)
- $14,230 – Kahalu'u (15 signs)
- $37,948 –Maunawili Valley Impact Area (40 signs)

Note that each IC can only be executed for this cost if all IC are implemented at the same time (under the same mobilization). If IC for each site is executed independently, the total cost will increase significantly.

4.0 ALTERNATIVE 3 – COMPREHENSIVE SURFACE CLEARANCE WITH IC

Costing and assumptions for a Comprehensive Surface Clearance for He'eia Kea, Kahalu'u, and Maunawili Valley Impact Area are detailed in the following sections. The Surface Clearance for each parcel is assumed to be executed independently (i.e. each accounts for mobilization, work plan, and report costs). The total cost to conduct a Surface Clearance would be greatly reduced if all three parcels were addressed simultaneously.

4.1 ALTERNATIVE 3 – HE'EIA KEA

The estimated capital cost to implement Alternative 3 is $ 689,775. Institutional control costs ($28,461) are included in this alternative. To present an inclusive financial commitment, a line item representing the total cost ($300,000) of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) has been added to the cost of Institutional Controls in Table 4-1. In addition, a line item is included representing the cost of 24 (smaller-scale) annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). The Recurring Review and Annual Review processes, however, are not Institutional Controls. Initial fieldwork is estimated to last approximately six weeks (28 workdays), based on removing 100% of the total assumed surface anomalies (9,825 anomalies) at a rate of 30 acres per day, five ten-hour days a week. (These figures are based on an assumed 75 anomalies per acre over 131 acres.) A Senior UXO Supervisor will supervise two five-man UXO teams during surface clearance activities. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($28,461) are included in this alternative.
- Surface Clearance totals $661,314.
- Review costs including the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future (300,000), and the cost of 24 smaller-scale annual reviews to occur on all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000).
- The project design will be conducted by a Task Manager and is estimated to take approximately 180 man-hours.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 464 man-hours.
- A Project Manager will provide approximately 106 man-hours of project oversight.
- A Contracting Officer will use approximately 32 man-hours to generate any necessary contractual agreements.
- Workweek will not exceed 50 hours. No stand-down time is assumed for weather, natural disasters, federal holidays, or denied access to any areas.
- Per Diem and lodging are based upon the rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- A UXO Safety Officer will support site work using an estimated 344 man-hours, which includes two eight-hour travel days and approximately 28 ten-hour workdays (554-100' x 100' grids and four acres of trail cleared at a rate of 4.8 acres per day), five days a week for six weeks. Also included, the UXOSO will attend two eight-hour site meetings, with 32 hours of associated travel.
- A Senior UXO Supervisor will supervise two five-man UXO teams (one UXO Tech III and four UXO Technician II) while conducting the surface Clearance. Each person is estimated at 296 man-hours, which includes two eight-hour travel days and

approximately 28 ten-hour workdays (554-100' x 100' grids and four acres of trail cleared at a rate of 4.8 acres per day), five days a week for six weeks.) In addition, the SUXOS will attend an eight-hour initial site visit, with 16 hours associated travel time.

- A local explosives distributor will make four explosives deliveries to the site so that any UXO items discovered can be destroyed.
- Cost for the equipment assumes no GFE including vehicles and explosives for demolition purposes.
- Cost for equipment assumes rental of portable explosives magazine.
- Security cost includes nighttime monitoring at 20 hours per week for six weeks.
- Mobilization, demobilization and subsistence costs include;
  - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (two 75% travel days and one full day) for the Task Manager, SUXOS and the UXO Safety Officer.
  - Fieldwork – 13 airfares, 168 days of a rental vehicle with fuel (four vehicles for six weeks), 546 nights at a hotel (13 men) and an estimated 565.5 per diem allowances (two 75% travel days and 168 full days for the 13-person team).
  - Site Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5 days per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment includes an ARMAG 5' x 4' x 7' explosives magazine @ 590/month for 1.5 months plus $1,750 shipping ($2,635), digital camera ($200), 15 Schonstedt® Magnetometers for six weeks @ $9/day each plus $450 shipping and prep ($6,120), eight hand-held radios at $125 each ($1,000) totaling $9,955.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Project Design.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for 50 percent of the area.
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport for all cultural debris and munitions debris will cost $1,500.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations ($1,000).
- The Mk II grenade was used as the MPM for He'eia Combat Training Area during the EE/CA investigation and has an MSD of 200-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It is assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a

particular day, and the general withdrawal and relocation procedures, including site security.
    - No evacuations are anticipated.
    - At present, no businesses are known to exist within the area influenced by the clearance.
    - If a business exists within the area at the time of the fieldwork, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 4-1 ALTERNATIVE 3 FOR HE'EIA KEA, COMPREHENSIVE SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Road Closure Plan) - Task Manager	Man-hours	$55.70	180	$10,026
Project Implementation - Task Manager	Man-hours	$55.70	464	$25,845
Project Oversight - Project Manager	Man-hours	$103.60	106	$10,982
Contract Management - Contracting Officer	Man-hours	$91.45	32	$2,926
UXO Safety Officer (OT)	Man-hours	$76.29	56	$4,272
UXO Safety Officer (8% differential)	Man-hours	$54.61	224	$12,233
UXO Safety Officer (no differential)	Man-hours	$50.86	64	$3,255
Senior UXO Supervisor (OT)	Man-hours	$72.72	56	$4,072
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	224	$12,127
Senior UXO Supervisor (no differential)	Man-hours	$48.48	40	$1,939
2 - UXO Supervisor (OT)	Man-hours	$75.63	112	$8,471
2 - UXO Supervisor (8% differential)	Man-hours	$54.14	448	$24,255
2 - UXO Supervisor (no differential)	Man-hours	$50.42	32	$1,613
8 - UXO Technician II (OT)	Man-hours	$63.08	448	$28,258
8 - UXO Technician II (8% differential)	Man-hours	$45.10	1,792	$80,819
8 - UXO Technician II (no differential)	Man-hours	$42.05	128	$5,382
Security Guard (Nightime Magazine Security)	Man-hours	$24.25	120	$2,910
Airfare – Charlotte, NC to Oahu, HI	Round trip	$1,200.00	18	$21,600
Rental Vehicles (4 vehicles for 1.5 months)	Month	$1,600.00	6	$9,600
Hotel Stay (including tax)	Day	$196.47	546	$107,273
Per Diem	Day	$112.00	565.5	$63,336
Explosives Delivery	Each	$1,000.00	4	$4,000
Equipment, Supplies and Storage Magazine	Lump Sum	$9,955.00	1	$9,955
Brush Clearing Subcontractor (escort included)	Acre	$3,000.00	65.5	$196,500
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Scrap Transport (MD and CD)	Lump Sum	$1,500.00	1	$1,500
Project Report - Task Manager	Man-hours	$55.70	84	$4,679
Project Report Review - Project Manager	Man-hours	$103.60	24	$2,486
			subtotal	$661,314
Institutional Control Costs (from Alt. 2)	Lump sum		1	$28,461
			subtotal	$689,775
5-Yr. Recurring Reviews Over 30 Years		$50,000	6	$300,000
Annual Reviews		$25,000	24	$600,000
SUM				$1,589,775

4.2 ALTERNATIVE 3 – KAHALU'U PARCEL

The estimated capital cost to implement Alternative 3 is $226,380. Institutional control costs ($14,230) are included in this alternative. To present an inclusive financial commitment, a line item representing the total cost ($300,000) of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) has been added to the cost of Institutional Controls in Table 4-2. In addition, a line item is included representing the cost of 24 (smaller-scale) annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). The Recurring Review and Annual Review processes, however, are not Institutional Controls. Initial fieldwork is estimated to last approximately three days, based on removing 100% of the total assumed surface anomalies (792 anomalies) at a rate of 22 acres (264 anomalies) per day. (These figures are based on an assumed 12 anomalies per acre over 66 acres.) A Senior UXO Supervisor will supervise two five-man UXO teams during surface clearance activities. Each team member will clear 2.5 acres per day collecting 30 surface anomalies. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($14,230) are included in this alternative.
- Surface Clearance totals $212,150.
- Review costs including the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future (300,000), and the cost of 24 smaller-scale annual reviews to occur on all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000).
- The project design will be conducted by a Task Manager and is estimated to take approximately 180 man-hours.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 214 man-hours.
- A Project Manager will provide approximately 53 man-hours of project oversight.
- A Contracting Officer will use approximately 32 man-hours to generate any necessary contractual agreements.
- Workweek will not exceed 50 hours per week. No stand-down time is assumed for weather, natural disasters, federal holidays, or denied access to any areas.
- Per Diem and lodging are based upon the rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- A UXO Safety Officer will support site work using an estimated 94 man-hours, which includes two eight-hour travel days and approximately three ten-hour field days. Also included, the UXOSO will attend two eight-hour site meetings, with 32 hours of associated travel.
- A Senior UXO Supervisor will supervise two five-man UXO teams (one UXO Tech III and four UXO Technician II) while conducting the surface clearance. Each person is estimated at 46 man-hours, which includes two eight-hour travel days and approximately three ten-hour workdays. In addition, the SUXOS will attend an eight-hour initial site visit, with 16 hours associated travel time.
- A local explosives distributor will make one explosives delivery to the site so that any UXO items discovered during the surface clearance can be destroyed.
- Explosives will be delivered on an on-call basis and therefore no explosives magazine is required.

- Security cost includes nighttime monitoring at 20 hours for guarding any potential MEC until demolition.
- Mobilization, demobilization and subsistence costs include;
  - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (two 75% travel days and one full day) for the Task Manager, SUXOS and the UXO Safety Officer.
  - Fieldwork – 13 airfares, three days of a rental vehicle with fuel (four vehicles for three days), 39 nights at a hotel (13 men) and an estimated 58.5 per diem allowances (two 75% travel days and 39 full days for the 13-person team).
  - Site Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5 days per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment includes a digital camera ($200), 15 Schonstedt® Magnetometers for three days @ $9/day each plus $450 shipping and prep ($855), eight hand-held radios at $125 each ($1,000) totaling $2,055.
- Cost for the equipment assumes no GFE including vehicles and explosives for demolition purposes.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Project Design.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for 50 percent of the area.
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport costs for all cultural debris and munitions debris total $1,500.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations ($1,000).
- The Mk II grenade was used as the MPM for He'eia Combat Training Area during the EE/CA investigation and has an MSD of 200-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It is assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
  - No evacuations are anticipated.
  - At present, no businesses are known to exist within the area influenced by the clearance.
  - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to

local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).

- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 4-2 ALTERNATIVE 3 FOR KAHALU'U, COMPREHENSIVE SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Road Closure Plan) - Task Manager	Man-hours	$55.70	180	$10,026
Project Implementation - Task Manager	Man-hours	$55.70	214	$11,920
Project Oversight - Project Manager	Man-hours	$103.60	53	$5,491
Contract Management - Contracting Officer	Man-hours	$91.45	32	$2,926
UXO Safety Officer (OT)	Man-hours	$76.29	0	$0
UXO Safety Officer (8% differential)	Man-hours	$54.61	24	$1,311
UXO Safety Officer (no differential)	Man-hours	$50.86	70	$3,560
Senior UXO Supervisor (OT)	Man-hours	$72.72	0	$0
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	24	$1,299
Senior UXO Supervisor (no differential)	Man-hours	$48.48	46	$2,230
2 - UXO Supervisor (OT)	Man-hours	$75.63	0	$0
2 - UXO Supervisor (8% differential)	Man-hours	$54.14	48	$2,599
2 - UXO Supervisor (no differential)	Man-hours	$50.42	44	$2,218
8 - UXO Technician II (OT)	Man-hours	$63.08	0	$0
8 - UXO Technician II (8% differential)	Man-hours	$45.10	192	$8,659
8 - UXO Technician II (no differential)	Man-hours	$42.05	176	$7,401
Security Guard (Nightime Security)	Man-hours	$24.25	20	$485
Airfare – Charlotte, NC to Oahu, HI	Round Trip	$1,200.00	18	$21,600
Rental Vehicles (4 vehicles for 3 days and meetings)	Day	$75.00	15	$1,125
Hotel Stay (fieldwork and meetings, including tax)	Day	$196.47	49	$9,627
Per Diem (fieldwork and meetings)	Day	$112.00	71	$7,952
Explosives Delivery	Each	$1,000.00	1	$1,000
Equipment and Supplies	Lump Sum	$2,055.00	1	$2,055
Brush Clearing Subcontractor (including escort)	Acre	$3,000.00	33	$99,000
Scrap Transport (MD and CD)	Lump Sum	$1,500.00	1	$1,500
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Project Report - Task Manager	Man-hours	$55.70	84	$4,679
Project Report Review - Project Manager	Man-hours	$103.60	24	$2,486
			subtotal	$212,150
Institutional Control Costs (from Alt. 2)	Lump Sum		1	$14,230
			subtotal	$226,380
5-Yr. Recurring Reviews Over 30 Years		$50,000	6	$300,000
Annual Reviews		$25,000	24	$600,000
SUM				$1,126,380

4.3 ALTERNATIVE 3 – MAUNAWILI VALLEY IMPACT AREA

The estimated capital cost to implement Alternative 3 is $331,521. Institutional control costs ($37,948) are included in this alternative. To present an inclusive financial commitment, a line item representing the total cost ($300.000) of six recurring reviews (5, 10, 15, 20, 25 and 30 years from present) has been added to the cost of Institutional Controls in Table 4-3. In addition, a line item is included representing the cost of 24 (smaller-scale) annual reviews to occur in all

years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). The Recurring Review and Annual Review processes, however, are not Institutional Controls. Initial fieldwork is estimated to last approximately four days, based on removing 100% of the total assumed surface anomalies (1,356 anomalies) at a rate of 30 acres per day. (These figures are based on an assumed 12 anomalies per acre over 113 acres.) A Senior UXO Supervisor will supervise two five-man UXO teams during surface clearance activities. Each team member will clear 2.5 acres per day collecting 30 surface anomalies. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($37,948) are included in this alternative.
- Surface Clearance totals $293,573.
- Review costs including the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future (300,000), and the cost of 24 smaller-scale annual reviews to occur on all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000).
- The project design will be conducted by a Task Manager and is estimated to take approximately 180 man-hours.
- The project implementation will be conducted by a Task Manager and is estimated to take approximately 224 man-hours.
- A Project Manager will provide approximately 53 man-hours of project oversight.
- A Contracting Officer will use approximately 32 man-hours to generate any necessary contractual agreements.
- Workweek will not exceed 50 hours per week. No stand-down time is assumed for weather, natural disasters, federal holidays, or denied access to any areas.
- Per Diem and lodging are based upon the rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- A UXO Safety Officer will support site work using an estimated 104 man-hours, which includes two eight-hour travel days and approximately four ten-hour field days. Also included, the UXOSO will attend two eight-hour site meetings, with 32 hours of associated travel.
- A Senior UXO Supervisor will supervise two five-man UXO teams (one UXO Tech III and four UXO Technician II) while conducting the surface clearance. Each person is estimated at 56 man-hours, which includes two eight-hour travel days and approximately four ten-hour workdays. In addition, the SUXOS will attend an eight-hour initial site visit, with 16 hours associated travel time (totaling 80 hours).
- A local explosives distributor will make one explosives delivery to the site so that any UXO items discovered during the surface clearance can be destroyed.
- Explosives will be delivered on an on-call basis and therefore no explosives magazine is required.
- Security cost includes nighttime monitoring at 20 hours for guarding any potential MEC until demolition for two nights.
- Mobilization, demobilization and subsistence costs include;
    - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (two 75% travel days and one full day) for the Task Manager, SUXOS and the UXO Safety Officer.

  - Fieldwork – 13 airfares, four days of a rental vehicle with fuel (four vehicles for four days), 52 nights at a hotel (13 men) and an estimated 71.5 per diem allowances (two 75% travel days and 52 full days for the 13-person team).
  - Site Meeting – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated 5 days per diem allowances (two 75% travel days and one full day) for the Task Manager and the UXO Safety Officer.
- Field equipment includes a digital camera ($200), 15 Schonstedt® Magnetometers for four days @ $9/day each plus $450 shipping and prep ($990), eight hand-held radios at $125 each ($1,000) totaling $2,190.
- Cost for the equipment assumes no GFE including vehicles and explosives for demolition purposes.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Surface Clearance.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for 50 percent of the area.
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport costs for all cultural debris and munitions debris total $1,500.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations ($1,000).
- The 105mm projectile was used as the MPM for Pali Training Camp during the EE/CA investigation with an MSD of 235-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It will be assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
  - No evacuations are anticipated.
  - At present, no businesses are known to exist within the area influenced by the clearance.
  - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 4-3 ALTERNATIVE 3 FOR THE MAUNAWILI VALLEY IMPACT AREA, COMPREHENSIVE SURFACE CLEARANCE WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Road Closure Plan) - Task Manager	Man-hours	$55.70	180	$10,026
Project Implementation - Task Manager	Man-hours	$55.70	224	$12,477
Project Oversight - Project Manager	Man-hours	$103.60	53	$5,491
Contract Management - Contracting Officer	Man-hours	$91.45	32	$2,926
UXO Safety Officer (OT)	Man-hours	$76.29	0	$0
UXO Safety Officer (8% differential)	Man-hours	$54.61	32	$1,748
UXO Safety Officer (no differential)	Man-hours	$50.86	72	$3,662
Senior UXO Supervisor (OT)	Man-hours	$72.72	0	$0
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	32	$1,732
Senior UXO Supervisor (no differential)	Man-hours	$48.48	48	$2,327
2 - UXO Supervisor (OT)	Man-hours	$75.63	0	$0
2 - UXO Supervisor (8% differential)	Man-hours	$54.14	64	$3,465
2 - UXO Supervisor (no differential)	Man-hours	$50.42	48	$2,420
8 - UXO Technician II (OT)	Man-hours	$63.08	0	$0
8 - UXO Technician II (8% differential)	Man-hours	$45.10	256	$11,546
8 - UXO Technician II (no differential)	Man-hours	$42.05	192	$8,074
Security Guard (Nightime Magazine Security)	Man-hours	$24.25	20	$485
Airfare – Charlotte, NC to Oahu, HI	Round Trip	$1,200.00	18	$21,600
Rental Vehicles (4 vehicles for 3 days and meetings)	Day	$75.00	22	$1,650
Hotel Stay (fieldwork and meetings, including tax)	Day	$196.47	62	$12,181
Per Diem (fieldwork and meetings)	Day	$112.00	84	$9,408
Explosives Delivery	Each	$1,000.00	1	$1,000
Equipment and Supplies	Lump Sum	$2,190.00	1	$2,190
Brush Clearing Subcontractor (including escort)	Acre	$3,000.00	56.5	$169,500
Scrap Transport (MD and CD)	Lump Sum	$1,500.00	1	$1,500
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Project Report - Task Manager	Man-hours	$55.70	84	$4,679
Project Report Review - Project Manager	Man-hours	$103.60	24	$2,486
			subtotal	$293,573
Institutional Control Costs (from Alt. 2)	Lump sum		1	$37,948
			subtotal	$331,521
5-Yr. Recurring Reviews Over 30 Years		$50,000	6	$300,000
Annual Reviews		$25,000	24	$600,000
SUM				$1,231,521

5.0 ALTERNATIVE 4 – CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

Costing and assumptions for a Clearance to Depth for He'eia Kea, Kahalu'u, and Maunawili Valley Impact Area is detailed in the following sections. The Clearance to Detectable Depth for each parcel is assumed executed independently (i.e. each accounts for mobilization, work plan, and report costs.) The total cost to conduct each Clearance to Detectable Depth would be greatly reduced if all three parcels were addressed simultaneously.

5.1 ALTERNATIVE 4 – HE'EIA KEA

5.1.1 Estimated capital cost to implement Alternative 4 is $ 2,593,793. The project is estimated to last approximately 5.5 months (109 workdays), based on removing 100% of the total estimated anomalies (35,501 anomalies) in 131 acres within the He'eia Kea parcel. Institutional Control (Alternative 2) costs ($28,461) are included in this alternative. Also included are the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future ($300,000), and the cost of 24 (smaller-scale) annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). Productivity is based on the following assumptions:

5.1.2 A Senior UXO Supervisor will supervise three seven-man UXO teams during the clearance to detectable depth activities. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($28,461) are included in this alternative.
- Subsurface Clearance costs total $2,565,332.
- The project design will be conducted by the Task Manager and is estimated to take approximately 320 man-hours.
- Cost is based on working five 10-hour days per week for all field activities.
- The project implementation will be conducted by a full time Task Manager (Site Manager) and is estimated to take approximately 1,200 man-hours. This 200 hours per month for 6 months includes fieldwork, fieldwork preparations, fieldwork travel, and other related travel.
- A Project Manager will provide approximately 600 man-hours of project oversight for the life of the project.
- A Contracting Officer will use approximately 40 man-hours to generate any necessary contractual agreements.
- Per Diem and lodging are based upon rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- Mobilization/demobilization cost assumes project management and UXO Supervisors/Technicians are not available locally and will require rental vehicles and air travel between the Charlotte, North Carolina and Oahu, Hawaii.
- One Blackhawk Geoservices, Inc., three-man geophysical team will mobilize to the site with all geophysical equipment, including two EM61 MK2, two Trimble Real-Time Kinematic GPS systems, and other necessary support equipment.
- One three-man geophysical team will collect data over the 127-acre area using grid methodology at a rate of three acres a day. A total of 43 workdays, two field preparation days, and two travel days will be required, totaling 462 hours per person.

- Geophysical data will be processed, interpreted, and checked for quality (QC'd) offsite by a Geophysicist at a rate equal to the geophysical survey of three acres a day for 43 eight-hour days (344 hours).
- A UXO Safety Officer will support site work using an estimated 1,154 man-hours, over 5.5 months, which includes 16 hours of travel time for fieldwork, 16 hours for a site visit and site meeting and 32 of site visit/meeting travel.
- A UXO QC Specialist will support site work using an estimated 700 man-hours, over 3.5 months, which includes 16 hours of travel.
- A Senior UXO Supervisor will supervise the three seven-man reacquisition and intrusive investigation teams (one UXO Team Leader and six UXO Technician II). The three seven-man teams are estimated at 700 man-hours per person for 3.5 months of field activities, which includes two eight-hour travel days, three eight-hour day for site preparation, and approximately 66 ten-hour workdays for clearance of 127 acres of DGM anomalies and four acres of mag-and-dig anomalies. In addition, the SUXOS will attend one eight-hour site meeting, with 16 hours of associated travel (totaling 748 hours).
- Cost for equipment assumes rental of portable explosives magazine.
- Security cost includes nighttime monitoring for duration of removal action. This is approximately 20 hours per week for 22 weeks (440 hours).
- A local explosives distributor will make four explosives-deliveries to the site so that any UXO items discovered during the subsurface clearance can be destroyed.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the clearance.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for the entire area.
- Surveying will be conducted by a subcontractor at $80,000 (UXO Escort included).
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport costs for all cultural debris and munitions debris total $3,000.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations in the vicinity of occupied structures ($1,000).
- Mobilization, demobilization and subsistence costs include;
  - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (three 75% travel days and one full day) for the Task Manager, SUXOS, and the UXO Safety Officer.
  - Fieldwork – 28 airfares, 20 months of rental vehicles with fuel (a peak of three SUVs and four pickup trucks), 2,694 nights at a hotel and an estimated 2,736 per diem allowances.
  - Site Meetings – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated five days per diem allowances (two 75% travel days and one full day per trip) for the Task Manager and the UXO Safety Officer.

- Field equipment includes an ARMAG 5' x 4' x 7' explosives magazine @ $590/month for 3.5 months plus $1,750 shipping ($3,815), four digital cameras ($800), 18 Schonstedt® Magnetometers for 14 weeks @ $9/day each plus $540 shipping and prep ($16,416), eight hand-held radios at $125 each ($1,000), totaling $22,031.
- Cost for equipment assumes no GFE including vehicles and explosives for demolition purposes.
- The Mk II grenade was used as the MPM for He'eia Combat Training Area during the EE/CA investigation and has an MSD of 200-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It will be assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
  - No evacuations are anticipated.
  - At present, no businesses are known to exist within the area influenced by the clearance.
  - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 5-1 ALTERNATIVE 4 FOR HE'EIA KEA, CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Evacuation Plan) - Task Manager	Man-hours	$55.70	320	$17,824
Project Implementation - Task Manager	Man-hours	$55.70	1200	$66,840
Project Oversight - Project Manager	Man-hours	$103.60	600	$62,160
Contracts Management - Contracting Officer	Man-hours	$91.45	40	$3,658
Site Geophysicist	Man-hours	$57.95	462	$26,773
Geophysics Operator	Man-hours	$46.41	924	$42,883
Geophysical Data Interpretation - Geophysicist	Man-hours	$46.41	344	$15,965
UXO Safety Officer (OT)	Man-hours	$76.29	132	$10,070
UXO Safety Officer (8% differential)	Man-hours	$54.61	446	$24,356
UXO Safety Officer (4% differential)	Man-hours	$52.73	274	$14,448
UXO Safety Officer (no differential)	Man-hours	$50.86	302	$15,360
Senior UXO Supervisor (OT)	Man-hours	$72.72	132	$9,599
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	528	$28,586
Senior UXO Supervisor (no differential)	Man-hours	$48.48	88	$4,266
1 - UXO QC (OT)	Man-hours	$72.72	132	$9,599
1 - UXO QC (8% differential)	Man-hours	$54.14	528	$28,586
1 - UXO QC (no differential)	Man-hours	$48.48	40	$1,939
3 - UXO Supervisor (OT)	Man-hours	$75.63	396	$29,949
3 - UXO Supervisor (8% differential)	Man-hours	$54.14	1584	$85,758
3 - UXO Supervisor (no differential)	Man-hours	$50.42	120	$6,050
18 - UXO Technician II (OT)	Man-hours	$63.08	2376	$149,866
18 - UXO Technician II (8% differential)	Man-hours	$45.10	9504	$428,630
18 - UXO Technician II (no differential)	Man-hours	$42.05	720	$30,276
Security Guard (Nightime Magazine Security)	Man-hours	$24.25	440	$10,670
Airfare – Charlotte, NC to Honolulu	Round Trip	$1,200.00	33	$39,600
Rental Vehicles (fieldwork, visits, meetings)	Month	$1,600.00	20.2	$32,320
Hotel Stay (fieldwork, visits, meetings, including tax)	Day	$194.70	2704	$526,469
Per Diem (fieldwork, visits, meetings)	Day	$112.00	2748.5	$307,832
Explosives Delivery	Lump Sum	$1,000.00	4	$4,000
Equipment, Supplies and Storage Magazine	Lump Sum	$22,031.00	1	$22,031
Surveyor Subcontractor (Escort Included)	Lump Sum	$80,000.00	1	$80,000
Brush Clearance Subcontractor (Escort Included)	Acre	$3,000.00	131	$393,000
EM61 MK2	Month	$3,500.00	2	$7,000
RTK GPS	Month	$1,500.00	2	$3,000
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Scrap Transport (MD and CD)	Lump Sum	$3,000.00	1	$3,000
Project Report - Task Manager	Man-hours	$55.70	320	$17,824
Project Report Review - Project Manager	Man-hours	$103.60	40	$4,144
		Total Clearance	subtotal	$2,565,332
Institutional Control Costs (from Alt. 2)	Lump Sum	$23,929.00	1	$28,461
		Total Clearance with IC	subtotal	$2,593,793
5-Yr. Recurring Reviews Over 30 Years		$50,000.00	6	$300,000
Annual Reviews		$25,000.00	24	$600,000
SUM				$3,493,793

5.2 ALTERNATIVE 4 – KAHALU'U

5.2.1 Estimated capital cost to implement Alternative 4 is $525,687. The project is estimated to last approximately six workdays, based on removing 100% of the total estimated anomalies (2,574 anomalies) in 66 acres within the Kahalu'u parcel. Institutional Control (Alternative 2) costs ($14,230) are included in this alternative. Also included are the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future ($300,000), and the cost of 24 (smaller-scale) annual reviews to occur on all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). Productivity is based on the following assumptions:

5.2.2 A Senior UXO Supervisor will supervise three seven-man UXO teams during the clearance to detectable depth activities. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($14,230) are included in this alternative.
- Subsurface Clearance costs total $511,457.
- The project design will be conducted by the Task Manager and is estimated to take approximately 320 man-hours.
- Cost is based on working five 10-hour days per week for all field activities.
- The project implementation will be conducted by a full time Task Manager (Site Manager) and is estimated to take approximately 150 man-hours. This 50 hours per week for three weeks includes fieldwork, fieldwork preparations, fieldwork travel, and other related travel.
- A Project Manager will provide approximately 75 man-hours of project oversight for the life of the project.
- A Contracting Officer will use approximately 20 man-hours to generate any necessary contractual agreements.
- Per Diem and lodging are based upon rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- Mobilization/demobilization cost assumes project management and UXO Supervisors/Technicians are not available locally and will require rental vehicles and air travel between the Charlotte, North Carolina and Oahu, Hawaii.
- A UXO Safety Officer will support site work using an estimated 124 man-hours, which includes six ten-hour field days, 16 hours of fieldwork travel time, 16 hours for a site visit and site meeting, 32 hours of visit/meeting travel.
- A UXO QC Specialist will support site work using an estimated 76 man-hours, over six days, which includes 16 hours of travel.
- A Senior UXO Supervisor will supervise the three seven-man intrusive investigation teams (one UXO Team Leader and six UXO Technician II). The three seven-man teams are estimated at 76 man-hours per person, which includes two eight-hour travel days, and approximately six ten-hour workdays for clearance of 66 acres. In addition, the SUXOS will attend one eight-hour site visit, with 16 hours of associated travel (totaling 100 hours.)
- Explosives will be delivered on an on-call basis and therefore no explosives magazine is required.

- Security cost includes nighttime monitoring at 20 hours for guarding any potential MEC until demolition for two nights.
- A local explosives distributor will make three explosives-deliveries to the site so that any UXO items discovered during the subsurface clearance can be destroyed.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Project Design.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for the entire area.
- Surveying will be conducted by a subcontractor at $40,000 (UXO Escort included).
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport costs for all cultural debris and munitions debris total $1,500.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations in the vicinity of occupied structures ($1,000).
- Mobilization, demobilization and subsistence costs include;
  - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (three 75% travel days and one full day) for the Task Manager, SUXOS, and the UXO Safety Officer.
  - Fieldwork – 25 airfares, 1.2 weeks of rental vehicles with fuel (seven vehicles), 210 nights at a hotel and an estimated 247.5 per diem allowances.
  - Site Meetings – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated five days per diem allowances (two 75% travel days and one full day per trip) for the Task Manager and the UXO Safety Officer.
- Field equipment includes four digital cameras ($800), 18 Schonstedt® Magnetometers for 1.2 weeks @ $9/day each plus $540 shipping and prep ($1,901), eight hand-held radios at $125 each ($1,000), totaling $3,701.
- Cost for equipment assumes no GFE including vehicles and explosives for demolition purposes.
- The Mk II grenade was used as the MPM for He'eia Combat Training Area during the EE/CA investigation and has an MSD of 200-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It will be assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
  - No evacuations are anticipated.

  - At present, no businesses are known to exist within the area influenced by the clearance.
  - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 5-2 ALTERNATIVE 4 FOR KAHALU'U , CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Evacuation Plan) - Task Manager	Man-hours	$55.70	320	$17,824
Project Implementation - Task Manager	Man-hours	$55.70	150	$8,355
Project Oversight - Project Manager	Man-hours	$103.60	75	$7,770
Contracts Management - Contracting Officer	Man-hours	$91.45	20	$1,829
UXO Safety Officer (OT)	Man-hours	$76.29	10	$763
UXO Safety Officer (8% differential)	Man-hours	$54.61	50	$2,731
UXO Safety Officer (4% differential)	Man-hours	$52.73	0	$0
UXO Safety Officer (no differential)	Man-hours	$50.86	64	$3,255
Senior UXO Supervisor (OT)	Man-hours	$72.72	10	$727
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	50	$2,707
Senior UXO Supervisor (no differential)	Man-hours	$48.48	40	$1,939
1 - UXO QC (OT)	Man-hours	$72.72	10	$727
1 - UXO QC (8% differential)	Man-hours	$54.14	50	$2,707
1 - UXO QC (no differential)	Man-hours	$48.48	16	$776
3 - UXO Supervisor (OT)	Man-hours	$75.63	30	$2,269
3 - UXO Supervisor (8% differential)	Man-hours	$54.14	150	$8,121
3 - UXO Supervisor (no differential)	Man-hours	$50.42	48	$2,420
18 - UXO Technician II (OT)	Man-hours	$63.08	180	$11,354
18 - UXO Technician II (8% differential)	Man-hours	$45.10	900	$40,590
18 - UXO Technician II (no differential)	Man-hours	$42.05	288	$12,110
Security Guard (Nightime Security)	Man-hours	$24.25	20	$485
Airfare – Charlotte, NC to Honolulu	Round Trip	$1,200.00	30	$36,000
Rental Vehicles (fieldwork, visits, meetings)	Day	$75.00	65	$4,875
Hotel Stay (fieldwork, visits, meetings, including tax)	Day	$194.70	220	$42,834
Per Diem (fieldwork, visits, meetings)	Day	$112.00	260	$29,120
Explosives Delivery	Lump Sum	$1,000.00	3	$3,000
Equipment and Supplies	Lump Sum	$3,701.00	1	$3,701
Surveyor Subcontractor (Escort Included)	Lump Sum	$40,000.00	1	$40,000
Brush Clearance Subcontractor (Escort Included)	Acre	$3,000.00	66	$198,000
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Scrap Transport (MD and CD)	Lump Sum	$1,500.00	1	$1,500
Project Report - Task Manager	Man-hours	$55.70	320	$17,824
Project Report Review - Project Manager	Man-hours	$103.60	40	$4,144
		Total Removal	subtotal	$511,457
Institutional Control Costs (from Alt. 2)	Lump sum		1	$14,230
		Total Removal with IC	subtotal	$525,687
5-Yr. Recurring Reviews Over 30 Years		$50,000.00	6	$300,000
Annual Reviews		$25,000.00	24	$600,000
SUM				$1,425,687

5.3 ALTERNATIVE 4 – MAUNAWILI VALLEY IMPACT AREA

5.3.1 Estimated capital cost to implement Alternative 4 is $819,645. The project is estimated to last approximately ten workdays, based on removing 100% of the total estimated anomalies (4,407 anomalies) in 113 acres within the Maunawili Valley Impact Area. Institutional Control (Alternative 2) costs ($37,948) are included in this alternative. Also included are the sum of the costs of six recurring reviews to occur 5, 10, 15, 20, 25 and 30 years in the future ($300,000), and the cost of 24 (smaller-scale) annual reviews to occur in all years other than those in which a Recurring Review is scheduled, 30 years into the future ($600,000). Productivity is based on the following assumptions:

5.3.2 A Senior UXO Supervisor will supervise three seven-man UXO teams during the clearance to detectable depth activities. The cost estimate is based on the following assumptions.

- Institutional Control (Alternative 2) costs ($37,948) are included in this alternative.
- Subsurface Clearance costs total $781,697.
- The project design will be conducted by the Task Manager and is estimated to take approximately 320 man-hours.
- Cost is based on working five 10-hour days per week for all field activities.
- The project implementation will be conducted by a full time Task Manager (Site Manager) and is estimated to take approximately 200 man-hours. This 50 hours per week for four weeks includes fieldwork, fieldwork preparations, fieldwork travel, and other related travel.
- A Project Manager will provide approximately 100 man-hours of project oversight for the life of the project.
- A Contracting Officer will use approximately 25 man-hours to generate any necessary contractual agreements.
- Per Diem and lodging are based upon rates established in the revised edition of the Joint Travel Regulations for Oahu, Hawaii.
- Mobilization/demobilization cost assumes project management and UXO Supervisors/Technicians are not available locally and will require rental vehicles and air travel between the Charlotte, North Carolina and Oahu, Hawaii.
- A UXO Safety Officer will support site work using an estimated 164 man-hours, which includes ten ten-hour field days, 16 hours of fieldwork travel time, 16 hours for a site visit and site meeting, 32 hours of visit/meeting travel.
- A UXO QC Specialist will support site work using an estimated 116 man-hours, over ten days, which includes 16 hours of travel.
- A Senior UXO Supervisor will supervise three seven-man intrusive investigation teams (one UXO Team Leader and six UXO Technician II). The three seven-man teams are estimated at 116 man-hours per person, which includes two eight-hour travel days, and approximately ten, ten-hour workdays for clearance of 113 acres. In addition, the SUXOS will attend one eight-hour site visit, with 16 hours of associated travel (totaling 140 hours).
- Explosives will be delivered on an on-call basis and therefore no explosives magazine is required.

- Security cost includes nighttime monitoring at 20 hours per week for two weeks for guarding any potential MEC until demolition.
- A local explosives distributor will make five explosives-deliveries to the site so that any UXO items discovered during the subsurface clearance can be destroyed.
- The costs for the Work Plan, Health and Safety Plan, and Evacuation Plan are included in the cost of the Project Design.
- Brush clearing will be conducted by a subcontractor at $3,000 per acre (UXO Escort included). Brush clearing will be required for the entire area.
- Surveying will be conducted by a subcontractor at $70,000 (UXO Escort included).
- All cultural debris will be removed, collected, and recycled through a local scrap dealer. All munitions debris will be demilitarized and shipped to scrap dealer within the continental United States. Transport costs for all cultural debris and munitions debris total $2,000.
- If necessary, noise monitoring will be conducted to ensure that safe noise levels are maintained during demolition operations in the vicinity of occupied structures ($1,000).
- Mobilization, demobilization and subsistence costs include;
  - Initial Site Visit – three airfares, three days of a rental vehicle with fuel, two nights at a hotel for three people and an estimated 7.5 per diem allowances (three 75% travel days and one full day) for the Task Manager, SUXOS, and the UXO Safety Officer.
  - Fieldwork – 25 airfares, two weeks of rental vehicles with fuel (seven vehicles), 350 nights at a hotel and an estimated 387.5 per diem allowances.
  - Site Meetings – two airfares, three days of a rental vehicle with fuel, two nights at a hotel for two people and an estimated five days per diem allowances (two 75% travel days and one full day per trip) for the Task Manager and the UXO Safety Officer.
- Field equipment includes four digital cameras ($800), 18 Schonstedt® Magnetometers for two weeks @ $9/day each plus $540 shipping and prep ($2,808), eight hand-held radios at $125 each ($1,000), totaling $4,608.
- Cost for equipment assumes no GFE including vehicles and explosives for demolition purposes.
- The 105mm projectile was used as the MPM for Pali Training Camp during the EE/CA investigation with an MSD of 235-ft. Road closures and evacuation of local residents are not anticipated during the clearance or when demolition activities (Intentional Detonations) are required because of the low MSD.
  - It will be assumed that all demolition operations will take place on the property, which will reduce the extent of required road closures.
  - Local police and fire departments will be notified approximately 60 days prior to commencement of field activities. These agencies will be briefed on the anticipated field schedule, the specific areas/addresses to be impacted on a particular day, and the general withdrawal and relocation procedures, including site security.
  - No evacuations are anticipated.

  - At present, no businesses are known to exist within the area influenced by the clearance.
  - If a business exists within the area at the time of the clearance, surface clearance activities will be coordinated in such a manner as to minimize fiscal impacts to local businesses (if possible, surface clearance activities will be conducted during lunch time/around business hours).
- A Task Manager will generate a project report at the conclusion of the site work.
- A Project Manager will review the project report.

TABLE 5-3 ALTERNATIVE 4 FOR THE MAUNAWILI VALLEY IMPACT AREA, CLEARANCE TO DETECTABLE DEPTH WITH INSTITUTIONAL CONTROLS

Item	Unit	Rate	Quantity	Cost
Project Design (WP, SSHP, Evacuation Plan) - Task Manager	Man-hours	$55.70	320	$17,824
Project Implementation - Task Manager	Man-hours	$55.70	200	$11,140
Project Oversight - Project Manager	Man-hours	$103.60	100	$10,360
Contracts Management - Contracting Officer	Man-hours	$91.45	25	$2,286
UXO Safety Officer (OT)	Man-hours	$76.29	20	$1,526
UXO Safety Officer (8% differential)	Man-hours	$54.61	80	$4,369
UXO Safety Officer (4% differential)	Man-hours	$52.73	0	$0
UXO Safety Officer (no differential)	Man-hours	$50.86	64	$3,255
Senior UXO Supervisor (OT)	Man-hours	$72.72	20	$1,454
Senior UXO Supervisor (8% differential)	Man-hours	$54.14	80	$4,331
Senior UXO Supervisor (no differential)	Man-hours	$48.48	40	$1,939
1 - UXO QC (OT)	Man-hours	$72.72	20	$1,454
1 - UXO QC (8% differential)	Man-hours	$54.14	80	$4,331
1 - UXO QC (no differential)	Man-hours	$48.48	16	$776
3 - UXO Supervisor (OT)	Man-hours	$75.63	60	$4,538
3 - UXO Supervisor (8% differential)	Man-hours	$54.14	240	$12,994
3 - UXO Supervisor (no differential)	Man-hours	$50.42	48	$2,420
18 - UXO Technician II (OT)	Man-hours	$63.08	360	$22,707
18 - UXO Technician II (8% differential)	Man-hours	$45.10	1440	$64,944
18 - UXO Technician II (no differential)	Man-hours	$42.05	288	$12,110
Security Guard (Nightime Security)	Man-hours	$24.25	40	$970
Airfare – Charlotte, NC to Honolulu	Round Trip	$1,200.00	30	$36,000
Rental Vehicles (fieldwork, visits, meetings)	Day	$75.00	20	$1,500
Hotel Stay (fieldwork, visits, meetings, including tax)	Day	$194.70	360	$70,092
Per Diem (fieldwork, visits, meetings)	Day	$112.00	400	$44,800
Explosives Delivery	Lump Sum	$1,000.00	5	$5,000
Equipment and Supplies	Lump Sum	$4,608.00	1	$4,608
Surveyor Subcontractor (Escort Included)	Lump Sum	$70,000.00	1	$70,000
Brush Clearance Subcontractor (Escort Included)	Acre	$3,000.00	113	$339,000
Noise Monitoring (inclusive)	Lump Sum	$1,000.00	1	$1,000
Scrap Transport (MD and CD)	Lump Sum	$2,000.00	1	$2,000
Project Report - Task Manager	Man-hours	$55.70	320	$17,824
Project Report Review - Project Manager	Man-hours	$103.60	40	$4,144
		Total Removal	subtotal	$781,697
Institutional Control Costs (from Alt. 2)	Lump sum		1	$37,948
		Total Removal with IC	subtotal	$819,645
5-Yr. Recurring Reviews Over 30 Years		$50,000.00	6	$300,000
Annual Reviews		$25,000.00	24	$600,000
SUM				$1,719,645

APPENDIX G

Responsiveness Summary

No Public Comments Received

APPENDIX H

Draft Recurring Review Plan

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Draft Recurring Review Plan

1.1 INTRODUCTION

1.1.1 In 2001, Zapata Incorporated (ZAPATA) was contracted by the USAESCH to conduct an EE/CA site investigation for the He'eia Combat Training Area and Pali Training Camp on the Island of Oahu, Hawaii.

1.1.2 The primary objective of the Recurring Review Plan is to ensure the MEC response actions implemented as a result of the EE/CA remain effective and continue to provide protection against MEC. Because this is an EE/CA report, this is a draft Recurring Review Plan. Any new information generated while following up on a recommended action should be included in the final Recurring Review Plan.

1.2 SITE DESCRIPTION

1.2.1 He'eia Combat Training Area

1.2.1.1 He'eia Kea

The hourglass-shaped He'eia Kea parcel covers approximately 204 acres located on the coastal plain adjacent to and on the slopes of Pu'u Ma'eli'eli, near the He'eia small boat harbor. The site is bordered to the east (*makai* – toward the ocean) by the Kamehameha Highway to the west (*mauka* – toward the mountains) by Kahekili Highway and the residential areas. (Figure 1, Appendix B1). The parcel's northern boundary follows the crest of the ridge down slope past the sewage disposal plant, and both the northern and the southern boundary generally follow ridges to the Kamehameha Highway. Most of this parcel is covered with dense vegetation including the densely forested coastal plain and thick grasses and shrubs in the higher elevations. There are several gulches throughout the parcel as well as areas with steep slopes. Elevations within the He'eia Kea parcel range from approximately 20 feet above mean sea level (MSL) to over 700 feet above MSL.

1.2.1.2 Kahalu'u

The Kahalu'u parcel covers approximately 2,254 acres, much consisting of densely forested hilly terrain containing numerous gulches and steep slopes within the Waihe'e and Ka'alaea Valleys in Kahalu'u, Hawaii (Figure 1, Appendix B2). Both valleys consist of a mix of residential and agricultural lots (USACE, 1993). The western boundary is formed by the Ko'olau mountain range with a maximum elevation of 2,660 feet above MSL. The eastern portion of the site overlaps with residential and agricultural plots along the edge of the Waiahole Forest Reserve (AMEC, 2001). Pu'u Kuolani and Kalahaku Ridge bound the parcel to the north and south, respectively. Portions of the site within both valleys contain permanent streams that are subject to flash flooding during storms (AMEC, 2001).

1.2.1.3 Military Activity

An encampment supporting 4,500 personnel compromising up to four infantry battalions was constructed in October 1943 including barracks, a mess hall, an open-air theater, a motor pool, and an ammunition storage shed on the He'eia Kea parcel. The He'eia Kea parcel supported the US Army's 98th Regimental Combat Team. Training facilities included several small arms

ranges, a hand-grenade range, an infiltration course, two bayonet courses, two obstacle courses, a shipside platform, and a maneuver area (Hawaiian HQ, Department of Army, 1943). The (larger) Kahalu'u tract was reportedly utilized as maneuvers and impact areas for jungle and assault training. An impact area is suspected for the firing of field artillery pieces, mortar, bazooka, and other assault weapons using live and practice rounds (INRP, 1993). By the end of 1945, structures and training facilities at both parcels were dismantled.

1.2.2 Pali Training Camp

The Pali Training Camp is comprised of four non-contiguous properties totaling approximately 4,396 acres located near the base of Ko'olau Range primarily within Maunawili Valley (Figure 1, Appendix B3). The largest parcel, referred to as the Maunawili Valley Impact Area, covers approximately 3,450 acres; it is in the *mauka* portion of Maunawili Valley and includes the suspected impact area above the Luana Hills Country Club and Maunawili Estates subdivision. This parcel ranges in elevation from approximately 200 feet MSL near the Country Club to over 2,000 feet MSL at the Ko'olau Range ridge line. The second, much smaller parcel (400 acres) called the Maunawili site is located on the western edge of the Maunawili Valley south of the Pali Highway behind St. Stephens Seminary and ranges in elevation from approximately 400 to 1,200 feet MSL (AMEC, 2001). The third parcel, the Maunawili Stream Site, formerly known as Makali'i Valley, is the smallest of the four (46 acres) and is located on the northern ridge of Mount Olomana. It ranges in elevation from approximately 50 to 200 feet MSL. The fourth and second largest parcel (500 acres), called the Ulumawao site, is located outside the Maunawili Valley, north of the Pali Highway and ranges in elevation from approximately 250 to 1,000 feet MSL at Ulumawao peak. These four parcels are mostly undeveloped, rugged, and densely forested land with some residential, agricultural, and recreational use. Each parcel contains shallow to deep gulches and moderate to steep slopes (AMEC, 2001).

1.2.2.1 Military Activity

In 1943, Pali was established as a regimental combat team training center, emphasizing the use of and familiarity with modern arms and field weapons. In addition, the camp provided rugged terrain for jungle and Ranger training. Several military structures were erected for use, but by 1946, all were dismantled and removed from the property. Valley residents report that artillery rounds were fired into Maunawili Valley from firing points at the mouth of the valley or from other locations within Kailua. Although the 212th Ordnance Disposal Squad conducted ordnance clearance in 1945, a public warning was issued in June 1948 by the Commanding Officer of the Army Ordnance Services to exercise caution when entering former training areas (Maunawili Valley). A ranch manager reported a "155mm round" in the Maunawili Valley (USACE, 1995) and a few claims have been made by local residents about finding duds and .30 caliber blanks. No reports of MPPEH in Maunawili or Makali'i Valleys have been substantiated (USACE, 1995). It is also reported by local residents that mortar rounds and machine gun bullets were frequently turned over in plowed fields (USACE, 1995). During the Geophysical Prove-Out conducted in March 2002, it was reported by a worker on a movie set within the Maunawili Valley Impact Area that a 20mm projectile was recently found.

1.3 SCHEDULE OF RECURRING REVIEW

1.3.1 The recurring review process is consistent with Section 121(c) of CERCLA, as amended by SARA, and Section 300.430 (f) (4) (ii) of the NCP. Recurring review, as outlined by these statutes, require that periodic (at least every five years) reviews be conducted for sites where hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure following the completion of all remedial actions.

1.3.2 Based on specific site conditions, an annual recurring review with site visit should be sufficient to evaluate the effectiveness of the response actions recommended for this area.

1.3.3 Documents that should be reviewed at the time of the recurring review include:

- AMEC Earth and Environmental, Archaeological Research Design for the Former He'eia Combat Training Area and Pali Training Camp, Ko'olaupoko District, Oahu Island, Hawaii, December 2001.
- USACE. DERP-FUDS Inventory Project Report – He'eia Combat Training Area, He'eia Kea and Kahaluu, Island of Oahu, Hawaii, Site No. H09HI011900, Project No. H09HI011901, August 1993.
- USACE. DERP-FUDS Inventory Project Report - Pali Training Camp, Island of Oahu, Hawaii, Site No. H09HI027700, March 1995.
- ZAPATA. Final Engineering Evaluation/Cost Analysis Report, He'eia Combat Training Area and Pali Training Camp, Island of Oahu, Hawaii, 2007.

1.3.4 The recurring review process that the CEPOH will implement to assess the continued effectiveness of the implemented MEC response actions includes, but is not limited to:

- Evaluate if changes have occurred in current and/or future land uses and their effect, if any, on selected MEC response actions;
- Investigate reported MEC encounters that may have occurred since completion of the MEC response actions;
- Conduct visual inspections at the site to evaluate erosion effects and the status of community awareness outreach programs and educational media;
- Consider new technology or techniques that have become available and may warrant reconsideration of the EE/CA recommendations;
- Evaluate the effectiveness of the response actions implemented for reducing risk.

1.4 RECOMMENDATIONS REGARDING THE NUMBER OF RECURRING REVIEWS

1.4.1 Recurring reviews will be conducted until the site is deemed satisfactory. At that time, recurring reviews may be terminated.

1.4.2 The initial recurring review will be scheduled by the Government after the completion of the recommended subsurface or surface clearance, where applicable, to address the issues and evaluate data as described above. The estimated cost for the first review with site visit is $50,000.

APPENDIX I

Intrusive Results

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Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA10G-311	1703872.26	100571.01	171.30	106.50	20.50			5/21/2003						CD	0.1		Nail	0	0	NA	NA	1	1	KEA10G-311.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-528	1703808.41	100493.27	137.89	11.61	24.32			5/21/2003						CD	0.2		Can	0	0	NA	NA	0	0	KEA10G-528.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-424	1703847.50	100661.76	117.00	183.30	26.14			5/21/2003						CD	0.25		Scrap	0	0	NA	NA	1	1	KEA10G-424.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-392	1703843.93	100642.30	120.30	163.80	26.46			5/21/2003						CD	0.2		Can	0	0	NA	NA	1	1	KEA10G-392.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-291	1703859.46	100554.28	165.00	86.40	33.16			5/21/2003						NC										KEA10G-291.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-391	1703868.59	100631.10	147.30	161.70	35.86			5/21/2003						CD	3		Bolts	12	N	NA	NA	4	6	KEA10G-391.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-376	1703853.10	100623.64	135.30	149.40	36.60			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	1	2	KEA10G-376.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-276	1703818.60	100520.95	138.00	41.10	42.19			5/21/2003						CD	0.2		Can	0	0	NA	NA	0	0	KEA10G-276.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-379	1703848.59	100628.80	129.30	152.70	45.03			5/21/2003						CD	1		Horse Shoe	0	0	NA	NA	2	3	KEA10G-379.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-292	1703880.02	100549.35	186.00	88.80	45.06			5/21/2003						CD	1		Scrap	0	0	NA	NA	3	5	KEA10G-292.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-257	1703795.01	100508.78	120.00	21.60	47.94			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	0	0	KEA10G-257.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-436	1703911.91	100646.61	182.70	191.10	51.19			5/21/2003						CD	0.25		Nail	0	0	NA	NA	3	3	KEA10G-436.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-244	1703846.88	100475.85	180.00	8.40	56.55			5/21/2003						CD	0.2		Can / Nail	0	0	NA	NA	1	1	KEA10G-244.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-333	1703828.31	100609.04	117.00	127.20	79.58			5/21/2003						CD	1		Scrap	0	0	NA	NA	1	1	KEA10G-333.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-335	1703840.28	100605.96	129.30	128.40	116.89			5/21/2003						CD	1		Scrap	0	0	NA	NA	1	1	KEA10G-335.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-278	1703876.49	100503.71	198.30	44.70	134.28			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	1	1.5	KEA10G-278.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-389	1703879.17	100625.97	159.00	160.50	189.11			5/21/2003						CD	2.5		Scrap	0	0	NA	NA	1	2	KEA10G-389.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-317	1703882.38	100573.40	180.00	112.20	307.06			5/21/2003						CD	2		Scrap	0	0	NA	NA	0	1	KEA10G-317.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-1	1703823.43	100516.86	143.94	38.91	9.28			5/21/2003						CD	0.2		Can	0	0	NA	NA	0	0	KEA10G-QC-1.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-2	1703858.49	100481.69	188.91	17.85	65.50			5/21/2003						CD	1		Scrap	0	0	NA	NA	0	1	KEA10G-QC-2.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-3	1703894.67	100562.65	195.22	106.31	10.08			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	1	2	KEA10G-QC-3.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-4	1703866.40	100572.60	165.25	105.99	7.92			5/21/2003						CD	0.1		Nail	0	0	NA	NA	3	3	KEA10G-QC-4.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-5	1703844.57	100574.75	144.01	100.54	13.62			5/21/2003						CD	0.2		Can	0	0	NA	NA	1	1	KEA10G-QC-5.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-6	1703837.56	100573.39	137.88	96.87	25.47			5/21/2003						CD	0.2		Can	0	0	NA	NA	0	0	KEA10G-QC-6.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-7	1703835.30	100584.59	131.93	106.61	6.33			5/21/2003						CD	0.2		Can / Nail	0	0	NA	NA	0	0	KEA10G-QC-7.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-8	1703880.31	100591.83	171.75	128.81	4.54			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	2	2	KEA10G-QC-8.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-9	1703850.90	100653.35	123.07	176.56	15.10			5/21/2003						CD	0.5		Scrap	0	0	NA	NA	1	2	KEA10G-QC-9.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-10	1703910.28	100640.46	183.27	184.75	6.26			5/21/2003						CD	0.1		Coaster	0	0	NA	NA	2	2	KEA10G-QC-10.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-11	1703918.98	100638.31	192.19	185.71	28.01			5/21/2003						CD	0.25		Nails	0	0	NA	NA	2	3	KEA10G-QC-11.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-12	1703921.92	100646.79	192.05	194.69	14.07			5/21/2003						CD	0.1		Nails	0	0	NA	NA	2	2	KEA10G-QC-12.JPG	7/14/2003	EMD		CR			DAS	
KEA10G-QC-13	1703880.49	100647.33	152.93	181.03	19.63			5/21/2003						CD	0.1		Nail	0	0	NA	NA	1	1	KEA10G-QC-13.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-105	1702615.69	99921.78	102.30	83.10	111.78			5/21/2003						CD	6		Barbed Wire	0	0	NA	NA	6	6	KEA11G-105.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-109	1702621.91	99924.22	108.00	86.40	54.11			5/21/2003						CD	3		Barbed Wire	0	0	NA	NA	3	3	KEA11G-109.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-123	1702642.71	99938.97	126.30	104.10	73.85			5/21/2003						CD	1		Barbed Wire	0	0	NA	NA	0	0	KEA11G-123.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-129	1702529.89	99962.81	15.30	111.90	33.41			5/21/2003						CD	3		Can	0	0	NA	NA	0	0	KEA11G-129.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-138	1702634.28	99973.63	114.30	137.70	97.12			5/21/2003						CD	1		Barbed Wire	0	0	NA	NA	3	3	KEA11G-138.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-153	1702654.36	99887.33	143.31	53.59	92.77			5/21/2003						FP											7/14/2003	EMD		CR			DAS	
KEA11G-155	1702507.95	99908.22	0.39	55.48	79.85			5/21/2003						CD	1		Barbed Wire	0	0	NA	NA	0	0	KEA11G-155.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-16	1702631.89	99846.84	126.30	9.90	55.92			5/21/2003						CD	1		Cartridge Case	0	0	NA	NA	6	6	KEA11G-16.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-25	1702527.37	99864.23	24.00	14.70	88.27			5/21/2003						MD	1		2.36-inch Rocket Parts	0	0	NA	NA	2	2	KEA11G-25.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-28	1702586.29	99857.71	81.30	15.30	232.92			5/21/2003						CD	10		Pipe	0	0	NA	NA	0	0	KEA11G-28.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-30	1702620.22	99853.91	114.30	15.60	37.09			5/21/2003						CD	8		Barbed Wire	0	0	NA	NA	2	2	KEA11G-30.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-35	1702623.81	99857.95	117.30	20.10	68.82			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-37	1702632.96	99858.62	126.00	21.90	47.04			5/21/2003						MD	10		2.36-inch Rocket Parts	0	0	NA	NA	2	2	KEA11G-37.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-47	1702618.38	99864.88	111.30	26.40	347.74			5/21/2003						CD	2		Wire mesh	0	0	NA	NA	0	0	KEA11G-47.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-55	1702597.00	99871.72	90.00	30.60	141.08			5/21/2003						CD	1		Barbed Wire	0	0	NA	NA	6	6	KEA11G-55.JPG	7/14/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA11G-61	1702604.16	99879.53	96.00	39.30	279.20			5/21/2003						CD	4		4 Cart. Cases	0	0	NA	NA	4	4	KEA11G-61.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-64	1702626.13	99880.34	117.00	42.90	162.85			5/21/2003						CD	3		3 Cart. Cases	0	0	NA	NA	4	4	KEA11G-64.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-67	1702559.06	99891.89	51.30	45.90	61.96			5/21/2003						CD	Unknown		Scrap Metal (Lip)	0	0	NA	NA	0	0	KEA11G-67.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-75	1702609.35	99894.45	99.30	54.90	84.23			5/21/2003						CD	1		Barbed Wire & 2 Bullets	0	0	NA	NA	6	6	KEA11G-75.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-86	1702637.64	99898.53	126.00	62.70	82.35			5/21/2003						MD	1		2.36-inch Rocket Parts	0	0	NA	NA	1	1	KEA11G-86.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-QC-1	1702507.48	99856.32	5.79	4.50	11.72			5/21/2003						CD	3		Tent Stake	0	0	NA	NA	3	3	KEA11G-QC-1.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-QC-10	1702654.99	99942.16	137.73	106.92	8.86			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-11	1702657.73	99934.72	141.21	99.93	4.77			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-2	1702514.14	99858.80	11.91	7.65	7.52			5/21/2003						CD	3		Tent Stake	0	0	NA	NA	4	4	KEA11G-QC-2.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-QC-3	1702529.17	99850.44	27.28	1.31	5.38			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-4	1702558.04	99858.93	54.04	12.86	7.29			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-5	1702598.28	99853.19	93.33	11.98	10.11			5/21/2003						CD	5		Scrap Metal	0	0	NA	NA	4	4	KEA11G-QC-5.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-QC-6	1702579.73	99907.28	69.41	62.56	4.41			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-7	1702563.14	99931.32	50.77	83.75	8.53			5/21/2003						NC											7/14/2003	EMD		CR			DAS	
KEA11G-QC-8	1702594.36	99930.80	80.81	87.42	8.63			5/21/2003						SA	11		11 Cart. Cases	0	0	NA	NA	6	6	KEA11G-QC-8.JPG	7/14/2003	EMD		CR			DAS	
KEA11G-QC-9	1702627.42	99943.86	111.07	104.74	4.60			5/21/2003						CD	4		4 Cart. Cases	0	0	NA	NA	6	6	KEA11G-QC-9.JPG	7/14/2003	EMD		CR			DAS	
KEA12G-109	1702951.86	99676.96	72.60	78.00	116.17			5/12/2003						CD	6		6 nails	0	0	NA	NA	0	0	KEA12G-109.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-116	1702984.06	99663.20	107.10	84.00	64.65			5/12/2003						CD	10		Pipe & 7 Nails	0	0	NA	NA	3	3	KEA12G-116.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-132	1702958.01	99690.85	70.20	93.00	95.10			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA12G-132.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-139	1702990.38	99677.34	104.70	99.30	118.54			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	1	1	KEA12G-139.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-14	1702897.54	99633.54	50.70	12.00	63.80			5/12/2003						CD	12		Wire	0	0	NA	NA	4	4	KEA12G-14.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-148	1702915.61	99743.43	6.00	114.00	131.67			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	4	4	KEA12G-148.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-160	1702991.97	99704.57	91.20	123.00	128.11			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	3	3	KEA12G-160.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-175	1702929.76	99687.59	48.28	74.88	276.76			5/12/2003						CD	2		Scrap Metal	0	0	NA	NA	3	3	KEA12G-175.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-182	1702859.83	99644.17	13.28	0.37	79.09			5/12/2003						CD	1		Pintel Hook	0	0	NA	NA	0	0	KEA12G-182.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-183	1702873.93	99635.28	29.95	0.60	64.31			5/12/2003						NC											7/15/2003	EMD		CR			DAS	
KEA12G-37	1702911.12	99646.19	55.20	30.00	99.39			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	4	4	KEA12G-37.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-42	1702943.99	99625.20	94.20	30.30	409.75			5/12/2003						CD	2		Assorted Tools	0	0	NA	NA	8	8	KEA12G-42.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-47	1702897.87	99661.59	35.70	35.70	75.82			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	6	6	KEA12G-47.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-59	1702951.37	99634.35	95.40	42.00	396.40			5/12/2003						CD	10		Scrap Metal	0	0	NA	NA	8	8	KEA12G-59.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-6	1702873.81	99642.16	26.10	6.30	339.51			5/12/2003						CD	8		Scrap Metal	0	0	NA	NA	1	1	KEA12G-6.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-63	1702897.31	99673.39	28.80	45.30	36.64			5/12/2003						CD	12		Scrap Metal	0	0	NA	NA	0	0	KEA12G-63.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-70	1702928.85	99659.71	62.70	51.00	434.79			5/12/2003						CD	5		Scrap Metal	0	0	NA	NA	2	2	KEA12G-70.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-84	1702913.88	99680.17	39.00	60.00	63.22			5/12/2003						CD	1		Spigot & Nail	0	0	NA	NA	8	8	KEA12G-84.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-94	1702938.94	99671.40	64.80	66.30	232.46			5/12/2003						CD	8		Scrap Metal	0	0	NA	NA	4	4	KEA12G-94.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-98	1702907.87	99695.16	25.80	69.30	147.84			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	4	4	KEA12G-98.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-1	1702858.99	99662.34	2.68	15.15	9.51			5/12/2003						CD	3		Can	0	0	NA	NA	4	4	KEA12G-QC-1.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-10	1702917.91	99702.66	30.13	81.06	34.62			5/12/2003						CD	8		Scrap Metal & Nails	0	0	NA	NA	0	0	KEA12G-QC-10.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-11	1702930.12	99716.10	33.05	98.98	6.06			5/12/2003						CD	10		Scrap Metal & Nails	0	0	NA	NA	6	6	KEA12G-QC-11.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-12	1702974.61	99672.92	93.89	87.00	10.89			5/12/2003						CD	1		Nail	0	0	NA	NA	4	4	KEA12G-QC-12.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-13	1703001.65	99687.50	108.62	113.96	20.77			5/12/2003						CD	3		3 Nails	0	0	NA	NA	1	1	KEA12G-QC-13.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-2	1702909.79	99629.15	63.36	14.99	8.48			5/12/2003						FP			Hot Soil								7/15/2003	EMD		CR			DAS	
KEA12G-QC-3	1702920.28	99607.84	83.76	2.83	40.28			5/12/2003						CD	3		Scrap Metal	0	0	NA	NA	4	4	KEA12G-QC-3.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-4	1702935.03	99623.58	87.57	24.06	5.53			5/12/2003						CD	5		Scrap Metal	0	0	NA	NA	2	2	KEA12G-QC-4.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-5	1702922.90	99634.88	71.23	26.94	13.56			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	2	2	KEA12G-QC-5.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-6	1702885.63	99695.03	7.21	57.08	16.29			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	4	4	KEA12G-QC-6.JPG	7/15/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA12G-QC-7	1702895.21	99688.81	18.64	57.08	19.67			5/12/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA12G-QC-7.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-8	1702947.08	99640.79	88.30	45.06	46.11			5/12/2003						CD	8		Can	0	0	NA	NA	6	6	KEA12G-QC-8.JPG	7/15/2003	EMD		CR			DAS	
KEA12G-QC-9	1702968.72	99670.37	90.33	81.66	5.47			5/12/2003						CD	2		Scrap Metal	0	0	NA	NA	4	4	KEA12G-QC-9.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-103	1703740.41	99966.78	162.00	91.80	442.12			5/15/2003						CD	3		Pipe	0	0	NA	NA	0	12	KEA13G-103.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-116	1703749.97	99983.50	180.30	98.10	30.35			5/15/2003						CD	1		Scrap	0	0	NA	NA	2	3	KEA13G-116.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-118	1703733.24	99970.42	159.00	99.30	97.38			5/15/2003						CD	2		Pipe	0	0	NA	NA	2	4	KEA13G-118.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-129	1703749.70	99992.40	186.00	105.00	37.52			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	1	2	KEA13G-129.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-132	1703695.70	99946.23	114.60	105.90	389.26			5/15/2003						CD	4		Scrap	0	0	NA	NA	0	1		7/15/2003	EMD		CR			DAS	
KEA13G-133	1703737.52	99984.10	171.30	106.80	23.90			5/15/2003						CD	0.2		Nails	0	0	NA	NA	1	1	KEA13G-133.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-136	1703724.51	99975.86	156.00	109.20	28.89			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	1	2	KEA13G-136.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-140	1703734.18	99987.92	171.30	111.90	26.60			5/15/2003						CD	0.1		Nails	0	0	NA	NA	1	2	KEA13G-140.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-164	1703688.25	99980.99	132.00	137.10	80.68			5/15/2003						CD	0.5		Pipe	0	0	NA	NA	1	3	KEA13G-164.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-165	1703672.57	99967.63	111.30	137.40	26.27			5/15/2003						CD	0.1		Nails	0	0	NA	NA	4	4	KEA13G-165.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-175	1703706.62	100019.34	171.30	153.90	341.49			5/15/2003						CD	LIP		Pipe	0	0	NA	NA	2	?	KEA13G-175.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-178	1703678.51	99997.07	135.30	155.70	64.16			5/15/2003						CD	1		Scrap	0	0	NA	NA	1	2	KEA13G-178.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-2	1703793.59	99897.08	156.00	3.90	63.77			5/15/2003						CD	2		Scrap	0	0	NA	NA	1	2	KEA13G-2.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-213	1703694.87	100036.82	174.00	174.90	62.44			5/15/2003						CD	1		Pipe	0	0	NA	NA	0	0	KEA13G-213.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-223	1703638.83	100001.57	108.30	185.40	123.40			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	2	3	KEA13G-223.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-226	1703680.09	100040.54	165.30	187.50	211.62			5/15/2003						CD	2		Scrap	0	0	NA	NA	0	0	KEA13G-226.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-23	1703745.01	99875.52	105.00	19.80	24.80			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	0	0	KEA13G-23.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-232	1703654.73	100024.64	135.60	192.30	77.91			5/15/2003						CD	1		Scrap	0	0	NA	NA	0	1	KEA13G-232.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-308	1703705.87	99820.55	39.00	4.20	27.12			5/15/2003						CD	0.1		Nails	0	0	NA	NA	0	0	KEA13G-308.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-320	1703741.57	99861.78	93.30	11.70	182.26			5/15/2003						CD	LIP		Grounding Rod	0	0	NA	NA	1	?	KEA13G-320.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-321	1703687.12	99815.22	21.30	12.60	108.09			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	0	0		7/15/2003	EMD		CR			DAS	
KEA13G-322	1703731.61	99855.03	81.30	13.20	285.76			5/15/2003						CD	2		Pipe	0	0	NA	NA	0	0	KEA13G-322.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-341	1703729.09	99871.49	90.30	27.30	27.08			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	0	1	KEA13G-341.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-345	1703709.93	99856.67	66.00	28.80	38.85			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	3	3.5	KEA13G-345.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-350	1703670.87	99828.77	18.00	33.60	46.08			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	0	0		7/15/2003	EMD		CR			DAS	
KEA13G-351	1703674.77	99833.38	24.00	34.50	66.02			5/15/2003						CD	1		Scrap	0	0	NA	NA	0	0		7/15/2003	EMD		CR			DAS	
KEA13G-352	1703678.86	99837.76	30.00	35.10	119.87			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	0	0	KEA13G-352.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-361	1703682.48	99847.68	39.30	40.20	73.50			5/15/2003						CD	0.1		Scrap	0	0	NA	NA	1	2	KEA13G-361.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-362	1703702.45	99865.19	66.00	40.20	76.35			5/15/2003						CD	1		Scrap	0	0	NA	NA	0	0.5	KEA13G-362.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-370	1703682.83	99856.33	45.30	46.50	103.38			5/15/2003						CD	3		Scrap	0	0	NA	NA	0	0	KEA13G-370.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-373	1703672.48	99850.03	33.30	48.60	61.01			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	0	0	KEA13G-373.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-375	1703693.96	99871.25	63.60	50.40	20.06			5/15/2003						CD	0.2		Scrap	0	0	NA	NA	1	1	KEA13G-375.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-385	1703663.74	99855.46	30.30	58.50	77.65			5/15/2003						CD	2		Scrap	0	0	NA	NA	4	5	KEA13G-385.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-39	1703744.96	99894.14	117.30	33.90	84.14			5/15/2003						CD	1		Scrap	0	0	NA	NA	0	0	KEA13G-39.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-393	1703680.35	99886.32	63.30	70.80	29.54			5/15/2003						CD	0.1		Scrap	0	0	NA	NA	2	2		7/14/2003	EMD		CR			DAS	
KEA13G-400	1703656.02	99895.95	51.30	94.20	111.67			5/15/2003						CD	1		Scrap	0	0	NA	NA	1	2		7/15/2003	EMD		CR			DAS	
KEA13G-410	1703668.12	99922.44	78.00	106.20	41.04			5/15/2003						CD	0.25		Scrap	2	N	NA	NA	0	0		7/15/2003	EMD		CR			DAS	
KEA13G-42	1703755.17	99904.68	132.00	35.10	43.78			5/15/2003						CD	0.1		Nails	0	0	NA	NA	1	1	KEA13G-42.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-443	1703591.79	99909.89	12.00	147.30	40.33			5/15/2003						CD	0.5		Car Parts	2	W	NA	NA	1	2	KEA13G-443.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-449	1703649.70	99970.61	96.00	154.80	44.45			5/15/2003						CD	2		Pipe	0	0	NA	NA	4	5	KEA13G-449.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-45	1703764.84	99916.74	147.30	37.80	65.42			5/15/2003						CD	0.1		Nails	0	0	NA	NA	1	1	KEA13G-45.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-455	1703562.65	99929.99	3.30	181.80	35.96			5/15/2003						CD	1		Car Parts	0	0	NA	NA	1	2	KEA13G-455.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-461	1703629.26	99994.37	96.30	186.30	41.57			5/15/2003						CD	1		Scrap	0	0	NA	NA	1	1.5	KEA13G-461.JPG	7/14/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA13G-466	1703605.52	99980.70	69.30	191.70	129.68			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	1	1	KEA13G-466.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-476	1703594.63	99979.09	60.00	197.70	33.75			5/15/2003						CD	0.1		Nails	0	0	NA	NA	1	2	KEA13G-476.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-485	1703734.33	99878.22	98.72	28.91	151.03			5/15/2003						CD	LIP		Stake	0	0	NA	NA	1	?	KEA13G-485.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-487	1703659.80	99814.99	0.51	30.53	113.72			5/15/2003						CD	0.1		Nails	0	0	NA	NA	0	0		7/15/2003	EMD		CR			DAS	
KEA13G-490	1703647.99	99976.36	98.51	160.28	67.95			5/15/2003						CD	0.5		Pipe	0	0	NA	NA	3	3.5	KEA13G-490.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-6	1703760.60	99871.33	114.00	6.30	140.37			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	0	0	KEA13G-6.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-61	1703731.82	99913.19	120.00	57.00	490.03			5/15/2003						CD	3		Scrap	0	0	NA	NA	0	0	KEA13G-61.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-65	1703781.27	99960.93	189.00	60.30	116.17			5/15/2003						CD	0.1		Wire	0	0	NA	NA	0	0	KEA13G-65.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-80	1703746.64	99942.47	150.60	69.30	22.37			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	1	1	KEA13G-80.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-1	1703780.57	99920.95	161.17	30.41	4.55			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	0	0	KEA13G-QC-1.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-10	1703633.54	99971.18	83.75	165.11	4.52			5/15/2003						CD	0.25		Pipe	0	0	NA	NA	2	2.5	KEA13G-QC-10.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-11	1703597.31	99939.85	35.85	165.45	9.34			5/15/2003						NC										KEA13G-QC-11.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-12	1703596.09	99936.88	32.97	164.02	8.80			5/15/2003						NC										KEA13G-QC-12.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-13	1703572.63	99940.73	17.87	182.38	5.64			5/15/2003						CD	0.01		Nails	0	0	NA	NA	2	2		7/14/2003	EMD		CR			DAS	
KEA13G-QC-14	1703607.47	99887.69	9.09	119.54	7.48			5/15/2003						CD	0.25		Scrap	0	0	NA	NA	2	3		7/15/2003	EMD		CR			DAS	
KEA13G-QC-2	1703801.57	99928.83	182.16	22.49	4.89			5/15/2003						CD	0.1		Nails	0	0	NA	NA	0	0	KEA13G-QC-2.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-3	1703768.85	99975.56	188.36	79.19	5.39			5/15/2003						CD	0.1		Nails	0	0	NA	NA	0	0	KEA13G-QC-3.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-4	1703765.87	99978.88	188.32	83.65	8.23			5/15/2003						CD	0.1		Nails	0	0	NA	NA	0	0	KEA13G-QC-4.JPG	7/15/2003	EMD		CR			DAS	
KEA13G-QC-5	1703742.24	100015.11	194.44	126.47	8.15			5/15/2003						NC										KEA13G-QC-5.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-6	1703729.11	100010.91	181.80	131.97	20.87			5/15/2003						CD	0.1		Nails	0	0	NA	NA	1	1	KEA13G-QC-6.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-7	1703712.13	99994.81	158.42	131.06	10.11			5/15/2003						CD	0.2		Scrap	0	0	NA	NA	2	2	KEA13G-QC-7.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-8	1703653.15	99989.21	110.38	165.74	17.00			5/15/2003						CD	0.1		Nails	0	0	NA	NA	2	2	KEA13G-QC-8.JPG	7/14/2003	EMD		CR			DAS	
KEA13G-QC-9	1703645.62	99989.21	104.72	170.70	12.90			5/15/2003						CD	0.5		Scrap	0	0	NA	NA	2	2	KEA13G-QC-9.JPG	7/14/2003	EMD		CR			DAS	
KEA14G-77	1703991.54	99662.61	64.80	126.30	21.42			5/14/2003						NC										KEA14G-77.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-55	1704044.90	99650.76	111.60	96.30	21.79			5/14/2003						CD	0.2		Wire	0	0	NA	NA	0	0	KEA14G-55.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-27	1704008.65	99594.95	58.50	54.00	27.63			5/14/2003						CD	1		Pipe	0	0	NA	NA	0	16	KEA14G-27.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-42	1703951.93	99605.61	8.10	84.00	31.27			5/14/2003						NC										KEA14G-42.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-35	1704026.87	99623.04	85.20	75.30	43.98			5/14/2003						CD	0.2		Wire	0	0	NA	NA	0	0	KEA14G-35.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-24	1704034.92	99595.60	83.70	45.60	85.17			5/14/2003						CD	0.25		Wire	0	0	NA	NA	0	0	KEA14G-24.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-52	1704032.93	99643.51	97.80	93.30	97.01			5/14/2003						CD	0.5		Wire	0	0	NA	NA	0	0	KEA14G-52.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-32	1704031.51	99615.19	87.00	66.00	168.05			5/14/2003						CD	1		Wire	0	0	NA	NA	0	0	KEA14G-32.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-50	1704042.03	99643.65	106.50	90.30	298.18			5/14/2003						CD	0.5		Wire	0	0	NA	NA	0	0	KEA14G-50.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-1	1704009.08	99561.74	48.20	21.26	8.97			5/14/2003						NC										KEA14G-QC-1.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-2	1704025.67	99567.22	65.96	20.93	6.26			5/14/2003						NC										KEA14G-QC-2.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-3	1704023.94	99576.03	67.26	30.17	5.39			5/14/2003						NC										KEA14G-QC-3.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-4	1704029.28	99584.25	75.14	36.40	104.77			5/14/2003						CD	0.1		Wire	0	0	NA	NA	0	0	KEA14G-QC-4.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-5	1704057.86	99584.83	102.74	27.13	11.50			5/14/2003						NC										KEA14G-QC-5.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-6	1704075.18	99606.19	126.53	42.13	4.50			5/14/2003						CD	0.5		Wire	0	0	NA	NA	0	0	KEA14G-QC-6.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-7	1703971.12	99609.51	27.88	81.21	9.87			5/14/2003						NC										KEA14G-QC-7.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-8	1703994.94	99642.27	61.73	105.16	6.45			5/14/2003						NC										KEA14G-QC-8.JPG	7/15/2003	EMD		CR			DAS	
KEA14G-QC-9	1703958.13	99638.52	25.18	114.15	4.83			5/14/2003						NC										KEA14G-QC-9.JPG	7/15/2003	EMD		CR			DAS	
KEA15G-153	1703317.73	100865.18	8.70	94.80	36.69			5/22/2003						CD	5		Scrap Metal / 2 Nails	0	0	NA	NA	4	4	KEA15G-153.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-108	1703326.39	100839.36	21.00	70.50	37.78			5/22/2003						CD	3		3 Nails	0	0	NA	NA	1	1	KEA15G-108.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-87	1703341.95	100821.33	39.00	54.90	38.70			5/22/2003						CD	3		3 Nails	0	0	NA	NA	6	6	KEA15G-87.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-121	1703384.35	100841.82	78.00	81.30	44.37			5/22/2003						CD	1		Nail	0	0	NA	NA	2	2	KEA15G-121.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-82	1703320.95	100822.87	18.00	53.40	47.26			5/22/2003						CD	10		Hasp / 6 Nails	0	0	NA	NA	4	4	KEA15G-82.JPG	7/14/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA15G-67	1703331.10	100811.39	29.70	43.50	68.45			5/22/2003						CD	4		4 Nails	0	0	NA	NA	6	6	KEA15G-67.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-106	1703337.87	100834.96	33.00	67.80	72.15			5/22/2003						CD	6		Can / 3 Nails	0	0	NA	NA	6	6	KEA15G-106.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-170	1703296.80	100779.90	0.31	7.39	79.08			5/22/2003						CD	3		3 Nails	0	0	NA	NA	8	8	KEA15G-170.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-100	1703367.25	100826.43	63.30	63.60	82.16			5/22/2003						CD	1		Pipe / 3 Nails	0	0	NA	NA	4	4	KEA15G-100.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-22	1703384.07	100777.59	87.00	17.70	83.61			5/22/2003						CD	10		Scrap Metal / 5 Nails	0	0	NA	NA	6	6	KEA15G-22.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-126	1703355.06	100848.82	48.00	84.00	109.83			5/22/2003						CD	4		4 Nails	0	0	NA	NA	6	6	KEA15G-126.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-47	1703395.06	100790.54	96.00	32.10	142.47			5/22/2003						CD	4		4 Nails	0	0	NA	NA	11	11	KEA15G-47.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-36	1703338.80	100791.47	40.20	24.90	156.58			5/22/2003						CD	11		11 Nails	0	0	NA	NA	6	6	KEA15G-36.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-16	1703351.33	100779.64	54.30	15.00	168.30			5/22/2003						CD	7		Bottle Opener / 4 Nails	0	0	NA	NA	8	8	KEA15G-16.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-7	1703377.44	100771.59	81.30	10.80	180.15			5/22/2003						CD	12		Chisel / 2 Nails	0	0	NA	NA	0	0	KEA15G-7.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-141	1703350.20	100857.11	42.00	91.50	244.32			5/22/2003						CD	1		Scrap Metal / 3 Nails	0	0	NA	NA	2	2	KEA15G-141.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-30	1703369.92	100784.50	72.00	22.50	450.00			5/22/2003						CD	4		4 Nails	0	0	NA	NA	8	8	KEA15G-30.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-1	1703355.70	100811.87	53.98	47.53	12.10			5/22/2003						CD	4		4 Nails	0	0	NA	NA	4	4	KEA15G-QC-1.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-2	1703358.84	100812.14	57.05	48.25	9.95			5/22/2003						CD	1		Scrap Metal / 2 Nails	0	0	NA	NA	4	4	KEA15G-QC-2.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-3	1703378.99	100824.52	75.20	63.41	5.23			5/22/2003						CD	5		Scrap Metal / 2 Nails	0	0	NA	NA	4	4	KEA15G-QC-3.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-4	1703375.02	100840.23	68.99	78.38	17.38			5/22/2003						CD	3		3 Nails	0	0	NA	NA	8	8	KEA15G-QC-4.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-5	1703321.97	100850.11	15.07	80.51	12.02			5/22/2003						CD	4		4 Nails	0	0	NA	NA	2	2	KEA15G-QC-5.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-6	1703306.53	100848.73	0.00	76.91	5.40			5/22/2003						CD	3		3 Nails	0	0	NA	NA	6	6	KEA15G-QC-6.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-7	1703323.08	100857.60	15.09	88.07	6.89			5/22/2003						CD	10		Pipe / 3 Nails	0	0	NA	NA	6	6	KEA15G-QC-7.JPG	7/14/2003	EMD		CR			DAS	
KEA15G-QC-8	1703370.95	100833.12	65.99	70.75	6.11			5/22/2003						CD	2		2 Nails	0	0	NA	NA	3	3	KEA15G-QC-8.JPG	7/14/2003	EMD		CR			DAS	
KEA1G-103	1703071.88	101864.74	66.60	46.80	41.96			5/2/2003						CD	1		Scrap	6"	0	NA	NA	3	3.5	KEA1G-103.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-107	1703089.45	101875.78	87.30	48.30	86.39			5/2/2003						CD	1		Scrap	2	N	NA	NA	2	2	KEA1G-107.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-109	1703107.30	101886.29	108.00	49.20	81.74			5/2/2003						CD	2		Car Parts	0	0	NA	NA	3	4	KEA1G-109.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-117	1703116.76	101894.72	120.30	52.20	43.62			5/2/2003						CD	1		Scrap	0	0	NA	NA	3	3	KEA1G-117.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-12	1703090.06	101829.90	66.30	7.50	94.66			5/2/2003						CD	4		Car Parts	10	E	NA	NA	1	1	KEA1G-12.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-120	1703062.93	101868.14	60.30	54.00	44.99			5/2/2003						CD	0.5		Car Parts	0	0	NA	NA	1	1	KEA1G-120.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-121	1703027.51	101851.68	21.30	56.10	140.58			5/2/2003						CD	3		Sheers	5	W	NA	NA	0	0	KEA1G-121.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-127	1703103.50	101893.44	108.00	57.30	49.02			5/2/2003						CD	1		Vice Grips	0	0	NA	NA	0	0	KEA1G-127.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-135	1703047.85	101870.31	48.00	63.00	163.92			5/2/2003						CD	1		Scrap Iron Bar	0	0	NA	NA	1	1	KEA1G-135.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-139	1703086.30	101894.49	93.30	66.30	353.52			5/2/2003						CD	0.25		Scrap	0	0	NA	NA	1	1	KEA1G-139.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-141	1703075.14	101889.92	81.30	67.50	39.93			5/2/2003						CD	0.5		Scrap	0	0	NA	NA	2	2	KEA1G-141.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-145	1703026.61	101866.15	27.30	69.30	79.61			5/2/2003						CD	1		Scrap	0	0	NA	NA	1	1	KEA1G-145.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-150	1703101.32	101910.97	114.30	73.80	70.27			5/2/2003						CD	1		Scrap	6	0	NA	NA	3	3.5	KEA1G-150.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-159	1703071.06	101902.70	83.70	80.70	137.61			5/2/2003						CD	2		Trash Pit	0	0	NA	NA	1	1	KEA1G-159.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-160	1703087.08	101911.55	102.00	81.00	39.97			5/2/2003						CD	0.25		Nail and Gas Cap	1"	5	NA	NA	0	0	KEA1G-160.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-163	1703001.87	101867.95	6.30	82.50	51.85			5/2/2003						CD	1		Scrap	0	0	NA	NA	1	1.5	KEA1G-163.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-165	1703096.95	101919.18	114.30	83.10	87.51			5/2/2003						CD	1		Scrap	5	0	NA	NA	3	3	KEA1G-165.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-167	1703120.65	101932.12	141.30	83.40	55.14			5/2/2003						CD	1		Scrap	0	0	NA	NA	0	0	KEA1G-167.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-186	1703107.38	101936.62	131.70	93.60	57.56			5/2/2003						CD	1		Car Parts	0	0	NA	NA	4	4.5	KEA1G-186.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-190	1703062.44	101914.43	81.60	95.10	44.45			5/2/2003						CD	0.5		Scrap	12	W	NA	NA	4	4	KEA1G-190.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-191	1703120.45	101945.27	147.30	95.10	45.74			5/2/2003						CD	3		Car Parts	0	0	NA	NA	4	5	KEA1G-191.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-196	1703028.70	101900.56	45.30	98.70	53.85			5/2/2003						CD	1		Scrap	2	S	NA	NA	1	3	KEA1G-196.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-211	1703063.38	101930.55	90.00	108.90	249.54			5/2/2003						CD	2		Scrap	6	0	NA	NA	1	2	KEA1G-211.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-214	1703084.27	101943.02	114.30	110.10	80.44			5/2/2003						CD	3		Brake Shoe	0	0	NA	NA	1	1	KEA1G-214.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-216	1703001.05	101900.81	21.00	111.90	41.52			5/2/2003						CD	1		Hose Bit	5"	N	NA	NA	1	1	KEA1G-216.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-226	1702982.04	101898.86	3.30	119.10	135.69			5/2/2003						CD	3		Scrap	0	0	NA	NA	2	3	KEA1G-226.JPG	7/9/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA1G-231	1703034.03	101928.88	63.30	121.20	83.38			5/2/2003						CD	2		Stake	0	0	NA	NA	0	10	KEA1G-231.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-252	1702978.89	101917.57	9.30	137.10	50.79			5/2/2003						CD	3		Pipe	15	N & S	NA	NA	1	4	KEA1G-252.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-256	1703014.42	101940.20	51.30	140.40	139.77			5/2/2003						CD	4		Metal Bar	0	0	NA	NA	0	3	KEA1G-256.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-27	1703142.87	101864.77	129.30	13.50	97.72			5/2/2003						CD	2		Metal Post	0	0	NA	NA	1	6	KEA1G-27.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-28	1703123.92	101855.04	108.00	13.80	52.30			5/2/2003						CD	1		Scrap	2	N	NA	NA	2	2.5	KEA1G-28.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-40	1703157.08	101876.40	147.30	17.10	73.86			5/2/2003						CD	1		Scrap	0	0	NA	NA	0	1	KEA1G-40.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-46	1703056.97	101827.59	36.00	21.00	205.90			5/2/2003						CD	0		Pipe	0	0	NA	NA	0	8	KEA1G-46.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-60	1703136.69	101875.76	129.00	26.10	105.45			5/2/2003						CD	2		Scrap	0	0	NA	NA	0	0.5	KEA1G-60.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-66	1703146.43	101883.65	141.30	28.50	58.48			5/2/2003						CD	2		Scrap	0	0	NA	NA	2	3	KEA1G-66.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-75	1703117.40	101874.33	111.30	33.90	70.74			5/2/2003						CD	1		Scrap	0	0	NA	NA	0	0.5	KEA1G-75.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-77	1703061.21	101845.82	48.30	35.10	46.38			5/2/2003						CD	1		Door Lock	0	0	NA	NA	0	0	KEA1G-77.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-9	1703083.21	101824.89	57.90	6.30	49.58			5/2/2003						CD	1		Car Parts	0	0	NA	NA	1	1	KEA1G-9.JPG	7/9/2003	EMD		CR			DAS	
KEA1G-91	1703105.65	101877.26	102.30	42.00	144.59			5/2/2003						CD	2		Bicycle Parts	10	0	NA	NA	3	3	KEA1G-91.JPG	7/9/2003	EMD		CR			DAS	
KEA1T-1	1702656.21	100809.48	1.28	528.05	8.28			5/16/2003						NC											7/15/2003	EMD		CR			DAS	
KEA1T-10	1702881.50	101014.19	69.37	-1.56	54.60			5/16/2003						CD	2		Survey Nail	0	0	NA	NA	0	0	KEA1T-10.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-2	1702705.88	100672.55	1.41	673.97	8.43			5/16/2003						MD	1		MKII Frag	0	0	NA	NA	6	6	KEA1T-2.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-3	1702745.96	100627.64	0.81	735.67	10.78			5/16/2003						CD	6		Knife Handle	0	0	NA	NA	8	8	KEA1T-3.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-4	1702654.06	100977.38	311.49	-1.46	11.08			5/16/2003						SA	1		7.62 mm proj.	0	0	NA	NA	4	4	KEA1T-4.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-5	1702622.04	100955.54	-0.95	377.45	14.57			5/16/2003						CD	10		4 Barb. Wire	0	0	NA	NA	6	6	KEA1T-5.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-6	1702862.98	101003.42	90.71	0.37	15.65			5/16/2003						CD	5		4 Nails	0	0	NA	NA	10	10	KEA1T-6.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-7	1702849.46	100999.37	104.67	-1.68	24.29			5/16/2003						CD	5		3 Nails	0	0	NA	NA	6	6	KEA1T-7.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-8	1702669.31	100974.92	296.05	-1.55	29.46			5/16/2003						CD	1		Nail	0	0	NA	NA	4	4	KEA1T-8.JPG	7/15/2003	EMD		CR			DAS	
KEA1T-9	1702663.83	100972.82	301.10	1.43	30.67			5/16/2003						NC											7/15/2003	EMD		CR			DAS	
KEA2G-5	1702635.33	102187.28	109.80	36.00	52.01									MD	2		2.36-inch Rocket Motor	0	0	33	0	0	0	KEA2G-5.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-11	1702550.98	102134.91	11.70	51.30	64.00									CD	0.25		Scrap Metal	12	W	NA	NA	5	5		7/9/2003	EMD		CR			DAS	
KEA2G-20	1702621.90	102215.31	117.90	66.00	9.53									NC	0		Nothing	0	0	NA	NA	0	0	KEA2G-20.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-26	1702632.09	102231.98	136.50	72.00	8.77									NC	0		Nothing	0	0	NA	NA	0	0	KEA2G-26.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-29	1702532.54	102147.15	5.70	72.60	15.72									CD	0.25		Wire	36"	NW	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-31	1702545.07	102161.10	24.30	75.00	212.53									CD	0.5		Window Frame	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-37	1702631.14	102239.07	140.40	78.00	18.32									CD	0.25		Can	0	0	NA	NA	0	0	KEA2G-37.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-35	1702538.57	102159.46	18.30	78.00	16.23									MD	1		MKII, Practice	0	NW	330	0	3	4	KEA2G-35.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-39	1702600.92	102213.48	100.80	78.30	8.57									NC	0		Nothing	0	0	0	0	0	0	KEA2G-39.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-48	1702609.00	102224.78	114.30	81.60	19.05									NC	0		Nothing	0	0	0	0	0	0	KEA2G-48.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-47	1702582.39	102201.90	79.20	81.60	13.34									FP	0		Hot Soil	0	0	0	0	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-59	1702590.23	102224.07	99.60	93.30	43.67									CD	0.25		Aluminum can	0	0	NA	NA	0	0	KEA2G-59.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-63	1702560.95	102202.45	63.30	96.00	16.21									CD	0.25		Aluminum can	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-62	1702530.70	102176.43	23.40	96.00	44.12									CD	0.25		Door handle	0	0	NA	NA	10	10		7/9/2003	EMD		CR			DAS	
KEA2G-65	1702565.30	102206.59	69.30	96.30	18.03									CD	0.25		Aluminum can	0	0	NA	NA	0	0	KEA2G-65.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-75	1702566.59	102215.21	75.90	102.00	21.18									NC	0		Nothing	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-74	1702543.16	102195.06	45.00	102.00	36.89									CD	0.5		Cot Frame	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-79	1702572.08	102220.33	83.40	102.30	19.49									CD	0.25		Aluminum can	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-78	1702550.01	102201.35	54.30	102.30	60.39									CD	1		Cot Frame	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-87	1702573.36	102228.95	90.00	108.00	58.59									CD	0.25		Aluminum can	0	0	NA	NA	0	0	KEA2G-87.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-91	1702561.85	102223.01	77.40	111.00	166.96									CD	0.5		Car Light	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	
KEA2G-92	1702536.41	102201.53	44.10	111.30	29.50									CD	1		Hammer	0	0	NA	NA	6	7		7/9/2003	EMD		CR			DAS	
KEA2G-119	1702563.19	102232.04	84.30	116.97	11.48									CD	1		Handle	0	0	NA	NA	0	0		7/9/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset			Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA2G-100	1702567.27	102235.58	89.70	117.00	39.45									CD	0.25		Aluminum can	0	0	NA	NA	0	0	KEA2G-100.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-102	1702569.40	102241.38	95.10	120.00	25.48									CD	0.25		Aluminum can	0	0	NA	NA	0	0	KEA2G-102.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-109	1702579.00	102281.29	128.40	144.00	39.10									MD	2		2.36-inch Rocket Motor	0	0	360	0	1	1	KEA2G-109.jpg	7/9/2003	EMD		CR			DAS	
KEA2G-123	1702485.59	102208.56	10.16	149.77	19.44									CF	1		Survey Pipe	30"	NE	-40	0	0	0		7/9/2003	EMD		CR			DAS	
QA-KEA2G-1	1702580.09	102221.02	89.93	97.60										CD			Aluminum Can							KEA2G-QA-1.jpg				CR			DAS	
QA-KEA2G-2	1702555.20	102212.35	65.40	107.25										CD														CR			DAS	
KEA2T-1	1703253.59	101367.78	1.80	981.60										CD	0.2		Nails	0	0	NA	NA	0	0	KEA2T-1.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-2	1703214.97	101072.75	1.50	1356.60										CD	0.5		Scrap	0	0	NA	NA	1	2	KEA2T-2.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-3	1702900.97	101783.43	-2.02	391.34										CD	0.25		Wire	0	0	NA	NA	1	1	KEA2T-3.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-4	1703034.46	100759.42	-0.89	1745.87										CD	0.2		Scrap	0	0	NA	NA	3	3	KEA2T-4.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-5	1702985.33	101602.43	1.50	591.00										CD	0.2		Nails	0	0	NA	NA	2	2	KEA2T-5.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-6	1702876.97	101833.47	-2.38	335.84										CD	0.2		Nails	0	0	NA	NA	1	1	KEA2T-6.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-7	1703262.09	101121.02	-1.95	1288.47										CD	0.5		Scrap	0	0	NA	NA	0	1	KEA2T-7.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-8	1703205.13	101063.94	1.80	1369.80										CD	0.2		Scrap	0	0	NA	NA	0.5	0.5	KEA2T-8.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-9	1703088.76	101410.97	1.50	811.20										NC										KEA2T-9.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-10	1703022.28	101526.66	1.50	675.30										CD	0.5		Scrap	0	0	NA	NA	4	4	KEA2T-10.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-11	1703310.69	101307.34	-2.08	1095.92										CD	1		Scrap	0	0	NA	NA	1	2	KEA2T-11.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-12	1703155.93	101012.91	-1.80	1440.60										CD	0.5		Scrap	0	0	NA	NA	3	4	KEA2T-12.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-13	1702814.97	101959.93	-2.10	195.00										CD	0.2		Wire	0	0	NA	NA	0	0	KEA2T-13.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-14	1702975.67	101629.76	-1.80	562.20										CD	0.5		Wire	0	0	NA	NA	0	0	KEA2T-14.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-15	1703073.05	101422.58	1.50	791.10										CD	2		Scrap	0	0	NA	NA	0	0	KEA2T-15.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-16	1703265.93	101150.68	1.80	1258.80										CD	0.5		Scrap	0	0	NA	NA	0	1	KEA2T-16.JPG	7/15/2003	EMD		CR			DAS	
KEA2T-17	1703229.71	101082.03	-1.80	1339.50										CD	10		Scrap	0	0	NA	NA	0	3	KEA2T-17.JPG	7/15/2003	EMD		CR			DAS	
KEA3G-137	1703489.63	101955.15	183.00	43.20				5/2/2003						CD	2		Scrap	0	NA	NA	NA	3	4	KEA3G-137.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-18	1703441.93	101918.25	135.30	6.30				5/2/2003						CD	2		Stake	0	NA	NA	NA	1	6	KEA3G-18.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-205	1703483.93	101973.45	177.30	61.50				5/2/2003						CD	0.25		Can	0	NA	NA	NA	3	3	KEA3G-205.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-213	1703501.93	101976.45	195.30	64.50				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	2	2	KEA3G-213.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-216	1703360.63	101977.35	54.00	65.40				5/2/2003						CD	2		Scrap	0	NA	NA	NA	3	4	KEA3G-216.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-230	1703432.63	101981.55	126.00	69.60				5/2/2003						CD	2		Scrap	0	NA	NA	NA	2	3	KEA3G-230.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-263	1703423.63	101992.65	117.00	80.70				5/2/2003						CD	2		Scrap	0	NA	NA	NA	3	4	KEA3G-263.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-315	1703456.63	102009.45	150.00	97.50				5/2/2003						CD	2		Scrap	0	NA	NA	NA	5	6	KEA3G-315.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-318	1703466.23	102010.65	159.60	98.70				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	1	1	KEA3G-318.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-322	1703477.93	102010.95	171.30	99.00				5/2/2003						CD	1		Rod	0	NA	NA	NA	1	4	KEA3G-322.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-337	1703400.23	102016.95	93.60	105.00				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	0	1	KEA3G-337.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-374	1703405.93	102030.75	99.30	118.80				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	1	3	KEA3G-374.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-38	1703468.63	101924.25	162.00	12.30				5/2/2003						CD	2		Scrap	0	NA	NA	NA	3	4	KEA3G-38.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-381	1703474.63	102032.55	168.00	120.60				5/2/2003						CD	1		Wire	0	NA	NA	NA	3	4	KEA3G-381.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-405	1703448.83	102040.65	142.20	128.70				5/2/2003						CD	1		Scrap	0	NA	NA	NA	4	5	KEA3G-405.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-408	1703411.93	102041.85	105.30	129.90				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	2	3	KEA3G-408.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-452	1703465.93	102055.95	159.30	144.00				5/2/2003						CD	0.25		Weight	0	NA	NA	NA	5	5	KEA3G-452.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-548	1703465.93	102083.25	159.30	171.30				5/2/2003						CD	0.5		Scrap	0	NA	NA	NA	2	2	KEA3G-548.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-583	1703486.33	102099.15	179.70	187.20				5/2/2003						CD	1		Pipe	0	NA	NA	NA	3	3.5	KEA3G-583.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-597	1703477.93	102103.65	171.30	191.70				5/2/2003						CD	0.5		Scrap	12	N	NA	NA	4	4.5	KEA3G-597.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-600	1703420.63	102105.15	114.00	193.20				5/2/2003						CD	2		Scrap	0	NA	NA	NA	3	4	KEA3G-600.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-75	1703486.63	101935.35	180.00	23.40				5/2/2003						CD	0.5		Padlock	0	NA	NA	NA	2	3	KEA3G-75.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-1	1703378.52	101936.22	71.89	24.27				5/2/2003						CD	3		Scrap	0	NA	NA	NA	2	3	KEA3G-QC-1.JPG	7/10/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
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Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA3G-QC-10	1703453.75	102031.59	147.12	119.64				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	2	2	KEA3G-QC-10.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-11	1703438.01	102035.89	131.38	123.94				5/2/2003						CD	0.5		Carpart	0	NA	NA	NA	4	5	KEA3G-QC-11.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-12	1703411.41	102053.00	104.78	141.05				5/2/2003						CD	1		Scrap	0	NA	NA	NA	1	2	KEA3G-QC-12.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-13	1703384.63	102037.65	78.00	125.70				5/2/2003						CD	0.5		Scrap	0	NA	NA	NA	1	2	KEA3G-QC-13.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-14	1703366.54	102028.36	59.91	116.41				5/2/2003						CD	0.5		Scrap	0	NA	NA	NA	1	1	KEA3G-QC-14.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-15	1703351.48	102038.53	44.85	126.58				5/2/2003						CD	1		Carpart	0	NA	NA	NA	2	2.5	KEA3G-QC-15.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-16	1703369.57	102060.04	62.94	148.09				5/2/2003						CD	1		Scrap	0	NA	NA	NA	3	4	KEA3G-QC-16.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-17	1703402.61	102102.87	95.98	190.92				5/2/2003						NC											7/10/2003	EMD		CR			DAS	
KEA3G-QC-18	1703411.81	102101.40	105.18	189.45				5/2/2003						CD	0.25		Scrap	0	NA	NA	NA	4	4	KEA3G-QC-18.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-2	1703417.85	101936.79	111.22	24.84				5/2/2003						CD	0.5		Scrap	0	NA	NA	NA	3	4	KEA3G-QC-2.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-3	1703486.44	102027.98	179.81	116.03				5/2/2003						CD	0.25		Fitting	0	NA	NA	NA	3	4	KEA3G-QC-3.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-4	1703396.57	102030.07	89.94	118.12				5/2/2003						CD	0.25		Carpart	0	NA	NA	NA	4	5	KEA3G-QC-4.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-5	1703372.47	102048.35	65.84	136.40				5/2/2003						CD	1		Scrap	0	NA	NA	NA	3	4	KEA3G-QC-5.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-6	1703351.55	102046.40	44.92	134.45				5/2/2003						CF	NA		Foundation	0	NA	NA	NA	0		KEA3G-QC-6.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-7	1703333.68	101982.22	27.05	70.27				5/2/2003						CD	3		Carpart	0	NA	NA	NA	1	3	KEA3G-QC-7.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-8	1703366.73	101955.52	60.10	43.57				5/2/2003						CD	2		Carpart	0	NA	NA	NA	4	5	KEA3G-QC-8.JPG	7/10/2003	EMD		CR			DAS	
KEA3G-QC-9	1703385.01	101950.05	78.38	38.10				5/2/2003						CD	1		Scrap	0	NA	NA	NA	2	3	KEA3G-QC-9.JPG	7/10/2003	EMD		CR			DAS	
KEA3T-1	1703688.62	100676.36	1436.50	-1.34				5/13/2003						CD	6		Scrap Metal	0	0	NA	NA	1	1	KEA3T-1.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-10	1702816.02	100096.71	2485.80	1.50				5/13/2003						CD	10		Scrap Metal	0	0	NA	NA	0	0	KEA3T-10.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-11	1703152.63	99938.78	3143.10	1.50				5/13/2003						CD	1		Scrap Metal	0	0	NA	NA	8	8	KEA3T-11.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-12	1702799.74	100082.98	2507.10	1.50				5/13/2003						CD	3		Can	0	0	NA	NA	0	0	KEA3T-12.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-13	1703695.56	100915.39	1.50	1177.80				5/13/2003						CD	6		Survey Spike	0	0	NA	NA	0	0	KEA3T-13.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-14	1703691.66	100949.67	1.80	1143.30				5/13/2003						CD	1		Scrap Metal	0	0	NA	NA	6	6	KEA3T-14.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-15	1703234.83	100393.35	1971.30	-1.80				5/13/2003						CD	1		Nail	0	0	NA	NA	10	10	KEA3T-15.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-16	1703196.16	100369.19	2016.90	-1.80				5/13/2003						CD	2		Wire / Nail	0	0	NA	NA	8	8	KEA3T-16.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-17	1702742.85	100035.02	2581.50	1.50				5/13/2003						CD	1		Barb. Wire / Nail	0	0	NA	NA	6	6	KEA3T-17.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-18	1703096.43	100306.86	2134.50	-1.80				5/13/2003						CD	2		Scrap Metal	0	0	NA	NA	4	4	KEA3T-18.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-19	1702985.46	100237.54	2944.59	-1.45				5/13/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA3T-19.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-2	1703279.48	100417.01	1920.90	1.80				5/13/2003						CD	1		RR Spike / Nail	0	0	NA	NA	10	10	KEA3T-2.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-20	1703368.16	99945.86	3358.81	-1.54				5/13/2003						CD	1		Scrap Metal	0	0	NA	NA	6	6	KEA3T-20.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-21	1703322.16	100447.51	1868.54	-1.45				5/13/2003						FP											7/15/2003	EMD		CR			DAS	
KEA3T-22	1703339.22	99947.24	3330.00	1.50				5/13/2003						CD	4		Spoon	0	0	NA	NA	0	0	KEA3T-22.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-23	1703711.60	100795.84	-1.95	1298.37				5/13/2003						CF											7/15/2003	EMD		CR			DAS	
KEA3T-24	1702895.37	100163.62	2382.00	1.50				5/13/2003						CD	1		Nail	0	0	NA	NA	8	8	KEA3T-24.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-25	1703006.94	100250.64	2240.18	-1.54				5/13/2003						CD	1		Pipe	0	0	NA	NA	4	4	KEA3T-25.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-3	1702876.49	99952.21	2865.73	-1.62				5/13/2003						CD	10		Bottle Cap / Knife Blade	0	0	NA	NA	8	8	KEA3T-3.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-4	1703666.80	100659.38	1464.00	1.50				5/13/2003						FP											7/15/2003	EMD		CR			DAS	
KEA3T-5	1703177.56	100353.67	2040.90	1.50				5/13/2003						CD	1		Nail	0	0	NA	NA	4	4	KEA3T-5.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-6	1702838.04	100115.27	2457.00	1.50				5/13/2003						CD	3		Wire	0	0	NA	NA	8	8	KEA3T-6.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-7	1703685.31	101043.47	-1.70	1049.35				5/13/2003						CD	1		Scrap Metal	0	0	NA	NA	3	3	KEA3T-7.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-8	1703688.69	100980.73	1.50	1112.10				5/13/2003						CD	1		Scrap Metal / HR	0	0	NA	NA	4	4	KEA3T-8.JPG	7/15/2003	EMD		CR			DAS	
KEA3T-9	1702700.44	99980.88	2687.40	1.80				5/13/2003						MD	2		2.36-inch Rocket, Practi	0	0	NA	NA	2	2	KEA3T-9.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-112	1703655.11	101643.40	90.30	52.80				5/14/2003						CD	2		Scrap	0	0	NA	NA	2	3	KEA4G-112.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-121	1703581.25	101609.89	9.30	57.00				5/14/2003						CD	2		Scrap	0	0	NA	NA	2	3	KEA4G-121.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-123	1703591.35	101616.48	21.30	58.20				5/14/2003						CD	0.5		Scrap	0	0	NA	NA	2	3	KEA4G-123.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-136	1703603.35	101631.81	39.00	66.30				5/14/2003						CD	Lip		Grounding Rod	0	0	NA	NA	2	?	KEA4G-136.JPG	7/15/2003	EMD		CR			DAS	

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Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA4G-192	1703611.70	101667.88	63.00	94.50				5/14/2003						CD	Lip		Sewer	0	0	NA	NA	2	?	KEA4G-192.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-206	1703634.48	101689.13	93.00	102.90				5/14/2003						CD	5		Horn	0	0	NA	NA	2	5	KEA4G-206.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-211	1703592.45	101672.44	48.00	107.40				5/14/2003						CD	0.25		Scrap	0	0	NA	NA	2	2	KEA4G-211.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-212	1703579.26	101665.95	33.30	107.70				5/14/2003						CD	0.1		Scrap	0	0	NA	NA	2	2	KEA4G-212.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-238	1703589.73	101684.88	51.30	119.70				5/14/2003						CD	1		Scrap	0	0	NA	NA	3	4	KEA4G-238.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-240	1703607.84	101694.93	72.00	120.30				5/14/2003						CD	1		Scrap	0	E	NA	NA	3	4	KEA4G-240.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-255	1703629.75	101711.34	99.00	124.80				5/14/2003						CD	8		Sledge	0	0	NA	NA	3	4	KEA4G-255.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-261	1703638.88	101720.45	111.30	128.70				5/14/2003						CD	5		Scrap	0	0	NA	NA	3	4	KEA4G-261.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-273	1703562.07	101686.10	27.30	133.50				5/14/2003						CD	2		Jack Base	0	0	NA	NA	1	2	KEA4G-273.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-277	1703584.54	101700.78	54.00	136.20				5/14/2003						CD	4		Pipe	0	0	NA	NA	2	3	KEA4G-277.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-297	1703568.32	101700.15	39.30	143.10				5/14/2003						CD	10		Car Parts	0	0	NA	NA	3	5	KEA4G-297.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-306	1703571.30	101707.43	45.30	148.20				5/14/2003						CD	1		Scrap	0	0	NA	NA	1	2	KEA4G-306.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-317	1703638.23	101747.82	123.30	153.30				5/14/2003						CD	5		Car Parts	0	0	NA	NA	3	5	KEA4G-317.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-34	1703658.21	101604.13	75.00	16.50				5/14/2003						CD	0.2		Can	0	0	NA	NA	1	1	KEA4G-34.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-35	1703636.61	101594.30	51.30	17.70				5/14/2003						CD	2		Rod	0	0	NA	NA	1	2	KEA4G-35.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-359	1703520.22	101714.10	3.00	177.60				5/14/2003						CD	2		Scrap	0	0	NA	NA	2	3	KEA4G-359.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-370	1703558.91	101739.86	49.20	182.70				5/14/2003						CD	0.5		Scrap	0	0	NA	NA	1	2	KEA4G-370.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-400	1703541.93	101744.59	36.30	194.70				5/14/2003						CD	2		Scrap	0	0	NA	NA	1	2	KEA4G-400.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-57	1703666.84	101620.75	90.30	27.30				5/14/2003						CD	2		Scrap	0	0	NA	NA	1	2	KEA4G-57.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-88	1703594.02	101598.27	15.30	40.80				5/14/2003						CD	0.2		Scrap	2	E	NA	NA	3	3	KEA4G-88.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-92	1703621.83	101615.02	47.70	42.90				5/14/2003						CD	3		Scrap	0	0	NA	NA	2	3	KEA4G-92.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-96	1703597.02	101604.88	21.00	45.30				5/14/2003						CD	2		Scrap	0	0	NA	NA	4	6	KEA4G-96.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-1	1703615.99	101568.10	20.94	3.91				5/15/2003						NC										KEA4G-QC-1.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-10	1703588.71	101725.51	69.07	156.25				5/24/2003						CD	0.25		Scrap	0	0	NA	NA	1	2	KEA4G-QC-10.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-11	1703549.68	101729.03	36.03	177.32				5/25/2003						CD	0.2		Scrap	0	0	NA	NA	1	2	KEA4G-QC-11.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-2	1703612.23	101575.63	21.06	12.33				5/16/2003						NC										KEA4G-QC-2.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-3	1703630.45	101573.51	36.27	2.07				5/17/2003						CD	0.25		Can	0	0	NA	NA	0	0	KEA4G-QC-3.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-4	1703629.63	101594.20	45.05	20.83				5/18/2003						CD	0.25		Scrap	0	0	NA	NA	1	2	KEA4G-QC-4.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-5	1703699.23	101616.89	117.30	8.98				5/19/2003						CD	0.2		Can	0	0	NA	NA	0	0	KEA4G-QC-5.JPG	7/15/2003	EMD		CR			DAS	
KEA4G-QC-6	1703652.31	101628.65	81.03	40.99				5/20/2003						CD	0.2		Can	0	0	NA	NA	2	2		7/15/2003	EMD		CR			DAS	
KEA4G-QC-7	1703608.00	101622.66	38.92	56.04				5/21/2003						CD	1		Scrap	0	0	NA	NA	3	4		7/15/2003	EMD		CR			DAS	
KEA4G-QC-8	1703665.37	101655.46	104.95	58.79				5/22/2003						CD	0.25		Scrap	0	0	NA	NA	0	1		7/15/2003	EMD		CR			DAS	
KEA4G-QC-9	1703640.80	101676.85	92.97	89.09				5/23/2003						CD	0.2		Scrap	0	0	NA	NA	3	3		7/15/2003	EMD		CR			DAS	
KEA5G-10	1702855.25	101390.58	18.00	12.30				4/30/2003						CD	6 oz		Metal Pipe	0	0	NA	NA	2	2	KEA5G-10.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-11	1702910.09	101415.65	78.30	12.90				4/30/2003						CD	1 oz		Wire	0	0	NA	NA	3	3	KEA5G-11.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-12	1702849.40	101388.96	12.00	13.20				4/30/2003						CD	18 oz		6 Cans	0	0	NA	NA	2	2	KEA5G-12.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-14	1702840.57	101386.67	3.00	14.70				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-14.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-16	1702844.71	101392.12	9.00	18.00				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-16.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-24	1702908.22	101433.86	84.00	30.30				4/30/2003						CD	2 lb		Bed Frame Parts	0	0	NA	NA	Surface	Surface	KEA5G-24.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-27	1702917.44	101441.91	95.70	33.90				4/30/2003						CD	3lb		Bed Frame Parts	0	0	NA	NA	Surface	Surface		7/9/2003	EMD		CR			DAS	
KEA5G-3	1702849.47	101381.44	9.00	6.30				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-3.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-30	1702865.83	101425.83	42.00	40.20				4/30/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA5G-32	1702917.29	101450.38	99.00	41.70				4/30/2003						CD	16 oz		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA5G-32.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-33	1702911.68	101448.21	93.00	42.00				4/30/2003						CD	1 lb		Bed Frame Parts	0	0	NA	NA	Surface	Surface	KEA5G-33.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-37	1702906.90	101452.32	90.30	47.70				4/30/2003						CD	1 lb		Scrap Metal	0	0	NA	NA	4	4	KEA5G-37.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-38	1702842.40	101427.55	21.30	51.30				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface		7/9/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset					Offset		Orientation of		Depth (in)											
Unique Target ID	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA5G-4	1702887.01	101401.11	51.30	9.00				4/30/2003						CD	10 oz		Pipe	0	0	NA	NA	Surface	Surface	KEA5G-4.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-40	1702829.98	101425.95	9.30	54.90				4/30/2003						CD	5 oz		Jerry Can Lid	0	0	NA	NA	3	3	KEA5G-40.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-41	1702846.45	101433.95	27.60	55.50				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-41.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-42	1702840.21	101432.48	21.30	56.70				4/30/2003						CD	1 lb		Dog Dish	0	0	NA	NA	Surface	Surface	KEA5G-42.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-48	1702832.56	101441.55	18.00	68.10				4/30/2003						CD	3 oz		Can	0	0	NA	NA	4	4	KEA5G-48.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-52	1702824.66	101460.03	18.30	88.20				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-52.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-56	1702840.22	101380.86	0.30	9.50				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-56.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-60	1702829.47	101404.73	0.20	35.70				4/30/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-60.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-7	1702903.09	101409.25	69.30	9.90				4/30/2003						CD	3 oz		Nail / Wire	0	0	NA	NA	4	4	KEA5G-7.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-QC-1	1702848.27	101413.58	20.98	36.15				5/1/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface		7/9/2003	EMD		CR			DAS	
KEA5G-QC-2	1702867.63	101407.05	36.01	22.32				5/2/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-QC-2.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-QC-3	1702877.79	101428.66	54.08	37.92				5/3/2003						CD	3 oz		Can	0	0	NA	NA	6	6	KEA5G-QC-3.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-QC-4	1702891.37	101420.53	63.18	24.97				5/4/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA5G-QC-5	1702925.92	101423.74	96.05	13.85				5/5/2003						NC											7/9/2003	EMD		CR			DAS	
KEA5G-QC-6	1702890.20	101459.77	78.07	61.30				5/6/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA5G-QC-6.JPG	7/9/2003	EMD		CR			DAS	
KEA5G-QC-7	1702876.83	101445.34	59.98	53.55				5/7/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA5G-QC-8	1702830.52	101457.53	22.64	83.53				5/8/2003						CD	3 oz		Can	0	0	NA	NA	4	4	KEA5G-QC-8.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-21	1702641.90	101850.36	18.00	78.30				5/8/2003						CD	1 lb		Nail	0	0	NA	NA	3	3	KEA6G-21.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-25	1702652.10	101787.21	0.55	16.76				5/8/2003						CD	1 lb		Pipe	0	0	NA	NA	Surface	Surface	KEA6G-25.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-8	1702690.34	101810.38	45.00	21.60				5/8/2003						CD	2 oz		Rod and Nail	0	0	NA	NA	8	8	KEA6G-8.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-1	1702699.50	101792.15	45.60	1.20				5/8/2003						CD	3 oz		Can	0	0	NA	NA	Surface	Surface	KEA6G-1.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-3	1702675.70	101785.69	21.30	5.40				5/8/2003						CD	3 oz		Nut and Bolt	0	0	NA	NA	5	5	KEA6G-3.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-20	1702674.91	101864.76	54.00	77.40				5/8/2003						CD	3 oz		Can	0	0	NA	NA	4	4	KEA6G-20.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-6	1702661.95	101793.17	12.00	18.00				5/8/2003						CD	6 oz		Scrap Metal	0	0	NA	NA	3	3	KEA6G-6.JPG	7/9/2003	EMD		CR			DAS	
KEA6G-2	1702671.28	101780.97	15.30	3.00				5/8/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA6G-7	1702713.25	101818.75	69.30	19.50				5/8/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA6G-9	1702723.08	101854.45	93.30	47.70				5/8/2003						NC											7/9/2003	EMD		CR			DAS	
KEA6G-10	1702680.71	101845.94	51.30	57.90				5/8/2003						NC											7/9/2003	EMD		CR			DAS	
KEA6G-13	1702673.78	101852.98	48.00	67.20				5/8/2003						NC											7/9/2003	EMD		CR			DAS	
KEA6G-23	1702654.51	101874.44	39.60	94.80				5/8/2003						NC											7/9/2003	EMD		CR			DAS	
KEA6G-24	1702638.59	101871.66	24.00	99.00				5/8/2003						FP			Hot Soil								7/9/2003	EMD		CR			DAS	
KEA7G-100	1703050.94	101207.46	33.30	40.20				5/7/2003						CD	1 oz		Wire	0	0	NA	NA	3	3	KEA7G-100.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-116	1703119.54	101197.47	102.00	47.70				5/7/2003						CD	1 lb		Tricycle Wheel	0	0	NA	NA	Surface	Surface	KEA7G-116.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-12	1703196.50	101138.31	192.30	9.60				5/7/2003						CD	1 lb		Pipe	0	0	NA	NA	6	6	KEA7G-12.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-135	1703043.49	101227.50	21.00	57.90				5/7/2003						CD	5 lb		Pipe	0	0	NA	NA	2	2	KEA7G-135.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-164	1703206.14	101194.05	186.00	66.00				5/7/2003						CD	10 oz		Brake Rod	0	0	NA	NA	Surface	Surface	KEA7G-164.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-176	1703166.25	101207.99	144.00	69.60				5/7/2003						CD			Scrap							KEA7G-176.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-192	1703084.62	101241.23	57.00	81.60				5/7/2003						CD	3 lbs		Rebar	0	0	NA	NA	Surface	Surface	KEA7G-192.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-200	1703112.45	101238.73	84.30	86.10				5/7/2003						FP			Hot Rock								7/10/2003	EMD		CR			DAS	
KEA7G-210	1703163.31	101229.74	135.30	90.00				5/7/2003						CD	2 oz		Wire Brush	0	0	NA	NA	4	4	KEA7G-210.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-211	1703081.37	101251.28	51.30	90.60				5/7/2003						CD	3 lbs		Rebar (up)	0	0	NA	NA	Surface	Surface	KEA7G-211.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-215	1703210.54	101218.92	183.30	91.20				5/7/2003						CD			Scrap							KEA7G-215.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-244	1703090.81	101263.01	57.30	104.40				5/7/2003						CD	8 lbs		File	0	0	NA	NA	Surface	Surface	KEA7G-244.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-248	1703117.59	101258.65	84.00	106.80				5/7/2003						CD	9 oz		Nail and Wire	0	0	NA	NA	3	3	KEA7G-248.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-291	1703131.66	101264.01	96.00	115.50				5/7/2003						CD	3 lbs		Rebar	0	0	NA	NA	Surface	Surface	KEA7G-291.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-31	1703157.68	101155.81	150.00	16.80				5/7/2003						CD	10 oz		Scrap Metal	0	0	NA	NA	10	10	KEA7G-31.jpg	7/10/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey						Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset				Depth (in)												
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA7G-312	1703101.20	101278.20	63.30	121.80				5/7/2003						CD	3 oz		Scrap Metal	0	0	NA	NA	6	6	KEA7G-312.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-336	1703210.89	101255.01	173.70	126.30				5/7/2003						CD	12 oz		Scrap Metal	0	0	NA	NA	4	4	KEA7G-336.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-337	1703232.12	101249.64	195.30	126.30				5/7/2003						CD	1 lb		Nails and Scrap Metal	0	0	NA	NA	2	2	KEA7G-337.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-342	1703088.25	101289.78	48.00	129.90				5/7/2003						CD	3 oz		Nails	0	0	NA	NA	2	2	KEA7G-342.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-349	1703162.97	101273.32	123.30	132.30				5/7/2003						CD	5 oz		Gas Cap	0	0	NA	NA	Surface	Surface	KEA7G-349.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-352	1703133.39	101281.73	93.00	133.20				5/7/2003						CD	10 oz		Door Handle	0	0	NA	NA	3	3	KEA7G-352.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-378	1703145.66	101290.64	102.30	144.90				5/7/2003						CD	5 oz		Scrap Metal	0	0	NA	NA	3	3	KEA7G-378.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-408	1703070.41	101318.83	23.70	153.90				5/7/2003						CD	8 oz		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-408.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-420	1703161.59	101302.33	114.30	160.20				5/7/2003						CD	6 oz		Scrap Metal	0	0	NA	NA	8	8	KEA7G-420.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-434	1703213.28	101295.19	165.00	165.90				5/7/2003						CD	4 oz		Scrap Aluminum	0	0	NA	NA	2	2	KEA7G-434.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-449	1703102.09	101328.35	51.30	171.00				5/7/2003						CD	5 lbs		Jack	0	0	NA	NA	Surface	Surface	KEA7G-449.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-455	1703081.74	101335.30	30.30	172.80				5/7/2003						CD	3 lbs		Pipe	0	0	NA	NA	3	3	KEA7G-455.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-473	1703204.78	101309.98	153.00	178.20				5/7/2003						CD	6 oz		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-473.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-480	1703194.00	101315.76	141.30	181.20				5/7/2003						CD	2 lbs		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-480.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-491	1703078.16	101348.16	23.70	184.50				5/7/2003						CD	2 lbs		Pick Handle	0	0	NA	NA	Surface	Surface	KEA7G-491.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-505	1703213.29	101317.41	159.00	187.50				5/7/2003						CD	6 oz		Scrap Metal	0	0	NA	NA	3	3	KEA7G-505.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-514	1703133.57	101340.12	78.00	190.20				5/7/2003						CD	1 lb		Mesh and Bailing Wire	0	0	NA	NA	Surface	Surface	KEA7G-514.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-519	1703185.21	101330.91	129.00	193.80				5/7/2003						CD	1 oz		Nail	0	0	NA	NA	6	6	KEA7G-519.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-521	1703176.64	101333.35	120.30	194.10				5/7/2003						CD	2 oz		Bolt	0	0	NA	NA	4	4	KEA7G-521.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-523	1703146.84	101342.03	90.00	195.30				5/7/2003						CD	1 lb		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-523.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-1	1703203.90	101229.16	175.03	99.38				5/7/2003						CD	4 oz		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-QC-1.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-10	1703206.17	101292.73	161.29	161.48				5/7/2003						CD	1 lb		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-QC-10.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-11	1703207.10	101301.44	160.00	170.14				5/7/2003						CD	8 oz		Roll Wire	0	0	NA	NA	6	6	KEA7G-QC-11.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-12	1703192.48	101333.34	137.93	197.33				5/7/2003						CD	5 oz		Scrap Metal	0	0	NA	NA	2	2	KEA7G-QC-12.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-13	1703080.62	101355.89	24.57	190.99				5/7/2003						CD	2 oz		Can	0	0	NA	NA	Surface	Surface	KEA7G-QC-13.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-2	1703152.34	101280.96	112.41	136.54				5/7/2003						CD	12 oz		Nails	0	0	NA	NA	Surface	Surface	KEA7G-QC-2.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-3	1703108.12	101317.61	60.64	160.87				5/7/2003						CD	1 oz		Bolt	0	0	NA	NA	Surface	Surface	KEA7G-QC-3.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-4	1703156.19	101341.26	101.01	195.86				5/7/2003						CD	5 oz		Scrap Metal	0	0	NA	NA	Surface	Surface	KEA7G-QC-4.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-5	1703164.79	101159.57	154.80	22.19				5/7/2003						CD	1 oz		Nails	0	0	NA	NA	6	6	KEA7G-QC-5.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-6	1703172.72	101176.37	158.23	40.45				5/7/2003						CD	11 oz		Scrap Metal	0	0	NA	NA	3	3	KEA7G-QC-6.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-7	1703179.88	101178.55	164.58	44.36				5/7/2003						CD	3 oz		Nails	0	0	NA	NA	1	1	KEA7G-QC-7.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-8	1703059.62	101245.75	31.94	79.12				5/7/2003						CD	8 oz		Scrap Metal	0	0	NA	NA	2	2	KEA7G-QC-8.jpg	7/10/2003	EMD		CR			DAS	
KEA7G-QC-9	1703142.07	101286.36	101.16	139.17				5/7/2003						CD	8 oz		Scrap Metal	0	0	NA	NA	3	3	KEA7G-QC-9.jpg	7/10/2003	EMD		CR			DAS	
KEA8G-1	1703052.14	101977.24	102.00	5.40										CD	3		Stake	0	0	NA	NA	0	12	KEA8G-1.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-107	1702964.94	102013.45	42.00	78.30										CD	0.25		Drain	0	0	NA	NA	0	1	KEA8G-107.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-109	1702999.50	102032.16	81.30	78.60										CD	3.4		Rad. Cap	0	0	NA	NA	4	4	KEA8G-109.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-115	1702979.69	102024.69	60.30	81.30										CD	1		Scrap	0	0	NA	NA	2	3		7/14/2003	EDM		CR			DAS	
KEA8G-117	1703034.63	102054.92	123.00	82.20										CD	1.5		Car Part	0	0	NA	NA	1	2	KEA8G-117.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-118	1703021.11	102048.40	108.00	82.80										CD	0.5		Hinge	0	0	NA	NA	3	3	KEA8G-118.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-119	1702973.29	102023.32	54.00	83.10										CD	1.5		Car Part	0	0	NA	NA	2	3	KEA8G-119.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-120	1702928.12	101999.64	3.00	83.40										CD	0.5		Wire	0	0	NA	NA	0	2	KEA8G-120.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-121	1702933.68	102002.60	9.30	83.40										CD	1		Scrap	0	0	NA	NA	1	2	KEA8G-121.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-122	1702983.18	102030.28	66.00	84.60										CD	1		Scrap	0	0	NA	NA	2	2.5	KEA8G-122.JPG	7/11/2003	EDM		CR			DAS	
KEA8G-123	1703045.60	102066.87	138.30	87.60										CD	3		Car Part	0	0	NA	NA	2	3	KEA8G-123.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-130	1702948.68	102019.75	30.60	91.50										CD	1		Car Part	2	0	NA	NA	1	2	KEA8G-130.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-134	1702972.95	102036.73	60.00	95.10										CD	0.5		Scrap	0	0	NA	NA	1	2	KEA8G-134.JPG	7/14/2003	EDM		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset						Offset			Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KEA8G-143	1702960.66	102034.28	48.00	98.70										CD	1		Scrap	0	0	NA	NA	2	3	KEA8G-143.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-155	1702946.67	102035.67	36.30	106.50										CD	1		Scrap	0	0	NA	NA	1	2	KEA8G-155.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-156	1703041.50	102086.09	143.70	106.50										CD	3		Scrap	0	0	NA	NA	1	2	KEA8G-156.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-16	1702979.43	101954.89	27.30	19.80										CD	1		Scrap	0	0	NA	NA	1	1	KEA8G-16.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-168	1702935.92	102041.84	29.70	117.00										CD	0.25		Scrap	0	0	NA	NA	2	3	KEA8G-168.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-170	1702944.66	102051.59	42.00	121.50										CD	0.1		Scrap	0	0	NA	NA	2	2	KEA8G-170.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-171	1702921.22	102044.56	18.00	126.30										CD	0.1		Bolt	0	0	NA	NA	4	4	KEA8G-171.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-182	1702908.18	102056.32	12.00	142.80										CD	0.2		Pipe	0	0	NA	NA	0	2	KEA8G-182.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-186	1703020.65	102120.20	141.30	146.40										CD	3		Scrap	0	0	NA	NA	2	3	KEA8G-186.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-205	1702994.75	101944.55	35.98	3.48										CD	2		Pipe & Nails	0	0	NA	NA	0	0	KEA8G-205.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-210	1702945.61	102005.35	21.13	80.23										CD	10		Bar	0	0	NA	NA	0	1	KEA8G-210.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-227	1702957.99	101937.33	0.13	14.36										CD	0.5		Nails	0	0	NA	NA	2	3	KEA8G-227.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-25	1703051.18	101999.50	111.60	25.50										CD	1		Nails	0	0	NA	NA	2	2	KEA8G-25.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-255	1702998.51	101988.75	60.05	40.74										CD	0.4		Scrap	0	0	NA	NA	0	0	KEA8G-255.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-29	1702980.08	101966.45	33.30	29.70										CD	1		Nails & Pipe Fitting	10"	0	NA	NA	2	2	KEA8G-29.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-32	1702998.06	101977.37	54.30	30.90										CD	0.2		Nails	0	0	NA	NA	3	3	KEA8G-32.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-41	1702963.19	101965.62	18.00	36.90										CD	1.2		Scrap	0	0	NA	NA	4	4	KEA8G-41.jpg	7/14/2003	EDM		CR			DAS	
KEA8G-48	1703054.47	102018.24	123.30	40.50										CD	0.5		Brake Shoe	0	0	NA	NA	0	0	KEA8G-48.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-54	1702957.43	101970.71	15.30	44.10										CD	10		Pipe	0	0	NA	NA	0	6	KEA8G-54.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-57	1703068.53	102030.13	141.30	44.40										CD	2		Scrap	0	0	NA	NA	4	4	KEA8G-57.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-63	1702945.02	101967.85	3.00	47.40										CD	0.5		Rod	0	0	NA	NA	2	2.5	KEA8G-63.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-64	1702965.64	101980.18	27.00	48.60										CD	2		Scrap	0	0	NA	NA	2	3	KEA8G-64.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-66	1703013.32	102005.53	81.00	48.60										CD	<0.1		Condom Wrapper	0	0	NA	NA	0	0	KEA8G-66.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-67	1703049.40	102027.77	123.30	51.30										CD	0.5		Scrap	0	0	NA	NA	4	4	KEA8G-67.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-8	1703001.93	101956.66	48.00	10.80										CD	0.1		Metal Can	0	0	NA	NA	0	0	KEA8G-8.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-89	1702943.10	101990.62	12.00	68.40										CD	4		Scrap	0	0	NA	NA	1	2	KEA8G-89.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-9	1703063.12	101989.19	117.30	10.80										CD	0.1		Scrap	0	0	NA	NA	0	1	KEA8G-9.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-93	1703000.67	102022.93	78.00	69.90										CD	2		Starter Case	0	0	NA	NA	2	2	KEA8G-93.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-97	1703009.98	102031.62	90.30	73.20										CD	0.5		Rod	0	0	NA	NA	0	1	KEA8G-97.JPG	7/14/2003	EDM		CR			DAS	
KEA8G-QC-1	1702986.92	101972.96	42.40	32.24										CD	1.2		2' Pipe & Nails	0	0	NA	NA	0	0	KEA8G-QC-1.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-QC-2	1703027.01	102019.07	99.44	54.13										CD	0.2		Fastener	0	0	NA	NA	3	3	KEA8G-QC-2.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-QC-3	1703039.08	102027.89	114.24	56.25										CD	0.2		Scrap	0	0	NA	NA	4	4	KEA8G-QC-3.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-QC-4	1702997.99	102002.59	66.08	53.20										CD	0.4		Scrap	0	0	NA	NA	3	3	KEA8G-QC-4.jpg	7/11/2003	EDM		CR			DAS	
KEA8G-QC-5	1703052.54	102073.63	147.60	90.31										CD	0.2		Can	0	0	NA	NA	2	2	KEA8G-QC-5.JPG	7/14/2003	EDM		CR			DAS	
KEA9G-110	1703258.71	100307.95	33.30	59.10				5/9/2003						CD	6		Scrap Metal	0	0	NA	NA	6	6	KEA9G-110.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-116	1703270.63	100306.56	45.00	61.80				5/9/2003						CD	1		Junction Box	0	0	NA	NA	0	0	KEA9G-116.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-134	1703343.89	100288.66	120.00	69.60				5/9/2003						CD	10		Canteen Frag.	0	0	NA	NA	4	4	KEA9G-134.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-138	1703279.90	100313.76	51.30	71.70				5/9/2003						CD	10		12 Nails	0	0	NA	NA	6	6	KEA9G-138.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-157	1703238.94	100341.78	3.30	84.30				5/9/2003						CD	4		4 Nails	0	0	NA	NA	6	6	KEA9G-157.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-160	1703259.04	100336.51	24.00	86.10				5/9/2003						CD	4		4 Nails	0	0	NA	NA	4	4	KEA9G-160.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-170	1703244.49	100348.39	6.30	92.40				5/9/2003						CD	6		6 Nails	0	0	NA	NA	6	6	KEA9G-170.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-179	1703333.78	100321.90	99.30	97.50				5/9/2003						CD	1		Pipe	0	0	NA	NA	0	0	KEA9G-179.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-20	1703267.17	100260.32	57.30	17.10				5/9/2003						CD	1		Scrap Metal	0	0	NA	NA	4	4	KEA9G-20.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-203	1703338.43	100334.89	99.30	111.30				5/9/2003						CD	1		Pipe	0	0	NA	NA	4	4	KEA9G-203.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-207	1703248.45	100369.28	3.00	113.40				5/9/2003						CD	6		SoM & 2 Nails	0	0	NA	NA	6	6	KEA9G-207.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-225	1703341.27	100343.75	99.00	120.60				5/9/2003						CD	4		4 Nails	0	0	NA	NA	4	4	KEA9G-225.JPG	7/14/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - He'eia Kea
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset		Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset		Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in)		Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
											X Distance (in)	Y Distance (in)						X Distance (in)	Direction			Top of Item	Center of Mass								
KEA9G-226	1703293.45	100361.48	48.00	121.20				5/9/2003						CD	3		3 Nail	0	0	NA	NA	4	4	KEA9G-226.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-243	1703315.12	100252.76	104.99	26.11				5/9/2003						CD	2		Fence Post & Fencing	0	0	NA	NA	4	4	KEA9G-243.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-41	1703237.31	100283.74	21.30	29.10				5/9/2003						CD	2		2 Nails	0	0	NA	NA	6	6	KEA9G-41.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-47	1703305.74	100262.15	93.00	31.80				5/9/2003						CD	2		2 Nails	0	0	NA	NA	4	4	KEA9G-47.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-6	1703328.52	100226.93	126.30	6.30				5/9/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA9G-6.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-64	1703325.19	100262.21	111.30	38.40				5/9/2003						CD	2		Fence Post & Nails	0	0	NA	NA	8	8	KEA9G-64.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-72	1703238.24	100296.15	18.00	41.10				5/9/2003						CD	1		Scrap Metal	0	0	NA	NA	6	6	KEA9G-72.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-87	1703249.02	100298.67	27.30	47.10				5/9/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA9G-87.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-94	1703239.23	100306.95	15.30	51.60				5/9/2003						CD	10		Scrap Metal	0	0	NA	NA	0	0	KEA9G-94.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-97	1703231.16	100311.11	6.30	52.80				5/9/2003						CD	1		Scrap Metal	0	0	NA	NA	0	0	KEA9G-97.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-QA-1	1703249.98	100271.31	37.41	21.65										CD			Door Hinge							KEA9G-QA-1.jpg				CR			DAS	
KEA9G-QA-2	1703266.78	100277.97	50.99	33.58										CD			Nails, 2ea							KEA9G-QA-2.jpg				CR			DAS	
KEA9G-QA-3	1703334.44	100288.77	111.07	66.52										CD			Nails, 2ea							KEA9G-QA-3.jpg				CR			DAS	
KEA9G-QA-4	1703298.80	100342.47	59.44	105.10										CD			Metal Flakes							KEA9G-QA-4.jpg				CR			DAS	
KEA9G-QC-1	1703295.55	100313.82	66.02	77.03				5/9/2003						CD	3		Can	0	0	NA	NA	0	0	KEA9G-QC-1.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-QC-2	1703231.64	100322.20	3.02	63.40				5/9/2003						CD	1		Nail	0	0	NA	NA	3	3	KEA9G-QC-2.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-QC-3	1703229.51	100325.46	-0.09	65.76				5/9/2003						CD	3		Spoon	0	0	NA	NA	0	0	KEA9G-QC-3.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-QC-4	1703254.94	100368.78	9.28	115.12				5/9/2003						CD	1		Nail	0	0	NA	NA	6	6	KEA9G-QC-4.JPG	7/14/2003	EMD		CR			DAS	
KEA9G-QC-5	1703286.47	100368.36	39.11	125.33				5/9/2003						CD	3		3 Nail	0	0	NA	NA	4	4	KEA9G-QC-5.JPG	7/14/2003	EMD		CR			DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - Kahalu'u
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results													Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset		Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset		Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in)		Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
											X Distance (in)	Y Distance (in)						X Distance (in)	Direction			Top of Item	Center of Mass									
KAH9G-3	1688788.480	101948.3800	60.00	3.90	132.40									CD	2		Wire Rope	0	0	NA	NA	2.0	2	KAH9G-3.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH9G-22	1688806.230	101969.8000	84.00	17.40	114.25									CD	3		Wire Rope	0	0	NA	NA	4.0	4	KAH9G-22.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH9G-28	1688762.670	101974.1800	45.30	36.90	6.05									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH9G-29	1688744.330	101970.3900	27.00	39.90	17.48									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH9G-47	1688743.390	102032.0200	48.00	97.20	5.74									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH8G-1	1688809.010	102129.5700	54.30	0.90	10.37									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH8G-9	1688839.700	102157.4200	90.30	22.20	61.91									CD	3oz		Can	0	0	NA	NA	0.0	0	KAH8G-9.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH8G-13	1688835.000	102194.9700	93.30	60.30	21.10									CD	3oz		Can	0	0	NA	NA	0.0	0	KAH8G-13.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH8G-14	1688846.570	102211.0000	108.00	73.80	39.82									CD	3oz		Can	0	0	NA	NA	0.0	0	KAH8G-14.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH8G-29	1688751.010	102145.8200	0.29	28.78	185.96									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH7G-30	1688748.900	102574.0200	57.30	32.40	10.94									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-52	1688701.340	102584.4400	12.30	52.20	7.26									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-55	1688740.520	102597.1000	53.70	56.70	19.39									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-58	1688769.370	102605.4900	84.00	59.10	35.15									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-60	1688716.730	102596.4900	30.00	60.90	5.00									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-62	1688753.760	102607.7900	69.00	64.50	8.49									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-64	1688690.450	102607.9300	6.30	77.40	6.44									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH7G-66	1688698.470	102539.8300	0.35	9.09	72.06									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH6G-10	1688210.100	102609.4600	18.00	19.50	11.23									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH6G-26	1688287.950	102580.5300	96.00	44.70	82.57									CD	1		Axe Head	0	0	NA	NA	0.8	8	KAH6G-26.jpg	7/16/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH6G-34	1688232.980	102647.5600	12.00	63.00	15.61									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH6G-41	1688238.960	102663.6900	6.60	79.20	12.77									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH6G-52	1688297.190	102635.5000	69.00	92.40	5.51									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH5G-1	1688134.190	102982.2100	21.00	6.00	5.25									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-3	1688145.820	102990.7200	6.90	9.00	5.03									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-7	1688144.400	102975.8600	18.90	18.00	10.54									CD	3		Survey Nail	0	0	NA	NA	0.0	0	KAH5G-7.jpg	7/16/2003	EMD					DAS	
KAH5G-9	1688154.220	102982.3600	7.50	21.00	6.03									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-10	1688139.580	102966.0800	29.40	21.00	6.97									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-25	1688161.160	102950.7100	26.40	47.70	6.15									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-34	1688167.160	102930.3900	37.50	66.00	9.57									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH5G-36	1688137.980	102994.8200	9.09	0.31	89.64									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH4T-2	1689186.970	103725.4600	3.00	19.20	5.29									NC	0			0	0	NA	NA	0.0	0	KAH4T-2.jpg	7/16/2003	EMD					DAS	
KAH4T-8	1689232.370	103784.7600	6.00	94.20	8.73									SA	0.1		7.62 Cart.	0	0	NA	NA	0.0	0	KAH4T-8.jpg	7/16/2003	EMD					DAS	
KAH4T-12	1689269.050	103826.4700	12.00	149.70	46.76									CD	1		Scrap	0	0	NA	NA	0.0	0	KAH4T-12.jpg	7/16/2003	EMD					DAS	
KAH4T-17	1689255.642	103802.7517	14.68	122.45	27.21									NC	0			0	0	NA	NA	0.0	0	KAH4T-17.jpg	7/16/2003	EMD					DAS	
KAH4T-20	1689183.164	103705.3774	11.44	0.50	18.67									SA	0.1		5.56 Proj.	0	0	NA	NA	0.0	0	KAH4T-20.jpg	7/16/2003	EMD					DAS	
KAH4T-24	1689232.810	103795.6562	0.09	103.41	19.29									CD	0.1		Survey Nail	0	0	NA	NA	0.0	0	KAH4T-24.jpg	7/16/2003	EMD					DAS	
KAH4G-2	1688791.020	103045.6900	51.30	6.30	6.70									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH4G-12	1688801.680	103059.6100	57.30	22.80	11.90									CD	1		Scrap Metal	0	0	NA	NA	12.0	12	KAH4G-12.jpg	7/16/2003	EMD					DAS	
KAH4G-17	1688815.160	103083.3300	63.00	49.50	5.57									CD	3oz		Can	0	0	NA	NA	0.0	0	KAH4G-17.jpg	7/16/2003	EMD					DAS	
KAH4G-22	1688744.190	103064.7100	0.23	10.18	69.81									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH3T-1	1689302.580	101909.6100	3.00	62.10	7.36									NC	0			0	0	NA	NA	0.0	0	KAH3T-1.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH3T-3	1689293.480	101858.6100	0.18	9.99	78.11									NC	0			0	0	NA	NA	0.0	0	KAH3T-3.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH3T-4	1689305.970	101960.2800	0.18	113.18	18.43									CD	1		Wrench	0	0	NA	NA	3.0	3	KAH3T-4.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH3G-7	1689622.210	103078.2100	24.00	52.20	11.85									CD	8oz		Scrap Metal	0	0	NA	NA	12.0	12	KAH3G-7.jpg	7/16/2003	EMD					DAS	
KAH3G-8	1689616.370	103099.1400	6.30	64.80	22.26									CD	1		Axe Head	0	0	NA	NA	12.0	12	KAH3G-8.jpg	7/16/2003	EMD					DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - Kahalu'u
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset					Offset				Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KAH3G-13	1689605.550	103049.1000	29.35	19.09	16.11									FP	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH3G-14	1689576.610	103059.5600	0.28	9.02	137.23									FP	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH2T-5	1689281.520	102173.0800	10.20	12.00	11.43									NC	0			0	0	NA	NA	0.0	0	KAH2T-5.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH2T-7	1689432.020	102141.0900	165.60	12.00	11.06									NC	0			0	0	NA	NA	0.0	0	KAH2T-7.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH2T-9	1689278.530	102161.8100	9.61	0.36	83.92									NC	0			0	0	NA	NA	0.0	0	KAH2T-9.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH2G-1	1689568.250	103486.9800	9.30	1.80	39.29									CD	1		Scrap Metal	0	0	NA	NA	12.0	12	KAH2G-1.jpg	7/16/2003	EMD					DAS	
KAH2G-5	1689566.430	103497.6500	3.30	10.80	33.54									CD	10oz		Scrap Metal	0	0	NA	NA	6.0	6	KAH2G-5.jpg	7/16/2003	EMD					DAS	
KAH2G-18	1689569.010	103511.4600	0.04	24.47	78.33									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH1T-1	1688948.060	102148.7800	9.30	3.00	5.66									NC	0			0	0	NA	NA	0.0	0	KAH1T-1.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1T-21	1689047.410	102315.4500	12.00	198.00	274.50									CD	2		Scrap	0	0	NA	NA	1.0	2		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1T-25	1688943.200	102158.4400	0.26	8.97	94.93									NC	0			0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1T-27	1688954.950	102178.8000	0.26	32.60	28.10									CD	0.1		Wire	0	0	NA	NA	1.0	1		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1T-28	1688969.910	102203.9200	0.65	61.98	9.98									CD	0.1		Nails	0	0	NA	NA	1.0	1		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1T-29	1688975.910	102197.5500	9.03	59.45	18.41									CD	0.1		Wire	0	0	NA	NA	1.0	1		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH1G-25	1689456.280	103524.2800	54.00	22.20	12.99									NC	0			0	0	NA	NA	0.0	0	KAH1G-25.jpg	7/16/2003	EMD					DAS	
KAH1G-29	1689462.760	103529.2000	59.70	28.20	9.72									SA	0.1		Spent 7.62	0	0	NA	NA	2.0	2	KAH1G-29.jpg	7/16/2003	EMD					DAS	
KAH1G-31	1689446.350	103534.8700	42.30	31.20	7.52									NC	0			0	0	NA	NA	0.0	0	KAH1G-31.jpg	7/16/2003	EMD					DAS	
KAH1G-33	1689452.930	103540.3700	48.00	37.80	5.09									NC	0			0	0	NA	NA	0.0	0	KAH1G-33.jpg	7/16/2003	EMD					DAS	
KAH1G-36	1689436.350	103548.7600	30.00	43.50	10.72									NC	0			0	0	NA	NA	0.0	0	KAH1G-36.jpg	7/16/2003	EMD					DAS	
KAH1G-51	1689456.350	103561.3400	48.00	59.40	7.60									NC	0			0	0	NA	NA	0.0	0	KAH1G-51.jpg	7/16/2003	EMD					DAS	
KAH1G-59	1689460.360	103515.7000	59.50	14.26	5.62									NC	0			0	0	NA	NA	0.0	0	KAH1G-59.jpg	7/16/2003	EMD					DAS	
KAH18G-8	1689181.070	103911.5400	21.30	12.60	26.05									CD	0.1		Rust Flakes	0	0	NA	NA	0.0	0	KAH18G-8.jpg	7/16/2003	EMD					DAS	
KAH18G-15	1689215.390	103915.0900	33.60	45.30	5.35									SA	0.1		7.62 Round	2	NE	NA	NA	2.0	2	KAH18G-15.jpg	7/16/2003	EMD					DAS	
KAH18G-17	1689242.270	103895.7200	63.30	60.90	6.82									NC	0			0	0	NA	NA	0.0	0	KAH18G-17.jpg	7/16/2003	EMD					DAS	
KAH18G-18	1689232.880	103917.8600	39.00	62.40	7.06									NC	0			0	0	NA	NA	0.0	0	KAH18G-18.jpg	7/16/2003	EMD					DAS	
KAH18G-19	1689241.490	103915.2000	45.30	69.00	12.37									CD	1		Horse shoe	0	0	NA	NA	4.0	4	KAH18G-19.jpg	7/16/2003	EMD					DAS	
KAH18G-23	1689256.320	103899.4200	66.30	75.30	11.78									NC	0			0	0	NA	NA	0.0	0	KAH18G-23.jpg	7/16/2003	EMD					DAS	
KAH17G-5	1689667.350	103058.2500	6.30	43.20	6.94									FP	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH17G-7	1689691.970	103066.1700	21.00	64.80	6.17									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH17G-9	1689674.660	103076.6800	0.26	62.15	63.22									CD	12oz		Wire	0	0	NA	NA	4.0	4	KAH17G-9.jpg	7/16/2003	EMD					DAS	
KAH17G-10	1689678.470	103072.6600	5.93	61.40	25.81									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH16G-3	1689243.230	101988.0700	31.50	6.30	27.03									CD	0.2		Can	0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-7	1689257.090	102001.1200	48.60	15.00	30.80									CD	0.2		Can	0	0	NA	NA	0.0	0	KAH16G-7.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-11	1689252.610	102009.1300	46.50	24.00	89.68									CD	0.1		Wire	0	0	NA	NA	0.0	0		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-16	1689243.540	102022.3200	41.40	39.30	48.18									CD	0.2		Can	0	0	NA	NA	2.0	2		7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-18	1689256.800	102028.9900	56.10	42.00	7.29									NC	0			0	0	NA	NA	0.0	0	KAH16G-18.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-22	1689254.630	102047.3000	59.10	60.30	5.39									NC	0			0	0	NA	NA	0.0	0	KAH16G-22.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-30	1689199.020	102046.2900	5.10	75.00	5.92									NC	0			0	0	NA	NA	0.0	0	KAH16G-30.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-43	1689244.820	102112.7700	67.80	126.30	6.67									NC	0			0	0	NA	NA	0.0	0	KAH16G-43.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-44	1689253.320	102121.1500	78.30	132.00	9.16									CD	0.1		Wire	0	0	NA	NA	2.0	2	KAH16G-44.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-45	1689263.130	102127.1200	89.40	135.00	58.22									CD	0.5		Wrench	0	0	NA	NA	0.0	0	KAH16G-45.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-48	1689208.580	102115.2300	33.60	138.90	8.67									NC	0			0	0	NA	NA	0.0	0	KAH16G-48.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-50	1689224.170	102134.6900	54.00	153.30	356.33									CD	LIP		Survey Stake	0	0	NA	NA	0.0	?	KAH16G-50.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH16G-56	1689228.530	101978.0200	14.42	0.73	59.44									NC	0			0	0	NA	NA	0.0	0	KAH16G-56.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-1	1689188.860	102184.7000	51.30	1.20	5.79									NC	0			0	0	NA	NA	0.0	0	KAH15G-1.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-9	1689156.100	102205.3400	15.30	15.60	6.23									NC	0			0	0	NA	NA	0.0	0	KAH15G-9.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: He'eia Combat Training Area - Kahalu'u
Project Location: Oahu, Hawaii
Date:
Coordinate System: State Plane NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated / Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist:
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
											Offset					Offset				Depth (in)											
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	X Distance (in)	Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	X Distance (in)	Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top of Item	Center of Mass	Digital Photo Filename**	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
KAH15G-11	1689241.840	102190.4800	102.30	16.80	5.80									NC	0			0	0	NA	NA	0.0	0	KAH15G-11.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-15	1689237.070	102199.2300	96.00	24.60	7.23									NC	0			0	0	NA	NA	0.0	0	KAH15G-15.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-16	1689216.940	102204.2100	75.30	25.80	57.49									CD	0.25		Scrap	0	0	NA	NA	0.0	0	KAH15G-16.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-26	1689250.200	102218.8300	105.30	46.50	6.56									NC	0			0	0	NA	NA	0.0	0	KAH15G-26.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-40	1689262.800	102238.8300	114.00	68.70	12.24									CD	0.1		Nails	0	0	NA	NA	0.0	0	KAH15G-40.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-42	1689190.250	102257.2700	39.30	73.50	232.69									NC	0			0	0	NA	NA	0.0	0	KAH15G-42.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-46	1689156.620	102273.2400	3.30	83.10	37.98									CD	0.1		Survey Pin	0	0	NA	NA	0.0	2	KAH15G-46.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH15G-53	1689143.970	102221.7700	0.35	29.65	88.61									NC	0			0	0	NA	NA	0.0	0	KAH15G-53.jpg	7/17/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH14G-8	1687175.390	100815.2900	36.00	52.20	6.53									NC	0			0	0	NA	NA	0.0	0	KAH14G-8.jpg	7/16/2003	EMD					DAS	
KAH14G-10	1687203.510	100779.5800	0.29	25.10	100.96									NC	0			0	0	NA	NA	0.0	0	KAH14G-10.jpg	7/16/2003	EMD					DAS	
KAH14G-11	1687193.260	100782.2400	2.95	34.98	260.91									CD	3		Pipe	0	0	NA	NA	0.0	1	KAH14G-11.jpg	7/16/2003	EMD					DAS	
KAH14G-12	1687175.276	100803.1200	23.83	52.31	6.93									NC	0			0	0	NA	NA	0.0	0	KAH14G-12.jpg	7/16/2003	EMD					DAS	
KAH13G-2	1687225.310	100601.5800	15.00	8.10	5.03									NC	0			0	0	NA	NA	0.0	0	KAH13G-2.jpg	7/16/2003	EMD					DAS	
KAH13G-4	1687215.550	100655.5800	69.00	17.40	23.04									NC	0			0	0	NA	NA	0.0	0	KAH13G-4.jpg	7/16/2003	EMD					DAS	
KAH13G-6	1687198.040	100607.5800	21.00	35.10	5.08									NC	0			0	0	NA	NA	0.0	0	KAH13G-6.jpg	7/16/2003	EMD					DAS	
KAH13G-20	1687182.670	100634.5800	48.00	49.80	54.19									NC	0			0	0	NA	NA	0.0	0	KAH13G-20.jpg	7/16/2003	EMD					DAS	
KAH13G-25	1687179.120	100628.8800	42.30	53.40	29.04									NC	0			0	0	NA	NA	0.0	0	KAH13G-25.jpg	7/16/2003	EMD					DAS	
KAH13G-36	1687165.540	100601.5800	15.00	67.50	9.10									NC	0			0	0	NA	NA	0.0	0	KAH13G-36.jpg	7/16/2003	EMD					DAS	
KAH13G-39	1687161.190	100667.8800	81.30	69.90	5.75									NC	0			0	0	NA	NA	0.0	0	KAH13G-39.jpg	7/16/2003	EMD					DAS	
KAH13G-41	1687147.140	100670.8800	84.30	83.40	7.90									NC	0			0	0	NA	NA	0.0	0	KAH13G-41.jpg	7/16/2003	EMD					DAS	
KAH13G-46	1687208.960	100589.6900	3.11	24.46	21.75									NC	0			0	0	NA	NA	0.0	0	KAH13G-46.jpg	7/16/2003	EMD					DAS	
KAH13G-47	1687221.030	100659.9400	73.36	12.06	24.86									NC	0			0	0	NA	NA	0.0	0	KAH13G-47.jpg	7/16/2003	EMD					DAS	
KAH12G-3	1687432.740	100698.4100	33.00	13.20	249.20									CD	2		Rebar	0	0	NA	NA	1.0	2	KAH12G-3.jpg	7/16/2003	EMD					DAS	
KAH12G-5	1687396.950	100688.3900	-0.30	29.70	78.38									NC	0			0	0	NA	NA	0.0	0	KAH12G-5.jpg	7/16/2003	EMD					DAS	
KAH12G-13	1687427.610	100726.0900	47.70	37.20	33.38									CD	1		Bolt	0	0	NA	NA	1.0	2	KAH12G-13.jpg	7/16/2003	EMD					DAS	
KAH11G-3	1687727.680	101220.5400	68.10	33.30	6.29									NC	0			0	0	NA	NA	0.0	0	KAH11G-3.jpg	7/16/2003	EMD					DAS	
KAH11G-4	1687718.810	101167.3000	25.31	0.41	120.87									NC	0			0	0	NA	NA	0.0	0		7/16/2003	EMD					DAS	
KAH11G-5	1687726.440	101174.0400	35.48	0.14	5.75									NC	0			0	0	NA	NA	0.0	0	KAH11G-5.jpg	7/16/2003	EMD					DAS	
KAH10G-91	1688167.310	101623.0000	78.00	70.80	110.87									CD	3oz		Wire	0	0	NA	NA	6.0	6	KAH10G-91.jpg	7/18/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH10G-108	1688167.450	101640.7500	87.00	86.10	137.22									CD	1		Pipe	0	0	NA	NA	8.0	8	KAH10G-108.jpg	7/18/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH10G-121	1688154.720	101651.4100	81.30	101.70	125.78									CD	3		Pipe	0	0	NA	NA	18.0	18	KAH10G-121.jpg	7/18/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH10G-124	1688135.370	101642.3200	60.00	103.50	116.54									CD	1		Scrap Metal	0	0	NA	NA	6.0	6	KAH10G-124.jpg	7/18/2003	EMD	Yes	JC	7/17/2003		DAS	
KAH10G-138	1688085.970	101608.5100	0.31	98.92	85.78									NC	0			0	0	NA	NA	0.0	0		7/18/2003	EMD	Yes	JC	7/17/2003		DAS	

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi² Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi² Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
01-01A_001	627652.200	2361184.5000	0.00	92.00	164.20						0	0	09/24/06	QA	3		QA Seed #QA6	0	0			3.0	5	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01A_009	627670.700	2361170.9000	6.00	16.50	5.90						0	0	09/24/06	GEO			HOT SOIL	0	0			0.0	18		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01A_029	627658.500	2361184.9000	15.00	77.00	22.70						0	0	09/24/06	GEO			HOT SOIL	0	0			0.0	18		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01A_029.1	627658.500	2361184.9000	15.00	77.00	22.70						18	180	09/24/06	CD	0		WIRE	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01A_030	627661.300	2361182.5000	15.00	65.00	42.70						0	0	09/24/06	GEO	1		HOT ROCK	0	0			4.0	5		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01A_074	627679.300	2361173.7000	33.00	1.50	14.30						12	45	09/24/06	GEO	1		HOT ROCK	0	0			2.0	3		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01A_083	627669.100	2361183.8000	36.00	48.50	13.20						0	0	09/24/06	GEO	1		HOT ROCK	0	0			4.0	6		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_001	627635.600	2361198.7000	0.00	164.00	5.20						18	135	09/24/06	CD	0		Pin Flag near surface	0	0			0.1	0		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01B_006	627627.700	2361205.7000	0.30	199.00	19.20						0	0	09/24/06	CD	0		PIN FLAG ORIGINALLY COILED	0	0			1.0	1		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_011	627639.100	2361196.9000	3.00	151.50	12.60						18	45	09/24/06	CD	0		PIN FLAG NEAR SURFACE	0	0			0.1	0		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01B_014	627633.600	2361202.0000	4.00	176.20	13.90						12	110	09/24/06	GEO	1		HOT ROCK NEAR SURFACE	0	0			0.1	1		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_016	627642.200	2361195.4000	6.00	140.50	14.50						0	0	09/24/06	GEO			HOT SOIL	0	0			0.0	18		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_031	627630.800	2361208.8000	15.00	197.50	19.20						0	0	09/24/06	GEO	0		HOT ROCK	0	0			0.5	1		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01B_042	627632.700	2361210.8000	24.00	197.00	25.30						12	270	09/24/06	MD	1		Projectile Fuze	0	0			2.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01B_047	627636.700	2361208.5000	27.00	182.00	97.50						12	45	09/24/06	QA	3		QA Seed #QA5	0	0	NA	270	8.0	12	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_054	627641.600	2361205.4000	30.00	163.00	20.20						0	0	09/24/06	GEO	1		HOT ROCK NEAR SURFACE	0	0			0.1	1		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_065	627635.000	2361213.6000	36.00	197.00	6.00						0	0	09/24/06	CD	0		PIN FALG NEAR SURFACE	0	0			0.1	0	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01B_074	627639.000	2361212.4000	42.00	184.50	7.70						0	0	09/24/06	GEO			HOT SOIL	0	0			0.0	18		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01C_003	627621.000	2361211.4000	0.20	228.20	11.50						0	0	09/24/06	CD	0		MULTIPLE BROKEN PIN FLAG	0	0			0.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01C_005	627625.200	2361210.1000	6.00	214.50	18.40						12	45	09/24/06	MD	1		2 PIECES OF HE FRAG	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01C_006	627622.600	2361212.3000	6.00	226.00	16.80						0	0	09/24/06	MD	1		2 PIECES OF HE FRAG	0	0			2.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-01C_019	627622.900	2361216.8000	18.00	234.50	24.30						0	0	09/24/06	CD	0		PIN FALG NEAR SURFACE	0	0			0.1	0	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-01C_020	627626.800	2361213.5000	18.00	217.50	6.00						0	0	09/24/06	GEO	0		HOT ROCK	0	0			4.0	5		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-07_004	627659.870	2361173.2840	0.39	50.86	13.40						0	0	09/24/06	GEO			HOT SOIL	0	0			0.0	18		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-07_014	627668.726	2361169.0000	9.00	19.00	6.80						0	0	09/24/06	GEO	100		HOT ROCK	0	0			0.0	0		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/24/2006
01-07_020	627652.002	2361183.9730	11.36	91.48	106.50									QA			SAME AS 01-01A_001 - SEED #QA6														DRA	9/28/2006
01-09_002	627614.564	2361213.6950	0.25	49.42	14.60						0	0	09/24/06	CD	0		PIN FLAG	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-09_006	627615.366	2361214.7260	6.00	49.50	41.00						12	335	09/24/06	CD	0		PIN FLAG	0	0			5.0	5	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-09_010	627620.356	2361211.2360	8.83	29.11	12.90						0	0	09/24/06	CD	0		PIN FLAG	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/24/2006
01-20_010	627641.876	2361268.6530	52.50	3.00	62.20						0	0	09/26/06	Geo			Hot Soil	0	0			36.0	36		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_017	627643.627	2361271.4440	63.00	6.00	98.40						0	0	09/26/06	CD	3		S Crank Rod	0	0			3.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
01-20_021	627651.505	2361278.4770	98.00	6.00	380.70						0	0	09/26/06	CD	10		Tin Roofing	0	0			0.0	0	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_028	627641.102	2361270.4180	54.50	9.00	53.30						0	0	09/26/06	GEO			Hot Soil	0	0			0.0	24		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_062	627644.805	2361278.6440	82.00	21.00	50.00						0	0	09/26/06	CD	5		Twisted Wire	0	0			3.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_063	627637.644	2361272.2430	50.00	21.00	40.80						0	0	09/26/06	GEO	1		Hot Rock	0	0			3.0	3		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_085	627631.796	2361270.6970	32.00	30.00	95.00						0	0	09/26/06	GEO			Hot Soil	0	0			0.0	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	11/20/2006
01-20_139	627635.349	2361281.2100	64.39	47.89	150.60						0	0	09/26/06	GEO			Hot Soil	0	0			0.0	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_211	627620.339	2361277.6300	18.50	72.00	92.10						0	0	09/26/06	CD			Caulk Gun					4.0	4	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_222	627623.460	2361281.6640	35.50	75.00	2735.30						0	0	09/26/06	CD			Trash Pile - ~200lbs Metal Debris	0	0			3.0	5	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_227	627621.447	2361281.4950	30.00	79.00	732.60						0	0	09/26/06	CD			Trash Pile - ~200lbs Metal Debris	0	0			2.0		C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_236	627623.056	2361284.9940	42.00	84.00	30.90						0	0	09/26/06	CD			Trash Pile - ~200lbs Metal Debris	0	0			3.0		no photo	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_250	627618.570	2361283.4210	27.00	90.00	360.30						0	0	09/26/06	CD			Trash Pile - ~200lbs Metal Debris	0	0			6.0		C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_259	627623.486	2361289.1060	52.45	93.07	592.40						0	0	09/26/06	CD			Trash Pile - ~200lbs Metal Debris	0	0			2.0			9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-20_268	627611.181	2361280.2840	0.93	98.57	158.30						0	0	09/26/06	GEO			Hot Soil	0	0				18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	11/20/2006
01-22_025	627611.658	2361284.8820	12.50	9.00	12.20						0	0	38986	GEO			Hot Soil	0	0				18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
01-22_028	627616.897	2361289.6020	36.50	9.00	13.30						0	0	38986	GEO			Hot Soil	0	0				18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
01-22_052	627620.089	2361296.0660	58.50	18.00	32.20						0	0	38986	GEO			Hot Rock	0	0				10		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
01-22_128	627613.702	2361299.8730	49.50	42.00	49.30						0	0	38986	GEO			Hot Rock	0	0				18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi² Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi² Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
01-22_146	627609.909	2361298.8810	37.79	48.10	41.90						0	0	38986	CD			Metal Rod	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
01-22_206	627610.478	2361306.6090	54.66	66.19	50.50						0	0	38986	GEO	1		Hot Rock	0	0			8.0	10		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
01-22_225	627603.926	2361305.3990	36.00	78.00	28.30						0	0	38986	GEO	5		Hot Rock	0	0			1.0	1		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
01-22_263	627614.033	2361319.3330	87.50	90.00	13.60						0	0	38986	GEO			Hot Rock	0	0			2.0	2		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
03-01_008	627841.091	2360910.4900	3.00	22.50	24.90						0	0	38983	GEO			Hot Soil	0	0			0.0	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
03-01_020	627822.180	2360921.9540	6.00	94.50	27.70						12	180	38983	GEO	1		Hot Rock	0	0			2.0	3		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
03-01_031	627845.602	2360911.0470	12.00	10.50	47.60						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
03-01_036	627837.409	2360915.5730	12.00	41.00	25.20						0	0	38983	CD	0		Metal Flakes	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
03-01_040	627831.983	2360919.0790	13.50	62.00	10.10						0	0	38983	GEO			Hot Soil	0	0			0.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-01_044	627843.747	2360913.0870	15.00	19.00	27.80						0	0	38983	GEO			Hot Soil	0	0			0.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-01_050	627847.265	2360912.1600	18.00	7.50	71.00						16	135	38983	GEO	1		Hot Rock	0	0			3.0	3		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
03-01_075	627835.390	2360921.7700	27.00	56.50	7463.60						0	0	38983	CD	200		Trash Pit	0	0			1.0	12	C:\Projects\Pali EECA\Photos_Dig\	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
03-01_078	627837.619	2360921.0470	28.50	49.00	36.50						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-01_105	627836.302	2360924.4590	36.42	58.12	40.80						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-01_200	627834.252	2360935.6110	66.00	81.50	9.50						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
03-01_235	627836.360	2360940.7140	84.50	83.50	28.70						0	0	38983	GEO			Hot Rock	0	0			2.0	2		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_008	627793.173	2360935.0970	0.57	99.53	56.00						0	0	38983	QC			QC Corner Nails and Geology	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	11/20/2006
03-02_015	627817.387	2360923.6400	3.50	11.00	13.40						0	0	38983	GEO			Hot Rock	0	0			0.0	0		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_022	627805.240	2360930.7130	6.00	57.50							0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_034	627796.254	2360936.3300	9.00	92.50	187.10						0	0	38983	CD			Angle Iron	0	0			3.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
03-02_038	627806.092	2360932.2780	12.00	57.50	15.00						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_093	627811.476	2360935.5180	30.00	47.00	8.40						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_143	627808.644	2360942.9860	48.00	67.00	40.60						0	0	39035	GEO			Amomaly occurred over mounded soil ~1.5' height, 2' diam					18.0	18		11/14/2006	JF				YES	DRA	11/20/2006
03-02_146	627806.488	2360944.0970	48.00	75.00	45.40						0	0	39035	GEO			Amomaly occurred over mounded soil ~1.5' height, 1.5' diam					18.0	18		11/14/2006	JF				YES	DRA	11/20/2006
03-02_194	627802.639	2360952.1370	66.12	98.78	58.40						0	0	38983	GEO	1		hot rock	0	0			2.0	3	No Photo	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_198	627813.648	2360947.4230	69.00	59.50	23.60						0	0	38983	GEO			hot soil	0	0			0.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_199	627802.851	2360952.9920	69.00	99.50	59.50						0	0	38983	GEO	1		hot rock	0	0			1.0	3		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_210	627815.424	2360947.5090	72.00	54.50	11.60						24	30	38983	GEO			hot soil	0	0			0.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_243	627805.395	2360957.7010	87.00	99.50	37.00						24	215	38983	GEO	1		Hot Rock	0	0			4.0	5	NO PHOTO	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_246	627816.630	2360952.9010	90.00	59.50	34.30						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_267	627807.184	2360959.7790	95.97	97.57	45.60						0	0	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
03-02_272	627831.409	2360947.2680	96.00	8.00	60.50						12	180	38983	GEO			Hot Soil	0	0			18.0	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
04-01A_001	627764.600	2360965.2000	0.00	11.60	3.40						0	0	38982	GEO	1		Hot rock	0	0			3.0	5		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/26/2006
04-01A_007	627758.200	2360973.4000	3.00	46.00	42.90						0	0	38982	GEO	1		Hot Rock	0	0			2.0	2		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/26/2006
04-01A_021	627748.100	2360985.8000	6.00	98.50	32.50						0	0	38982	NC			NC with Mindlab/White	0	0			18.0	18	No Photo	9/22/2006	LH	YES	CR	9/22/2006		DRA	9/28/2006
04-01A_049	627759.800	2360978.3000	18.00	54.50	107.60						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_052	627754.800	2360983.8000	18.00	79.00	51.10						0	0	38982	CD	1		Wire	0	0			2.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_058	627761.300	2360978.1000	21.00	50.50	55.50						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_059	627763.500	2360975.6000	21.00	39.50	49.40						0	0	38982	CD	1		Wire	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_071	627772.600	2360968.4000	27.00	2.00	117.40						12	0	38982	GEO			hot soil	0	0			0.0	18		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/26/2006
04-01A_073	627766.200	2360975.4000	27.00	33.00	63.00						0	0	38982	CD	1		Wire	0	0			2.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_081	627755.400	2360988.5000	30.00	89.00	41.10						0	0	38982	CD	1		Wire	0	0			4.0	4	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_099	627761.100	2360984.9000	36.00	67.50	111.80						0	0	38982	CD	1		Wire	0	0			3.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_101	627764.300	2360982.7000	39.00	55.00	79.20						0	0	38982	CD	1		Wire	0	0			2.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_102	627767.300	2360979.5000	39.00	40.50	68.90						0	0	38982	CD	1		Wire	0	0			2.0	3	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_109	627769.100	2360978.8000	42.00	35.00	58.20						0	0	38982	GEO			hot soil	0	0			0.0	18		9/22/2006	LH	YES	CR	9/22/2006	FAIR	DRA	11/20/2006
04-01A_126	627762.800	2360988.3000	48.00	72.00	84.70						0	0	38982	CD	1		WIRE	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	11/20/2006
04-01A_148	627776.900	2360975.6000	54.00	10.00	57.90						0	0	38982	GEO			Hot soil	0	0			0.0	18		9/22/2006	LH	YES	CR	9/22/2006	FAIR	DRA	9/26/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
04-01A_149	627766.400	2360987.1000	54.00	61.00	65.40						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_150	627758.900	2360995.2000	54.00	97.50	94.70						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_151	627761.300	2360992.7000	54.00	86.00	7.70						0	0	38982	CD	0		Small wire	0	0			1.0	1		9/22/2006	LH	YES	CR	9/22/2006		DRA	9/28/2006
04-01A_153	627772.800	2360980.1000	54.00	30.00	20.70						0	0	38982	CD	1		Wire	0	0			1.0	1		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_159	627764.400	2360990.6000	57.00	74.00	52.60						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_169	627771.600	2360984.1000	60.00	42.50	11.70						0	0	38982	GEO	5		Hot Rock	0	0			4.0	6		9/22/2006	LH	YES	CR	9/22/2006	FAIR	DRA	9/26/2006
04-01A_176	627767.700	2360989.7000	63.00	64.50	150.30						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_177	627766.000	2360991.6000	63.00	73.00	69.20						0	0	38982	CD	1+		Long Wire - LIG	0	0			0.5	5	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_188	627761.700	2360997.5000	66.00	97.00	51.20						0	0	38982	CD	1		Wire	0	0			2.0	3	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_201	627764.500	2360997.2000	72.00	90.00	67.00						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_221	627773.900	2360989.5000	78.00	50.50	67.40						0	0	38982	CD	1		Wire	0	0			2.0	3	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_235	627765.600	2361001.3000	84.00	97.50	82.90						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_267	627778.500	2360991.2000	93.00	44.50	73.10						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01A_273	627785.900	2360984.4000	96.00	11.50	140.00						0	0	39035	CD	1		WIRE	0	0			0.5	1		11/14/2006	JF	YES			GOOD	DRA	11/20/2006
04-01A_277	627778.200	2360992.8000	96.00	49.00	75.10						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	11/20/2006
04-01A_281	627788.700	2360982.6000	98.50	0.80	146.20						0	0	38982	CD	1		Wire	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_007	627789.500	2360983.1000	102.00	0.20	51.40						0	0	38982	GEO			Hot Soil	0	0			0.0	18		9/22/2006	LH	YES	CR	9/22/2006	FAIR	DRA	9/26/2006
04-01B_008	627774.300	2361000.0000	102.70	75.20	85.60						0	0	38982	CD	1		Wire	0	0			1.0	3	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_011	627785.300	2360989.0000	105.00	24.00	54.90						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_016	627776.200	2361000.4000	108.00	72.00	38.90						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_018	627777.900	2360998.5000	108.00	63.50	91.20						0	0	38982	CD	1		Wire	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_029	627772.000	2361006.3000	111.00	95.50	120.90						0	0	38982	CD	1		Wire	0	0			2.0	4		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_067	627775.100	2361009.5000	126.00	96.50	59.00						0	0	38982	CD	1		Wire	0	0			1.0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_072	627793.200	2360989.8000	126.00	8.50	66.60						0	0	38982	CD	1		Wire	0	0			1.0	2	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_084	627788.200	2360997.8000	132.00	39.00	83.80						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_090	627785.800	2361001.8000	135.00	54.00	78.00						0	0	38982	CD	0		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_106	627796.700	2360992.6000	141.00	7.50	80.90						0	0	38982	CD	1		Wire	0	0			0.5	1		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_118	627785.600	2361007.4000	147.00	68.00	104.30						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_143	627800.400	2360995.2000	156.00	5.50	53.50						0	0	38982	CD	1		Wire	0	0			0.5	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_151	627782.50	2361016.20	159.00	96.50	97.00						0	0	38982	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_182	627785.50	2361018.20	171.00	94.50	76.00						0	0	38982	CD	1		Wire / Nail	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_191	627793.30	2361011.00	174.00	60.00	55.20						0	0	38982	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-01B_192	627795.90	2361008.10	174.00	47.00	68.10						0	0	38982	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	9/28/2006
04-02A_001	627744.10	2360987.60	0.30	11.90	36.40						12	270	38983	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_003	627726.20	2361007.50	0.50	99.40	9.20						0	0	38983	GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_006	627733.50	2361000.40	2.70	66.30	11.20						0	0	38983	GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_048	627746.40	2360994.20	20.70	22.70	18.00						12	180	38983	CD	1		Wire	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_050	627745.90	2360994.90	21.00	25.50	21.60						12	0	38983	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_053	627732.50	2361009.70	21.00	91.00	31.20						0	0	38983	GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_056	627739.90	2361001.40	21.00	54.50	28.20						0	0	38983	GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_057	627750.40	2360990.30	22.00	4.50	28.40						12	90	38983	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_058	627745.90	2360996.20	24.00	28.50	13.60						0	0	38983	GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_086	627736.00	2361011.20	33.00	87.00	19.00						0	0	38983	CD	2		Hot Rock	0	0			0	0		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_093	627754.20	2360992.10	35.40	0.50	17.40						0	0	38983	GEO	3		Hot Rock	0	0			0	0		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_094	627747.80	2360999.40	35.80	32.30	19.30						0	0	38983	CD	0		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_102	627754.30	2360993.50	38.50	3.50	22.10						0	0	38983	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_103	627747.20	2361001.40	39.00	38.40	12.60						0	0	38983	CD	0		Wire	0	0			4	4	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_142	627756.30	2360996.70	50.70	6.80	11.90						0	0	38983	CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
04-02A_143	627745.70	2361008.50	51.00	59.00	25.30						0	0	38983 GEO	1		Hot Rocks	0	0			4	4		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_147	627747.90	2361006.00	51.00	48.00	21.90						0	0	38983 GEO			Hot Rocks	0	0			5	5		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_152	627758.10	2360995.70	52.90	0.50	21.10						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_187	627752.50	2361006.30	62.90	38.50	17.90						0	0	38983 GEO			hot soil	0	0			0	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_201	627756.50	2361003.50	66.40	22.90	19.30						0	0	38983 CD	1		Wire	0	0			1	4	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_208	627760.90	2361000.90	71.50	7.00	11.30						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_224	627759.40	2361004.30	75.50	18.50	22.30						0	0	38983 CD	1		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_240	627764.00	2361002.30	82.50	3.50	29.00						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_246	627757.80	2361009.90	84.00	35.50	5.00						0	0	38983 CD	0		Wire	0	0			3	3		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_253	627759.90	2361008.90	87.00	28.50	28.90						0	0	38983 CD	1		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02A_254	627752.60	2361017.00	87.00	64.50	20.40						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02A_258	627763.90	2361005.90	90.00	12.50	16.20						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02B_070	627723.60	2361026.20	36.00	150.50	16.90						0	0	38983 GEO	1		Hot Rock	0	0			12	12		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02B_092	627735.70	2361018.20	48.00	104.50	4.20						0	0	38983 GEO	1		Hot Rock	0	0			4	4		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02B_099	627734.10	2361021.30	51.00	115.50	41.70						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02B_156	627738.50	2361027.20	75.00	120.50	11.20						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02B_188	627735.60	2361035.70	87.00	147.50	36.80						0	0	38983 GEO	2		Hot Rock	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02B_203	627735.50	2361038.50	93.00	154.50	44.20						0	0	38983 GEO	3		Hot Rocks	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02B_207	627728.70	2361047.40	96.00	191.00	15.20						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02C_020	627767.20	2361010.20	107.90	15.90	19.60						0	0	38983 CD	0		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_107	627772.10	2361015.60	132.00	18.00	246.60						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_127	627762.70	2361028.60	138.00	70.50	7.90						0	0	38983 GEO	1		Hot Rock	0	0			6	6		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02C_128	627771.60	2361018.80	138.00	27.00	50.90						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_136	627775.40	2361015.90	141.00	11.50	127.50						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_147	627770.50	2361022.70	144.00	39.00	60.00						0	0	38982 CD	1		WIRE	0	0			1	1		9/22/2006	LH	YES	CR	9/22/2006	GOOD	DRA	10/10/2006
04-02C_168	627773.30	2361022.30	150.00	31.50	132.50						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_169	627760.20	2361036.80	150.00	96.00	35.80						0	0	38983 CD	1		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_279	627779.20	2361030.50	183.00	38.50	39.30						0	0	38983 CD	1		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02C_288	627786.10	2361023.00	183.20	4.90	62.50						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	10/10/2006
04-02D_029	627748.70	2361032.00	111.00	109.50	22.80						12	135	38983 GEO	1		Hot Rock	0	0			4	4		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02D_036	627736.30	2361047.00	114.00	173.50	22.60						0	0	38983 GEO	1		Hot Rocks	0	0			2	2		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02D_050	627743.70	2361041.60	120.00	144.00	50.60						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02D_055	627739.00	2361048.10	123.00	170.00	25.40						0	0	38983 GEO	2		Hot Rock	0	0			0	0		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02D_202	627759.00	2361048.80	174.00	128.00	30.10						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02D_227	627747.00	2361066.10	183.00	196.50	13.50						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-02D_233	627751.60	2361062.30	186.00	177.00	26.70						0	0	38983 CD	0		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02E_005	627776.40	2361041.70	201.00	72.00	13.60						0	0	38983 CD	0		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-02F_004	627750.10	2361070.70	201.00	201.00	10.20						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-04_003	627694.60	2361042.25	0.34	53.99	11.80						0	0	38983 GEO	2		Hot Rock	0	0			2	2		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-04_025	627699.56	2361044.69	18.00	49.00	21.90						0	0	38983 GEO	2		Hot Rocks	0	0			2	2		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-04_041	627706.33	2361041.25	27.00	25.50	27.80						0	0	38983 CD	0		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-04_093	627719.44	2361042.91	63.00	0.50	47.40						0	0	38983 GEO	1		Hot Rock	0	0			2	2		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09A_011	627776.40	2361042.50	3.00	74.00	16.30						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09A_019	627791.40	2361026.20	3.30	1.10	37.20						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/26/2006
04-09A_046	627774.80	2361048.40	12.00	92.00	30.90						0	0	38983 CD	1		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-09A_059	627793.80	2361030.20	18.00	5.50	41.30						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09A_132	627793.20	2361043.20	45.00	38.50	41.50						0	0	38983 GEO	2		Hot Rock	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09A_135	627792.10	2361045.80	48.00	47.00	20.60						0	0	38983 CD	0		Survey Nail	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/28/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
04-09A_138	627799.20	2361039.30	51.00	15.50	33.20						0	0	38983 MD	0		Frag	0	0			3	3	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-09A_144	627798.20	2361042.00	54.50	24.00	40.90						0	0	38983 CD	0		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-09B_005	627750.30	2361070.10	0.20	199.10	26.20						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09B_018	627753.90	2361067.40	3.00	184.50	3.30						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09B_027	627762.30	2361060.90	9.00	150.00	24.40						0	0	38983 GEO	1		Hot Rock	0	0			4	4		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-09B_065	627772.70	2361054.90	21.00	112.50	158.20						0	0	38983 CD	5		Pick Axe Head	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-09B_075	627766.20	2361063.40	24.00	147.50	46.70						0	0	38983 CD	1		Wire	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-09B_086	627776.50	2361054.80	30.00	104.00	23.70						0	0	38983 GEO	1		Hot Rock	0	0			4	4		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-23_001	627798.76	2361016.59	0.09	61.35	7.70						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
04-23_019	627794.12	2361024.35	6.00	90.50	47.00						0	0	38983 CD	0		Wire	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-23_084	627802.03	2361029.17	36.00	84.50	32.80						0	0	38983 CD	0		Wire coil	0	0			1	1		9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	9/28/2006
04-23_111	627811.61	2361024.17	48.00	51.00	61.30						12	45	38983 CD	0		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/23/2006	LH	YES	CR	9/23/2006	GOOD	DRA	10/10/2006
04-23_145	627808.98	2361036.40	69.00	86.50	53.90						0	0	38983 GEO			Hot Soil	0	0			18	18		9/23/2006	LH	YES	CR	9/23/2006	FAIR	DRA	9/26/2006
06-01_014	626572.10	2360755.90	3.00	49.00	10.40						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_037	626585.70	2360752.30	12.00	1.40	11.40						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_048	626567.00	2360763.50	18.00	76.00	17.30						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_054	626577.50	2360758.30	18.00	36.00	12.00						0	0	38986 GEO	1		Hot Rock	0	0			4	5		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_067	626584.10	2360757.10	24.00	13.50	6.70						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_076	626574.80	2360762.70	27.00	50.50	77.40						0	0	38986 MD	10		75mm Shrap. Round (expended)	0	0			14	16	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-01_077	626581.60	2360760.30	29.90	26.20	12.10						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_175	626585.30	2360769.70	63.10	28.60	28.50						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_185	626581.60	2360773.50	69.00	45.50	39.70						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_207	626592.50	2360772.10	81.00	10.50	43.40						0	0	38986 MD	1		Frag	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-01_241	626583.10	2360780.80	93.00	51.50	22.20						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-01_243	626589.80	2360778.50	96.00	28.00	34.30								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-02_007	626531.75	2360775.61	3.00	96.50	255.30						0	0	38986 SA	2		M16 magazine/ 5.56 cartridges	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-02_008	626558.78	2360762.53	3.00	0.50	36.10						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_021	626548.83	2360769.36	9.00	38.50	17.90						0	0	38986 CD	2		Metal Rod	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-02_028	626532.09	2360778.48	12.00	99.50	35.10						0	0	38986 CD	0		Wire	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-02_038	626544.40	2360773.52	15.00	57.00	13.80						0	0	38986 CD	1		Metal	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-02_061	626533.66	2360781.75	24.00	99.50	35.20								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-02_062	626555.85	2360771.02	24.08	20.21	13.10						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
06-02_064	626537.13	2360781.08	27.00	88.50	369.00						0	0	38986 MD	10		75mm Shrap. Round (expended)	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-02_078	626549.86	2360775.95	30.09	44.35	13.40								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				GOOD	DRA	9/26/2006
06-02_085	626562.47	2360770.82	33.00	0.50	20.40								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-02_102	626563.20	2360772.47	39.00	0.50	22.40								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-02_134	626537.61	2360789.94	54.00	99.50	19.10						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_168	626546.06	2360790.88	69.00	76.00	5.40						0	0	38986 MD	1		FUZE PORTION	0	0			0	1	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	POOR	DRA	9/28/2006
06-02_179	626545.19	2360793.33	75.00	82.00	16.60						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_202	626568.37	2360784.08	81.00	0.50	39.00						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_203	626541.71	2360797.04	81.00	97.50	15.20						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_235	626555.74	2360794.26	93.00	52.00	32.30						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-02_237	626566.01	2360789.26	93.00	14.50	29.70						0	0	38986 NC			NC with Mindlab/White	0	0						9/26/2006	LH	YES	CR	9/26/2006		DRA	9/28/2006
06-03_003	626525.68	2360777.45	0.07	16.93	41.80						0	0	39035 CD	1		Metal					2	3		11/14/2006	JF				Y	DRA	11/20/2006
06-03_107	626527.94	2360794.35	54.00	34.50	79.00						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	11/20/2006
06-03_108	626520.69	2360797.82	54.50	61.00	5.20						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
06-03_110	626530.96	2360793.97	57.00	25.00	52.30						0	0	39035 GEO			Hot Soil	0	0			18	18		11/14/2006	JF				FAIR	DRA	11/20/2006
06-03_115	626519.76	2360800.06	60.00	67.00	90.90						0	0	38986 QA	3		QA Seed Item QA3	0	0			6	6	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

Unique Target ID	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	Ch1 Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
06-03_153	626522.30	2360804.88	78.00	66.50	30.40						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-03_159	626537.30	2360799.06	81.00	13.50	268.20						0	0	38986	CD			NRCS/USGS EROSION Survey	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	10/10/2006
06-03_173	626525.15	2360806.57	87.00	60.50	36.20						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-05_001	626580.04	2360784.71	0.03	66.02	39.00						12	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-05_004	626571.05	2360789.21	0.14	99.32	13.60						0	0	38986	CD	0		Survey Nail	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	10/10/2006
06-05_039	626594.68	2360782.45	15.00	19.00	31.40									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-05_056	626599.90	2360782.87	24.00	4.00	27.80									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-05_114	626601.23	2360789.21	45.00	9.00	21.60									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-05_123	626588.21	2360796.72	48.50	58.50	15.10									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-05_126	626587.16	2360798.06	51.00	63.50	48.20									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	11/20/2006
06-05_130	626591.79	2360795.80	51.00	46.50	16.40									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-05_147	626580.26	2360804.37	60.00	93.00	48.80						0	0	38986	MD	2		37mm AP-T (inert)	0	0			6	6	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-05_227	626584.43	2360812.20	90.00	91.50	44.80									NC			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH	YES	CR	9/26/2006	Y	DRA	11/20/2006
06-06_031	626552.18	2360801.29	9.00	72.50	14.60						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-06_032	626562.42	2360796.45	9.41	35.15	5.20						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-06_059	626552.60	2360805.01	21.00	76.50	13.90						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH				FAIR	DRA	9/26/2006
06-06_080	626557.04	2360804.82	27.00	63.00	37.20						0	0	39035	NC			Contact within Rill Erosion								11/14/2006	JF				Faiir	DRA	11/20/2006
06-06_082	626563.11	2360802.67	29.45	41.89	5.80						0	0	38986	MD	1		75mm Pusher Plate	0	0			1	1		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-06_105	626559.82	2360806.41	36.00	57.00	36.50									NC			contact within rill erosion								11/14/2006	JF				FAIR	DRA	11/20/2006
06-06_124	626559.32	2360809.60	45.00	63.00	45.50						0	0	39035	NC			Contact within Rill Erosion								11/14/2006	JF				Faiir	DRA	11/20/2006
06-06_175	626572.20	2360809.25	63.00	24.00	10.90									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-06_192	626551.93	2360820.14	66.36	100.08	33.70						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-06_264	626577.83	2360817.34	96.00	18.50	51.90						0	0	39035	GEO			Hot Rock					3	3		11/14/2006	JF				GOOD	DRA	11/20/2006
06-06_271	626567.27	2360823.43	99.07	58.87	5.00									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-07_027	626526.50	2360813.16	9.00	66.00	32.50						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_087	626543.53	2360815.13	39.00	18.00	198.00						0	0	38986	QA			QA Item recovered upon reinspe	0	0						11/14/2006	JF	YES			Y	DRA	11/20/2006
06-07_088	626535.68	2360818.68	39.00	46.50	12.70						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_094	626549.10	2360814.54	45.00	0.50	66.50									NC																Y	DRA	11/20/2006
06-07_105	626536.83	2360821.06	48.00	46.50	12.00						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_107	626529.67	2360824.30	48.00	72.50	36.90						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_124	626546.64	2360819.52	57.00	15.00	8.40						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_150	626542.21	2360826.36	72.00	38.00	19.50						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-07_169	626540.57	2360830.97	84.00	49.50	22.70						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_003	626556.54	2360828.92	0.09	98.91	12.90						0	0	38986	GEO			Hot Soil/Rocks	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_011	626583.74	2360817.56	5.28	1.04	13.10						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_012	626565.95	2360826.37	6.00	67.00	16.80						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_019	626577.04	2360822.03	9.00	27.50	6.90						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_046	626566.37	2360831.18	21.00	72.50	32.50						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_083	626583.15	2360830.12	42.00	20.50	15.20						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_106	626581.35	2360835.16	54.50	33.00	18.10						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_110	626587.88	2360833.85	60.00	11.50	30.1						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-10_115	626585.41	2360836.04	63.00	22.00	47.2						0	0	38986	GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
06-11_015	626584.81	2360816.31	3.06	96.10	12.2						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_047	626604.39	2360810.94	15.00	30.50	16						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_051	626599.02	2360813.51	15.00	50.00	38.6						0	0	38986	MD	1		Projo Fuze	0	0			2	2		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-11_057	626592.12	2360817.81	18.00	76.50	18.1									GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-11_081	626610.96	2360811.82	27.00	12.50	21.4						0	0	38986	GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_103	626609.41	2360815.57	36.00	22.50	51.4						6	0	39035	CD	1		Metal	0	0			3	3		11/14/2006	JF	YES			YES	DRA	11/20/2006

Zapata Incorporated
Geophysical Dig Sheet and Target History

Project Name: Pali Training Camp, Maunawili Valley Impact Area
Project Location: Oahu, Hawaii
Date:
Coordinate System: UTM, Zone 4, NAD 83
Survey Area ID: NA
Sector: Grid:
Field Book ID:

Geophysical Contractor: Zapata Incorporated/ Blackhawk Geophysics
Project Geophysicist: Jim Hild
Site Geophysicist: Rich Blohm
Field Team:
COE Design Center POC: Chad Berthelson
COE Project Engineer:
COE Geophysicist: Debbie Edwards

Geophysical Equipment Used	Component	Serial #	Grid Background Value (mV / nT)	Date	Time

	Original Survey								Reacquisition Survey					Dig Results												Post-Dig UXO QC Results			Post-Dig Geophysical QC		
Unique Target ID	Easting Coord. (ft.)	Northing Coord. (ft.)	Local X (ft)	Local Y (ft)	Max Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Associate Target ID	Date	$Ch1$ Amplitude Response (mV)	Chi^2 Amplitude Response (mV)	Offset X Distance (in)	Offset Y Distance (in)	Date	Anomaly type ***	Approx. weight (lbs)	Dimensions: Length, Width, Height (in)	Comments	Offset X Distance (in)	Offset Direction	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Depth (in) Top of Item	Depth (in) Center of Mass	Digital Photo Filename **	Date	Team Leader Initials	Excavation Hole Cleared?	UXO QC Spec. Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, A=avg, P=poor,	Geophysicist QC Initials	Date
06-11_107	626602.74	2360819.75	39.00	48.00	35.7						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_131	626605.34	2360820.52	45.00	41.50	12.1						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_145	626607.52	2360821.49	51.00	36.50	37.8						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-11_188	626617.64	2360820.69	63.00	6.00	18						0	0	38986 SA		0	5.56 BLANKS	0	0						9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/28/2006
06-11_274	626595.49	2360841.22	93.00	99.00	86						0	0	38986 MD		1	Shrap Round Fuze	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-14B_014	626590.99	2360851.87	18.00	128.50	10.8						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-14B_038	626593.02	2360860.79	48.00	135.00	17.6						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-14B_041	626602.86	2360856.95	50.71	100.82	11.9						12	45	38986 CD		0	Hunting Arrow	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-15_020	626616.26	2360804.19	12.00	85.50	16						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-15_057	626634.38	2360801.27	30.00	27.50	24.7						0	0	38986 MD		1	Expended Fuze	0	0			6	6	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-15_068	626628.48	2360806.23	36.00	52.50	12.7						0	0	38986 CD		1	FUEL CAN LID	0	0			1	2		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-15_083	626631.08	2360806.95	42.00	46.00	11.3						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-15_113	626642.40	2360805.31	54.00	10.50	11.8						18	0	38986 CD		1	Metal	0	0			3	3	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-15_127	626623.06	2360816.85	59.50	84.50	13.3						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/26/2006
06-17_006	626638.72	2360791.95	8.76	50.00	37								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	11/20/2006
06-17_021	626646.35	2360792.21	21.00	28.50	9.4								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-17_045	626644.39	2360802.31	47.93	49.99	26.3						0	0	38986 MD		1	Frag	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-32A_004	626559.70	2360732.90	15.00	49.50	48.4						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-32A_017	626553.20	2360739.60	24.50	80.50	27.6						0	0	38986 SA		2	SEVERAL 30.06 cartridge (exper	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/28/2006
06-32A_045	626555.20	2360745.40	45.00	83.00	17.6								GEO			Contact with Schonstaad, but NC with White/Mindlab								9/26/2006	LH				FAIR	DRA	9/26/2006
06-32A_110	626562.60	2360757.50	93.00	78.50	56.7						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-32A_123	626574.50	2360752.70	96.00	35.50	19.6						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-32B_021	626545.70	2360745.40	30.10	111.20	28.7						0	0	38986 GEO			Hot Soil	0	0			0	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-32B_023	626550.90	2360756.60	72.50	111.90	10.2						0	0	38986 NC			Checked with Schonstead, white	0	0												DRA	9/28/2006
06-32B_032	626548.40	2360756.70	69.00	119.50	2993.5						0	0	38986 CD		150	Towing cable	0	0			0	0	C:\Projects\Pali EECA\Photos_Dig\I	9/26/2006	LH	YES	CR	9/26/2006	GOOD	DRA	9/28/2006
06-32B_037	626549.00	2360759.70	79.00	122.00	23.1						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
06-32B_048	626545.20	2360760.30	75.00	134.00	103.6						0	0	38986 NC			Checked with Schonstead, white	0	0						9/26/2006	LH	YES	CR	9/26/2006	N	DRA	11/20/2006
06-32B_076	626538.00	2360770.60	96.00	170.50	17.8						0	0	38986 GEO			Hot Soil	0	0			18	18		9/26/2006	LH	YES	CR	9/26/2006	FAIR	DRA	9/26/2006
07-01_003	626874.60	2361015.27	0.15	26.99	7.1						0	0	38984 GEO		1	hot rock	-12	-6			3	6		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-01_016	626858.90	2361035.14	9.00	98.50	14.2						0	0	38984 MD		1	Frag	0	0			1	1	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-01_026	626884.05	2361012.23	15.00	0.50	28.9						0	0	38984 GEO		3	Hot Rocks (large area)	0	0			0	6		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-01_052	626882.73	2361020.20	30.00	18.00	13.3						0	0	38984 CD		4	Metal Rods	0	0			3	3	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-01_057	626880.56	2361023.71	33.00	29.50	13.4						0	0	38984 MD		1	PD Fuze	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-01_057.1	626880.56	2361023.71	33.00	29.50	13.4						0	0	38984 GEO		4	Hot rock	0	0			2	2		9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-01_089	626868.46	2361045.20	54.00	99.50	37.2						0	0	38984 GEO		1	Hot Rock	0	0			3	3		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-01_094	626887.82	2361025.62	54.00	16.50	25.7						0	0	38984 CD		2	Metal can and handle	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-01_127	626884.13	2361037.26	72.00	48.00	14.1						0	0	38984 GEO		5	Hot Rocks	0	0			1	1		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-01_143	626875.22	2361051.51	84.00	98.50	15						16	235	38984 GEO		3	Hot Rocks	0	0			1	1		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-03_001	626886.68	2361047.02	0.11	62.52	4.9						0	0	38984 GEO			Hot Soil	0	0			18	18		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-03_010	626898.44	2361037.80	6.00	16.00	12.3						0	0	38984 GEO		1	Hot Rocks	0	0			0	0		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-03_028	626899.53	2361042.03	18.00	24.00	42.9						0	0	38984 MD		5	Base end of 75mm Projo	0	0			6	6	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-03_053	626901.38	2361046.81	33.00	31.50	17.8						0	0	38984 CD		2	Metal Rod	0	0			3	3	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-03_088	626894.41	2361062.82	54.00	81.50	16.2						0	0	38984 GEO			Hot Soil	0	0			18	18		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-03_093	626911.07	2361047.82	57.00	15.00	237.4						0	0	38984 MD		10	75mm Shrap (expended)	0	0			4	4	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-03_157	626899.22	2361072.32	87.00	91.50	16.4						0	0	38984 MD		0	Frag	0	0			2	2	C:\Projects\Pali EECA\Photos_Dig\I	9/24/2006	LH	YES	CR	9/24/2006	GOOD	DRA	9/28/2006
07-03_170	626903.71	2361071.85	96.00	81.50	8						0	0	38984 GEO		1	Hot Rocks	0	0			0	6		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006
07-03_176	626917.54	2361058.59	96.03	26.92	32.3						0	0	38984 GEO		1	Hot Rocks	0	0			18	18		9/24/2006	LH	YES	CR	9/24/2006	FAIR	DRA	9/26/2006

APPENDIX J

Geophysical Data and Field Notes

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He'eia Combat Training Area Geophysical Field Notes

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BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002
706.DIS
~~File:~~ Grids : GPO

Daily Checklist

Date: 04/29/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	04/29/03	[initials]	Raw XYZ on Zap website	05/02/03	[initials]
Adjust lines and fiducials	04/29/03	[initials]	Split Files In Excel	04/30/03	[initials]
Create XYZ	04/29/03	[initials]			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	04/30/03	[initials]	Processed XYZ	05/01/03	[initials]
Determine Lag	04/30/03	"	Dig Sheets	05/01/03	[initials]
Create Map	04/30/03	"	Local & SP Maps	05/01/03	[initials]
Grid and Display Data	04/30/03	"	QC_tests.xls	[initials]	
Auto Pick Targets	04/30/03	"	Processing Log		
Review/Add Targets	04/30/03	"	Zapata spreadsheets		
Targets to Digsheet	04/30/03	"			
Warp Data to SP	05/01/03	"			
Create SP & Local Maps	05/01/03	"			
Correct Format of Files	05/01/03	"			

Total Area Of Data: GPO Total Targets: 34

Comments: GPO - Wheel Mode

Heeia Kea QC Tests

Date: _____ System: _____

AM Shake Test

File: 042903a XYZ: 042903-QC5-am_xyz

mV Range	
Ch1:	1.20 ± 1
ChT:	-0.599 ± 2

PM Shake Test

File: 042903d XYZ: 042903-QC5-pm_xyz

mV Range	
Ch1:	.2288 ± 1
ChT:	-.237 ± 2

AM Standard Test

File: 042903a XYZ: 042903-QC5-am_xyz

mV Range	Static 1	Standard	Static 2
Ch1:	-.397 ± 1	157.84 ± 2	-.172 ± 1
ChT:	-.82 ± 2	220.77 ± 3	-.813 ± 2

PM Standard Test

File: 042903d XYZ: 042903-QC5-pm-xyz

mV Range	Static 1	Standard	Static 2
Ch1:	1.09 ± 1	163.08 ± 2	1.43 ± 1
ChT:	-.328 ± 2	224.4 ± 2.5	-.58 ± 2

GPO Repeat Line Test

File: 042903b XYZ: 042903-QC10-xyz-pro

Locations	Local	State Plane
Line Start:	~~0, 6~~ 6, 0	1721714.76, 75571.76
Line End:	6, 300	1721701.23, 75811.58
Target:	6, 0; ~~6, 50~~ 6, 300	1721707.99, 75661.71

Attempted Lags: 1, 2, 1.5, 1.75 Actual Lag: 1.75

Peak Reading	Pass One	Pass Two
332 → Ch1:	~~149.67~~	~~150.67~~ 321.66
ChT:	174.84	171.24

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	6	6	1721708.01	1721710.96
Y	149.67	150.67	75661.34	75662.47

_____ Repeat Line Test

File: _____ XYZ: _____

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading	Pass One	Pass Two
Ch1:		
ChT:		

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X				
Y				

Daily Log and QC Testing

Date: 4/29/03 Page: ___ of ___

Blackhawk Field Personnel: R. Blottm, Vallpando SHAWNA, JAMES, RICH

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61MK2 Model: MK2 SN: 021927-3
Controller: PRO 4000 Model: P4216-EHJ SN: 1584
Top Coil: 1 X 0.5 Model: 1 X 0.5T SN: 0130 Height to Coil: 30 in
Bottom Coil: 1 X 0.5 Model: 1 X 0.5B SN: 0231 Height to Coil: 17 in

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0930 End Time: 09:45
Check Battery Voltage 13.01
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: 042903C Wheel Inc: 0.665 Time: _____ BATT LEVEL: 12.0

Line 1 NORTH/NO OBJ Line 2 SOUTH/NO OBJ Line 3 NORTH/OBJ @ 25

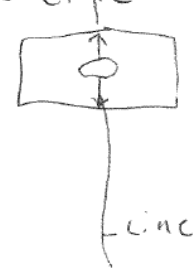
Line 4 SOUTH/OBJ @ 25 Line 5 NORTH/FAST OBJ Line 6 SOUTH/SLOW/OBJ

Length of lines: 50 ft Standard test item is on line: 3 & 4 & 5 & 6 @ 25F

Notes: (Sketch site, etc)

- Line 1 & 2 NO OBJECT (50ft) UP & BACK
- Line 3 (UP) & 4 (BACK) WITH OBJECT @ 25FT
- Line 5 UP FAST & 6 BACK SLOW WITH OBJECT @ 25FT

- MK2 OBJECT ORIENATED E/W ON LINE



wheel inc. = 0.665

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIAKIA **Project Location:** PROVE-OUT

Geophysical Contractor: BLKHAWK **Design Center POC:** _____

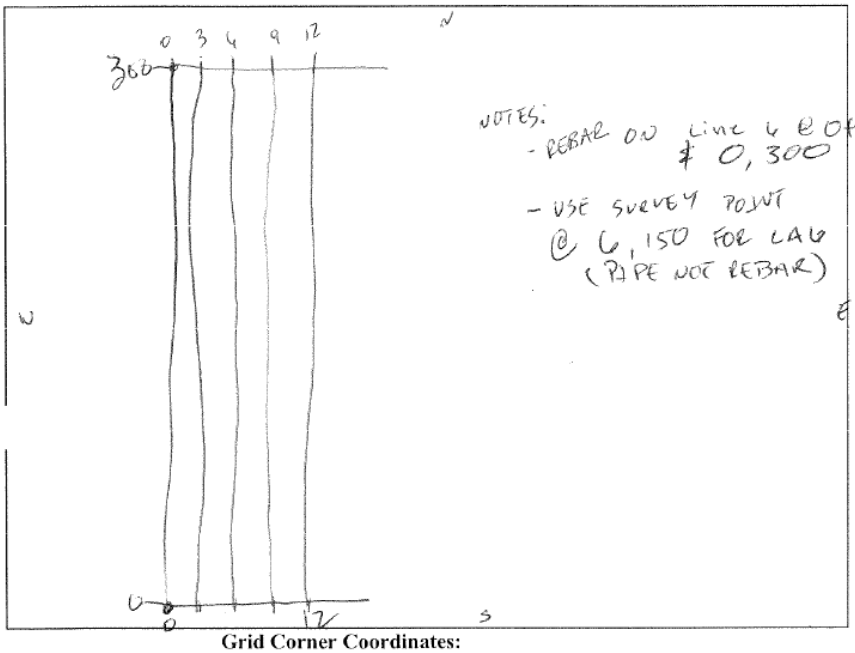
Project Geophysicist: DAVID SMITH **Site Geophysicist:** [redacted] RICH BLOHM

Survey Area ID: PROV-OUT **Date:** 4/29/03 **Field Team:** SHAWNA, JAMES, RICH [redacted]

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** ↑ N



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☒None ☐Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 300
NE	_____, _____	12, 300
SE	_____, _____	12, 0

	Start	End	File Name
Battery Voltage:	12.10	12.10	
Static Background Value:	0.5-1.0	0.5-1.0	A.042903
Static Response Value:	159	N/A	[redacted]A.042903
Instrument Clock Drift:	N/A		

both the same

Raw Data File Name: 042903B **LAG/Repeat Data File Name:** 042903B

Geophysical Instrumentation: EM61MK2 **Serial Number:** 021927-3

Base Station: N/A **Serial Number:** N/A

Navigation Method: [redacted] WHEEL MODE INC. = 0.665ft **Serial Number:** N/A

Additional Comments: PROVE-OUT PLACE IN OPEN FIELD

808-836-2213

AM Tests for Data Processing

Date: 4/24/03 Page: ___ of ___

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 042903a Battery Voltage: 12.20 Time: 11:32 Samples/Sec: 5ps

	Static	Standard	Static	Residual (standard minus static)
Channel 1-Bottom:	0.5	160	1.0	159
Channel 2-Bottom:	0.5	90	0.5	89.5
Channel 3-Bottom:	0.5	41	0.5	40.5
Channel 4-Top:	0.51	220	1.0	219

Location: PROVE OUT

~5 x Run Sec

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test) NO SPIKE

File Name: 042903D Battery Voltage: 12.0 Time: 1242 Samples/Sec: 5

	Static	Standard	Static	Residual (standard minus static)
Channel 1-Bottom:	0.5	161	0.5	160.5
Channel 2-Bottom:	-0.5	92	1.0	91
Channel 3-Bottom:	0.5	42	0.5	41.5
Channel 4-Top:	1.0	223	1.0	222

Location: GPO

~~EXTRA QC10~~ NOT COLLECTED
File name: 042903D Direction: SW
Pile of rocks (3)

088

w/i - 6" to ~~see~~ get a response

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400. 002

File: 706.015 KEA5G + KEA4G

Daily Checklist

Date: ~~05/[illegible]/03~~ 04/30/03

System: EM61MK2 - Whe

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/05/03	[initials]	Raw XYZ on Zap website	05/05/03	[initials]
Adjust lines and fiducials	05/05/03	"	Split Files In Excel	05/05/03	"
Create XYZ	05/05/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/01/03	[initials]	Processed XYZ	05/05/03	
Determine Lag	05/05/03	"	Dig Sheets	05/05/03	
Create Map	"	"	Local & SP Maps	05/05/03	
Grid and Display Data	"	"	QC_tests.xls		
Auto Pick Targets	"	"	Processing Log		
Review/Add Targets	"	"	Zapata spreadsheets		
Targets to Digsheet	"	"			
Warp Data to SP	"	"			
Create SP & Local Maps	"	"			
Correct Format of Files	"	"			

Total Area Of Data: . ~~[illegible]~~ 816

Total Targets:

Comments:

KEA5G - total targets = 86
KEA4G - total targets = 565

KEA4G → 25301.048 ft² → .58
KEA5G → 10259.57 ft² → .236

Heeia Kea QC Tests

Date: _____ System: _____

AM Shake Test

File: 043003a XYZ: 043003-QC5-AM-xyz.tmi

mV Range	
Ch1:	.88 ± 2
ChT:	1.894 ± 10

PM Shake Test

File: 043003e XYZ: 043003-QC5-PM-xyz.tmi

mV Range	
Ch1:	.404
ChT:	-.524 ± 2

AM Standard Test

File: 043003c XYZ: 043003-QC5-AM-xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	.897 ± 2	167.9 ± 3.5	.663 ± 2
ChT:	1.22 ± 5	234.6 ± 10	2.8 ± 5

PM Standard Test

File: 043003f XYZ: 043003-QC5-PM-xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	.75 ± 2	163.6 ± 5	1.666 ± 2
ChT:	-.922 ± 4.5	226.46 ± 3	-.48 ± 2

KEA46 Repeat Line Test

File: 043003b XYZ: KEA46_043003-QC10_1-xyz.tmi

Locations	Local	State Plane
Line Start:	0,0	1703599.19, 1015555.00
Line End:	0,200	1703587.26, 1015762.61
Target:	0,10	1703594.73, 1015663.65

Attempted Lags: 1.2, 1.5, 1.4, .5, .4 Actual Lag: .4

Peak Reading	Pass One	Pass Two
Ch1:	184.26	~~[illegible]~~ 158.73
ChT:	41.03	40.31

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	0	0	1703595.09	1703595.30
Y	9.03	8.66	1015663.02	1015662.74

KEA56 Repeat Line Test

File: 043003d XYZ: KEA56_043003-QC10_xyz.tmi

Locations	Local	State Plane
Line Start:	0,0	1702843.81, 1013772.02
Line End:	0,100	1702839.56, 1013815.58
Target:	0,10	1702803.14, 1014633.37

Attempted Lags: 1.2, 1.4, 1.5 Actual Lag: 1.5

Peak Reading	Pass One	Pass Two
Ch1:	110.53	102.57
ChT:	10.10	4.10

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	0	0	1702839.59	1702840.11
Y	11.11	9.33	1013822.17	1013805.58

Daily Log and QC Testing

Date: 4/30/03 Page: 1 of 3

Blackhawk Field Personnel: JAMES, MCH

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: [redacted] EM61 Model: MK2 SN: 021927-E
Controller: PQQ-4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1X05T SN: 0130 Height to Coil: 30in
Bottom Coil: EM61 Model: 1X05B SN: 0231 Height to Coil: 12in

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 8:30 End Time: 8:45
Check Battery Voltage 12.4
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

11:19 END DATA

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

Daily Log and QC Testing

Date: 4/30/03 Page: 1 of ____

Blackhawk Field Personnel: JAMES RICH

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-E
Controller: PRO-4000 Model: P4208-E SN: 1598
Top Coil: EM61 Model: 1x05T SN: 0130 Height to Coil: 30 in
Bottom Coil: EM61 Model: 1x05B SN: 0231 Height to Coil: 17 in

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 1400 End Time: _____
Check Battery Voltage	12.0	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up		
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)		

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 4/30/03 Page: 3 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 043003a Battery Voltage: 12.4 Time: 9:07 Samples/Sec: 5

	Static	Standard	Static	Residual (standard minus static)
Channel 1-Bottom:	0.5	168	0.5	167.5
Channel 2-Bottom:	0.5	94	0.5	93.5
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	1.0	232	0.5	231.5

Location: GRID 4 HEEIA KEA TRAINING CAMP

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 043003E Battery Voltage: 11.7 Time: 1538 Samples/Sec: 5

	Static	Standard	Static	Residual (standard minus static)
Channel 1-Bottom:	0.5	163	1.5	161.5
Channel 2-Bottom:	0.2	94	0.0	94
Channel 3-Bottom:	0.4	42	6.0	42
Channel 4-Top:	0.0	225	0.5	224.5

Location: GRID 5 HEEIA KEA (SOUTHEND ON ROAD)

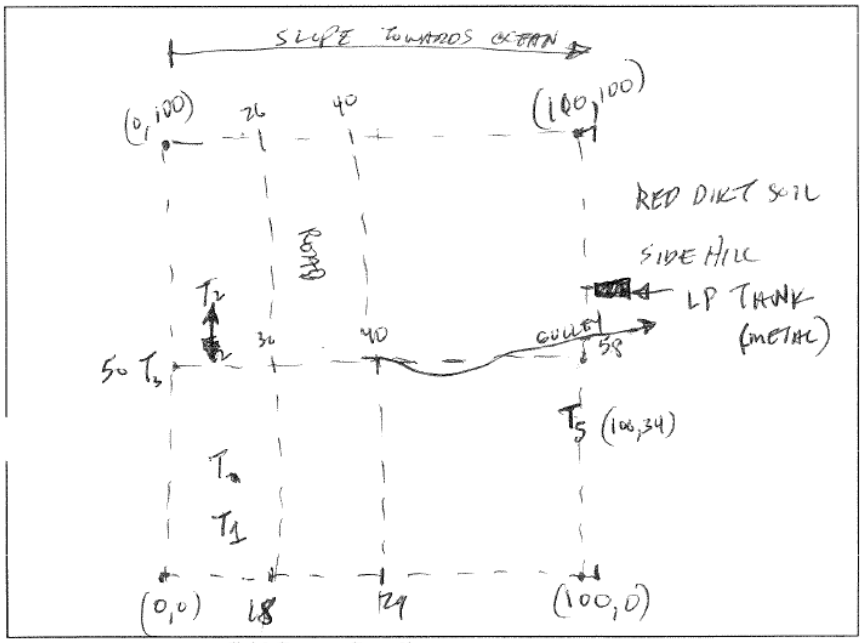
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA - KEA
Project Location: COMBAT TRAINING ARE
Geophysical Contractor: BLKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: GRID 5 **Date:** 4/30/03
Field Team: A.V. R.B
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☐Moderate Slope ☒Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 2
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local	
SW	101372.02, 1702843.81	0	0
NW	101463.37, 1702893.14	0	100
NE	101504.05, 1702894.49	100	100
SE	101412.69, 1702935.16	100	0

	Start	End	File Name
Battery Voltage:	12.0	11.8	
Static Background Value:	0.5	0.5	
Static Response Value:			

Instrument Clock Drift: N/A

Raw Data File Name: 043003D 125,246 KB **Repeat Data File Name:** _____
Geophysical Instrumentation: EM61- MK2 **Serial Number:** 021927-
Base Station: N/A DATA FROM LINE Ø TO 102 **Serial Number:** N/A
Navigation Method: WHEEL MODE INC = 0.65 **Serial Number:** T-0130 B-
Additional Comments: MK2 GRENADE @ Ø,10 REPEAT LINE Ø FROM 100 TO Ø

T7 SKIP AT TREES @ LINE 6 STA 52-63 | TREES @ (6,15) (6,52), (6,62) (7,41)

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400. 007

File: 706.015

Daily Checklist

Date: 05/01/03 System: EM61 MK2-4Whee

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files			Raw XYZ on Zap website		
Adjust lines and fiducials			Split Files In Excel		
Create XYZ					

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files			Processed XYZ		
Determine Lag			Dig Sheets		
Create Map			Local & SP Maps		
Grid and Display Data			QC_Tests.xls		
Auto Pick Targets			Processing Log		
Review/Add Targets			Zapata spreadsheets		
Targets to Digsheet					
Warp Data to SP					
Create SP & Local Maps					
Correct Format of Files					

Total Area Of Data: Total Targets:

Comments: Data deleted from pro 4000 in the field

Daily Log and QC Testing

Date: 5/1/03 Page: 1 of 3

Blackhawk Field Personnel: James, QC 17

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: EM61 Model: MK2 SN: 021927-E
Controller: PRO-4000 Model: PA208-ES SN: 1598
Top Coil: EM61 Model: 1x05 T SN: 0130 Height to Coil: 30
Bottom Coil: EM61 Model: 1x05 B SN: 0231 Height to Coil: 17in

Pre-Survey Checklist

Equipment Warm-up (15 minutes) ✓ Start time: 0830 End Time: 0845
Check Battery Voltage 12.4
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

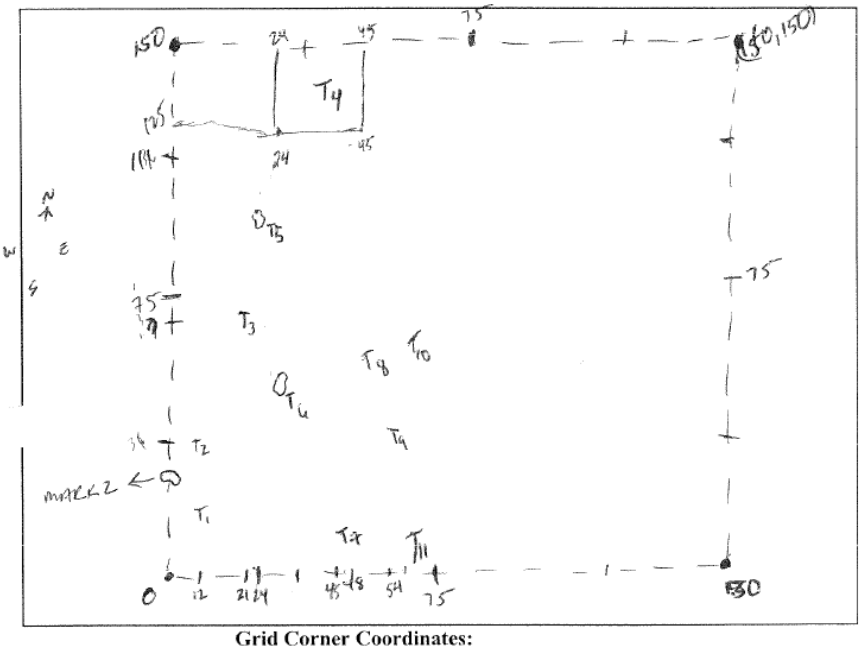
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: COMBAT TRAINING CAMP
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA GRID 1 **Date:** 5/1/03
Field Team: J.V. R.B
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☒Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local	
SW	101792.15, 1703035.04	0	0
NW	101924.59, 1702964.62	0	150
NE	101995.01, 1703097.06	150	150
SE	101862.57, 1703167.49	150	0

	Start	End	File Name
Battery Voltage:	12.4	12.1	
Static Background Value:	1.0	1.0	
Static Response Value:			

Instrument Clock Drift: _____

Raw Data File Name: 050103B
Repeat Data File Name: Line 0
Geophysical Instrumentation: EM61-MK2
Serial Number: 021927-E
Base Station: N/A
Serial Number: N/A
Navigation Method: WHEEL MODE (INC. @ 0.655)
Serial Number: T-0130 B-0231
Additional Comments: MARK 2 GRENED @ (0,30)

TREES: T_1 = (12, 34-36)
T_2 = (18, 36)
T_3 = (21, 71)
T_4 = (24-45, 125-150)
T_5 = (27, 93)
T_6 = (30, 43-50)
T_7 = (48, 14-17)
T_8 = (54, 58-63)
T_9 = (57, 40-45)
T_{10} = (63, 63-66)
T_{11} = (66, 7-11)

SKIPS = Line 12, 21, 24, 30
Line 25 = START @ 125
33 = " @ 117
39 = " @ 120
45 = " @ 125
54, 57, 63, 66

AM Tests for Data Processing

Date: 5/1/03 Page: 3 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050103a Battery Voltage: 12.4 Time: 8:55 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	168	1.0	167
Channel 2-Bottom:	1.0	92	0.0	92
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	0.5	234	1.0	233

Location: KEA GRID 7 KEEIA KEA C.T.C.

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050103c Battery Voltage: 12.14 Time: ~~13:49~~ 14: Samples/Sec: 5

	Static(1)	**Standard**(3)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	163	1.0	162
Channel 2-Bottom:	0.5	93	1.0	92
Channel 3-Bottom:	1.0	42	0.5	41.5
Channel 4-Top:	1.0	231	1.0	230

Location: KEA GRID 3 KEEIA KEA C.T.C.

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400. 002

~~File:~~ 706.015.

Daily Checklist

Date: 05/~~06~~02/03 System: EM61 MK2 - Wheel

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/06/03		Raw XYZ on Zap website	05/06/03	
Adjust lines and fiducials	05/06/03	"	Split Files In Excel	05/06/03	
Create XYZ	05/06/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/06/03		Processed XYZ	05/06/03 - 05/07/03	
Determine Lag	05/06/03		Dig Sheets	05/06/03 - 05/07/03	
Create Map	05/06/03 - 05/07/03		Local & SP Maps	05/06/03 - 05/07/03	
Grid and Display Data	05/06/03 - 05/07/03		QC_tests.xls	05/06/03 - 05/07/03	
Auto Pick Targets	5/6/03 - 5/7/03		Processing Log	05/06/03 - 05/07/03	
Review/Add Targets	5/6/03 - 5/7/03		Zapata spreadsheets	05/06/03 - 05/07/03	
Targets to Digsheet	5/6/03 - 5/7/03				
Warp Data to SP	5/6/03 - 5/7/03				
Create SP & Local Maps	5/6/03 - 5/7/03				
Correct Format of Files	5/6/03 - 5/7/03				

Total Area Of Data: 1.34 acres Total Targets:

Comments:

KEA367 total targets = 787
KEA1G7 total targets = 363

KEA367 → 36589.168 ft² → .84 acre
KEA1G7 → 21970.468 ft² → .50 acre

Heeia Kea QC Tests

Date: _____ System: _____

AM Shake Test

File: 050203a XYZ: 050203_QC5_am_xyz.tmi

mV Range	
Ch1:	.25 ± 2
ChT:	2.05 ± 3

PM Shake Test

File: 050203f XYZ: 050203_QC5_pm_xyz.tmi

mV Range	
Ch1:	-.001 ± 2
ChT:	-.10 ± 5

AM Standard Test

File: 050203a XYZ: 050203_QC5_am_xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	1.31 ± 2	160.70 ± 2	1.85 ± 3
ChT:	1.59 ± 5	234.109 ± 45	1.89 ± 4.5

PM Standard Test

File: 050203f XYZ: 050203_QC5_pm_xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	-1.82 ± 3	161.29 ± 2	-2.33 ± 3
ChT:	-.86 ± 5	266.55 ± 4.5	-.21 ± 10

KEA361 Repeat Line Test

File: 050203b tc XYZ: KEA361_050203_QC10_xyz.tmi

Locations	Local	State Plane
Line Start:	200, 0	1703506.6, 1019111.95
Line End:	200, 200	
Target:	200, 100	1703506.6, 1020127.37

Attempted Lags: 1, 2, 1.5, 1.4 Actual Lag: 1.4

Peak Reading	Pass One	Pass Two
Ch1:	64.13	51.71
ChT:	-2.88	-9.36

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	200	200	1703506.10	1703507.1
Y	~~99.3~~ 99.09	99.3	1020111.84	1020111.28

KEA1G Repeat Line Test

File: 050203d XYZ: KEA1G_050203_QC10_xyz.tmi

Locations	Local	State Plane
Line Start:	0, 0	
Line End:	0, 150	
Target:	0, 30	

Attempted Lags: 1, 2, 1.4 Actual Lag: 1.4

Peak Reading	Pass One	Pass Two
Ch1:	53.40	55.44
ChT:		

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	0	0	1703029.40	1703021.40
Y	30	30	1018118.64	1018118.87

Daily Log and QC Testing

Date: 5/2/03 Page: 1 of _

Blackhawk Field Personnel: J.V. & R.B.

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-E
Controller: PRO-4000 Model: P4208-E1 SN: 1598
Top Coil: EM61 Model: 1x05T SN: 0130 Height to Coil: 30in
Bottom Coil: EM61 Model: 1x05B SN: 0231 Height to Coil: 17in

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0700 End Time: 0730
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

FILE 050203B LINES 0 - 99
050203C " 102 -

PAGE 2 OF 3

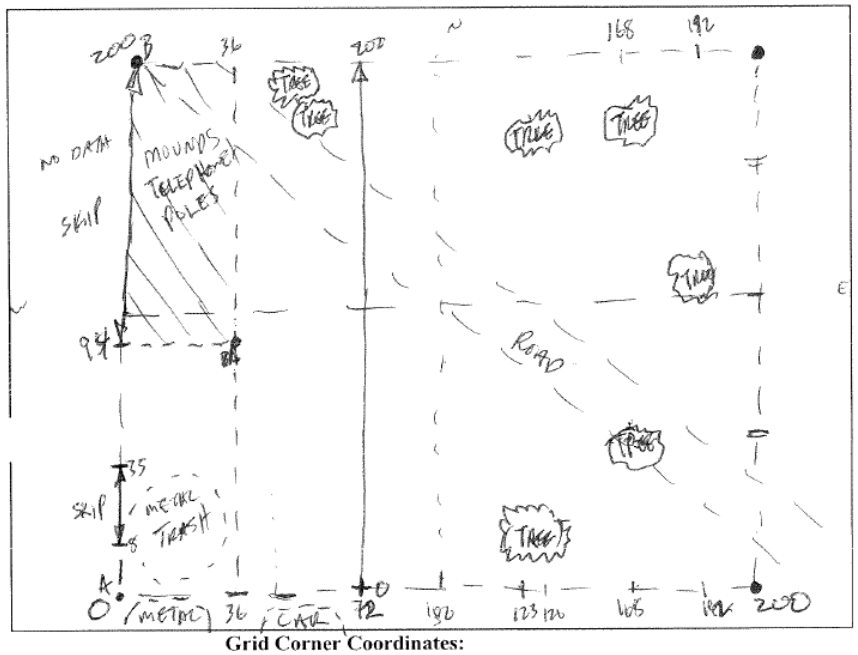
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: GRID 3 **Date:** 5/2/03
Field Team: J.V. & R.B.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒T

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☒Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☐Light ☒Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local	
SW	101911.95, 1703306.63	0	0
NW	102111.95, 1703306.63	0	200
NE	102111.95, 1703506.63	200	200
SE	101911.95, 1703506.63	200	0

	Start	End	File Name
Battery Voltage:	12.4		
Static Background Value:	0.5		
Static Response Value:	167		

Instrument Clock Drift: _____

Raw Data File Names: 050203B, 050203C 102-201 **Repeat Data File Name:** 050203B LINES Ø-99
Geophysical Instrumentation: EM61-MK2 **Serial Number:** 021927-E
~~**Base Station:**~~ N/A METAL DEBRIS FROM Ø TO 70E **Serial Number:** N/A
Navigation Method: WHEEL MODE INC = 0.665 **Serial Number:** T: 0130 B: 0231
Additional Comments: MARK 2 GRENADE @ (200,100)

SKIPS IN DATA	LINE	STA	TO STA	STA	TO STA	LINE	STA	TO STA	LINE	STA	STA
	0	8 39	94 20	94	200	36	SKIP		126	157 - 170 (TREE)	
	3	94	200	24		63	187	191 (TREE)	168	43 - 51 TREE	
	6	94	200	27		69	180	172 (TREE)	168	153 - 158 TREE	
	9	94	200	30		72	START Ø → 200 OK		171	50 - 43 "	
	12	94	200	33		123	15, 10 (TREE)		192	100 - 110 "	
	15	94	200	36	5 → 200 OK						
	18	94	200	39	5 → 200						
				42	5 → 200						

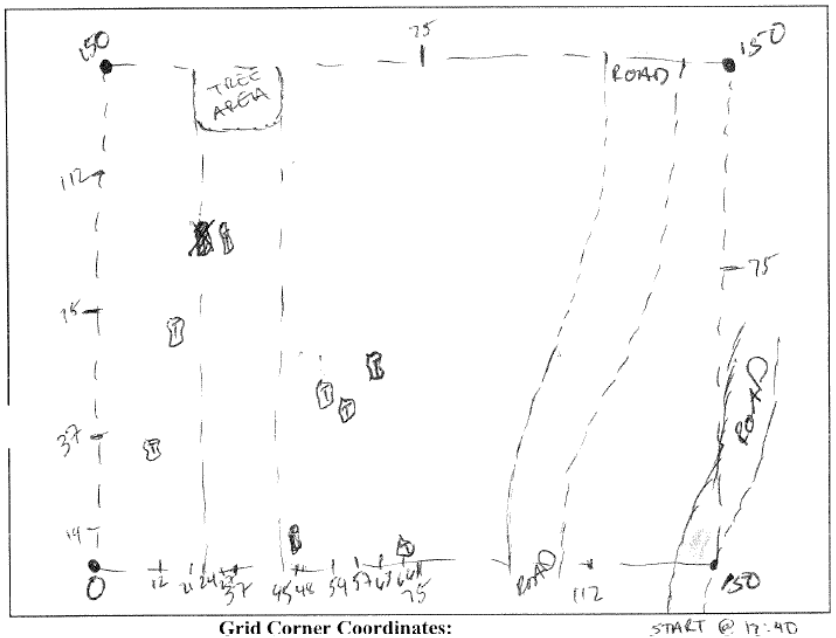
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: GRID 1 **Date:** 5/2/03
Field Team: JV RB
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



START @ 12:40

N

Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local	
SW	101792.15, 1703035.04	0	0
NW	101924.59, 1702964.62	0	150
NE	101995.01, 1703097.04	150	150
SE	101862.57, 1703167.49	150	0

	Start	End	File Name
Battery Voltage:	12.4		
Static Background Value:	1.0		
Static Response Value:			

Instrument Clock Drift: _____

Raw Data File Name: 050203D
Repeat Data File Name: _____
Geophysical Instrumentation: EM61-MK2
Serial Number: 021927-E
Base Station: N/A
Serial Number: N/A
Navigation Method: WHEEL MODE (INC @ 0.660)
Serial Number: T-0130 B-0231
Additional Comments: GRENED @ (0,30) *EDIT 119-127.8(OW) Line 30

SKIPS IN DATA	Line	STA TO STA	Line	STA - STA
54-184-90	12	34 - 36	48	14 - 17
	21	68 - 72	54	60 - 63
	24	125 - 150	57	40 - 45
	1		63	62 - 66
	45	86 - 93	66	8 - 13
EDIT @ END (STOP @ 119)	27			
	30	45 - 50		

	Line	START @
EDIT ← FROM 0-124 STAT	33	" @ 124(117)
	39	" @ 124
	45	" @ 125
	27	" @ 124
	30	" @
	31	" @

AM Tests for Data Processing

Date: 5/2/05 Page: 3 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050203A Battery Voltage: 12.43 Time: 0810 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	2.0	165
Channel 2-Bottom:	0.5	97	0.5	96.5
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	1.0	234	1.0	233

Location: GRID 3 SOUTHEAST CORNER

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050203F Battery Voltage: 12.3 Time: 1434 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	162	0.5	161.5
Channel 2-Bottom:	0.5	92	1.0	91
Channel 3-Bottom:	0.5	42	1.0	41
Channel 4-Top:	0.5	226	1.0	225

Location: GRID 4 SOUTHEAST CORNER ON ROAD

* GRID 4 5/2/05
REPEAT Lines 6, 9, 12
File NAME: 050203E

TREE ON Line 9
SKIP @ 93-104

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 7002.015

Daily Checklist

Date: 05/07/03 System: EM61MK2 - litter

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/04/03		Raw XYZ on Zap website	05/05/03	
Adjust lines and fiducials	05/04/03	"	Split Files In Excel	05/07/03	
Create XYZ	05/04/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/07/03		Processed XYZ	05/07/03	
Determine Lag	05/07/03	"	Dig Sheets	05/07/03	
Create Map	05/07/03	"	Local & SP Maps	05/07/03	
Grid and Display Data	05/07/03	"	QC_tests.xls	6/9/03	
Auto Pick Targets	05/07/03	"	Processing Log	~~5/4/03~~	
Review/Add Targets	05/07/03	"	Zapata spreadsheets		
Targets to Digsheet	05/07/03	"			
Warp Data to SP	05/07/03	"			
Create SP & Local Maps	05/07/03	"			
Correct Format of Files	05/07/03	"			

Total Area Of Data: GPO Total Targets: 39

Comments: GPO - litter Mode

Daily Log and QC Testing

Date: 5/3/03 Page: ___ of ___

Blackhawk Field Personnel: J.V. & R.B

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: EMG 1 Model: MK2 SN: 021927-E either mode

Controller: PRO-4220 Model: P4208-E1 SN: 1598

Top Coil: EMG 1 Model: 1x05T SN: 0130 Height to Coil: 30.0

Bottom Coil: EMG 1 Model: 1x05B SN: 0231 Height to Coil: 17.0

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 1130 End Time: 1145
Check Battery Voltage	12.4	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 5/2/03 Page: ___ of ___

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050303A Battery Voltage: 12.4 Time: 12:02 Samples/Sec: 15

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	466	1.0	965
Channel 2-Bottom:	0.5	556	0.5	555.5
Channel 3-Bottom:	0.5	254	0.5	253.5
Channel 4-Top:	0.5	224	0.5	223.5

Location: GPO SITE L7 ON BOTTOM COIL

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050303F Battery Voltage: 12.3 Time: 12:54 Samples/Sec: 15

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	978	1.0	977
Channel 2-Bottom:	0.5	566	1.0	565
Channel 3-Bottom:	0.5	259	1.0	258
Channel 4-Top:	0.5	228	1.0	227

Location: GPO SITE

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: KEEJA KEA **Project Location:** LOPO

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

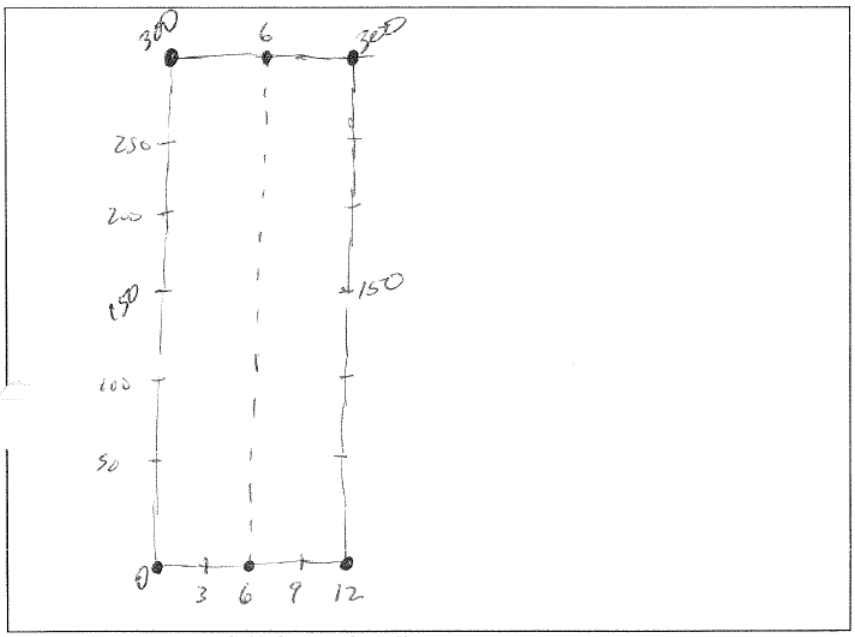
Project Geophysicist: J. HAND **Site Geophysicist:** R. BLOOM

Survey Area ID: 600 STC **Date:** 5/3/07 **Field Team:** J.V. R.B

Survey Type: ☒ Grid ☐ Meandering Path ☐ Transect ☐ Other _____

Coordinate System: ☐ UTM ☐ State Plane NAD _____ ☒ Local ☐ Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



N

Terrain:
☒ Level ☐ Moderate Slope ☐ Steep
☐ Rolling ☐ Ruts ☐ Gullies
☐ Rocky ☐ Swampy ☐ Dangerous

Tree Cover: **Tree Height:** ___
☒ None ☐ Light ☐ Medium ☐ Thi

Brush:
☐ None ☒ Light ☐ Medium ☐ Thi

Weather:
☒ Sunny ☐ Cloudy ☐ Drizzle
☐ Rain ☐ Thunderstorms ☐ Hail
☐ Fog ☒ Humid ☐ Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 300
NE	_____, _____	12, 300
SE	_____, _____	12, 0

	Start	End	File Name
Battery Voltage:	12.4	12.4	
Static Background Value:	____	____	_____, ____
Static Response Value:	____	____	_____, ____

Instrument Clock Drift: _____

Raw Data File Name: 0503038 **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 **Serial Number:** _____

Base Station: N/A **Serial Number:** _____

Navigation Method: SURVEY MODE AUTO SAMPLE 10/SEC **Serial Number:** _____

Additional Comments: _____

REPEATABILITY TEST LINE 6
CENTER LINE
UP & BACK & UP
File Name: 050303C
UP, BACK, UP

Daily Log and QC Testing

Date: 5/3/03 Page: ___ of ___

Blackhawk Field Personnel: JV. R, B.

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: _____ Model: _____ SN: _____
Controller: _____ Model: _____ SN: _____
Top Coil: _____ Model: _____ SN: _____ Height to Coil: _____
Bottom Coil: _____ Model: _____ SN: _____ Height to Coil: _____

Pre-Survey Checklist
Equipment Warm-up (15 minutes) _____ Start time: _____ End Time: _____
Check Battery Voltage _____
Check Cable Connections _____
Visual Inspection of EM Coils _____
Null Instrument After Warm-up _____
Personnel Test (remove metal) _____
Vibration Test (cable shake) _____

QC8 Test (Six Line Test 1st Day of Project)

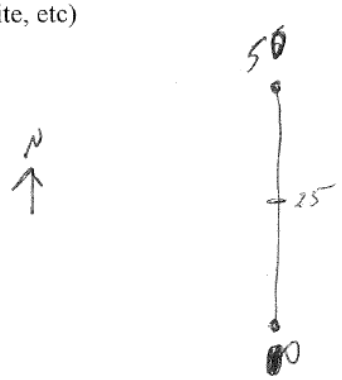
File Name: 050303D AUTO MODE 15 ~~Wheel Inc:~~ ____ Time: 12:45

Line 1 UP - NO OBS Line 2 BACK - NO OBS Line 3 UP - OBS @ 25ft

Line 4 BACK - OBS @ 25 Line 5 UP - OBS @ 25 (FAST) Line 6 BACK - OBS @ 25 (SLOW)

Length of lines: 50 ft Standard test item is on line: 3, 4, 5, 6

Notes: (Sketch site, etc)



Heeia/ Pali QC Tests

Date: 050303 System: EM61MK2

AM Shake Test

File: 050303a XYZ: 050303_QC5_am_xyz_tml

mV Range	
Ch1:	.88 ± 2.5
ChT:	-.98 ± 5

PM Shake Test

File: 050303f XYZ: 050303_QC5_pm_xyz_tml

mV Range	
Ch1:	-.27 ± 2.5
ChT:	1.3 ± 6

AM Standard Test

File: 050503a XYZ: 050303_QC5_am_xyz_tml

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.88 ± 3	965.0 ± 200	2.88 ± 3
ChT:	-.87 ± 4	222.3 ± 50	-.63 ± 5

PM Standard Test

File: 050303f XYZ: 050303_QC5_pm_xyz_tml

mV Range			
	Static 1	Standard	Static 2
Ch1:	.45 ± 2.5	977.2 ± 6	1.24 ± 2
ChT:	1.47 ± 4.5	226.26 ± 7.5	2.24 ± 4

GPO_L Repeat Line Test

File: 050303c XYZ: GPO_050303_QC10_LM_xyz_tml

Locations		
	Local	State Plane
Line Start:	6,0	
Line End:	6,300	
Target:	6,150	

Attempted Lags: 0, 1, 4, 4.5 Actual Lag: 4.5

Peak Reading		
	Pass One	Pass Two
Lag:	321.77	338.21

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	6	6	1721702.00	1721707.00
Pass Two	150.99	150	75661.40	75662.11

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400. 002

File: ~~700~~ 706.015

Daily Checklist KEA2G - KEA10

Date: 05/05/03 System: EM61MK2 - 4wheel

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/06/03		Raw XYZ on Zap website	05/06/05	
Adjust lines and fiducials	05/06/03	"	Split Files In Excel	05/08/03	
Create XYZ	05/06/05	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/08/03		Processed XYZ	05/09/03	
Determine Lag	05/08/03	"	Dig Sheets	05/08/03	"
Create Map	05/08/03	"	Local & SP Maps	05/09/03	"
Grid and Display Data	05/08/03	"	QC_tests.xls	06/09/03	
Auto Pick Targets	05/08/03	"	Processing Log	05/14/03	
Review/Add Targets	05/08/03	"	Zapata spreadsheets		
Targets to Digsheet	05/08/03	"			
Warp Data to SP	05/08/03	"			
Create SP & Local Maps	05/08/03	"			
Correct Format of Files	05/08/03	"			

Total Area Of Data: .973 Total Targets:

Comments:

KEA10G → 239
KEA2G 152

43560 ft² = 1acre

KEA2G → 22578.6388 ft² → .518 acres
KEA10G → 19812.623 ft² → .455 acres

Daily Log and QC Testing

Date: 5/5/03 Page: 1 of 3

Blackhawk Field Personnel: J.V. & R.B

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-E
Controller: PRO-4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1X05T SN: 0130 Height to Coil: 30in
Bottom Coil: EM61 Model: 1X05B SN: 0231 Height to Coil: 17in

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0900 End Time: 0915
Check Battery Voltage 12.1
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

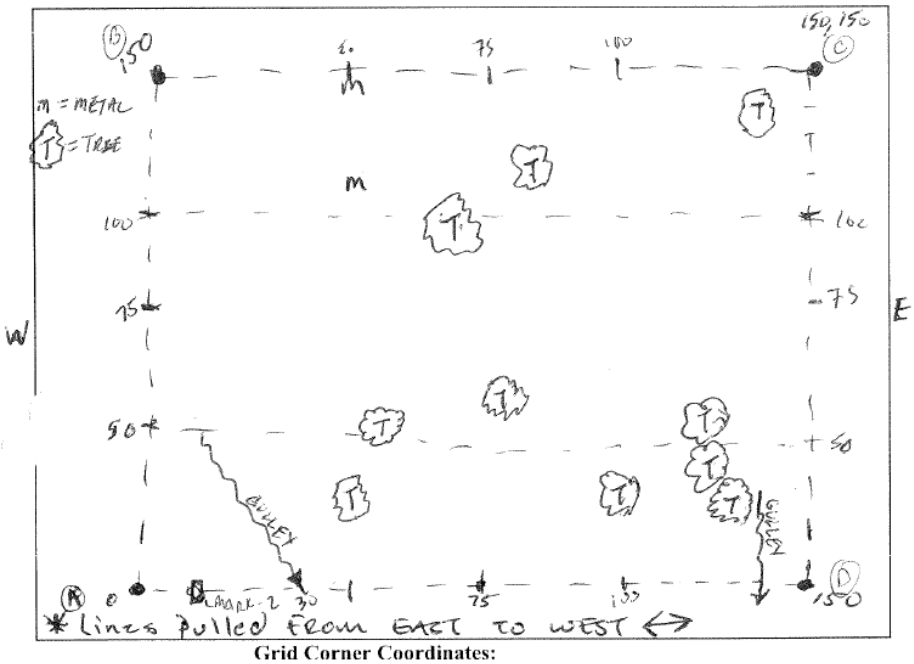
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA-26 **Date:** 5/5/03
Field Team: J.V. & R.B.
Survey Type: ☒ Grid ☐ Meandering Path ☐ Transect ☐ Other _____
Coordinate System: ☐ UTM ☐ State Plane NAD _____ ☒ Local ☐ Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐ Level ☒ Moderate Slope ☐ Steep
☐ Rolling ☐ Ruts ☒ Gullies
☐ Rocky ☐ Swampy ☐ Dangerous

Tree Cover: **Tree Height:** 2.
☐ None ☒ Light ☒ Medium ☐ Thi

Brush:
☐ None ☒ Light ☐ Medium ☐ Thi

Weather:
☐ Sunny ☒ Cloudy ☐ Drizzle
☐ Rain ☐ Thunderstorms ☐ Hail
☐ Fog ☒ Humid ☐ Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	102088.39, 1702575.56	0, 0
NW	102202.11, 1702477.74	0, 150
NE	102299.42, 1702591.46	150, 150
SE	102186.20, 1702689.28	150, 0

	Start	End	File Name
Battery Voltage:	12.1	11.8	
Static Background Value:	0.5		
Static Response Value:	165		
Instrument Clock Drift:			

Raw Data File Name: 050503B (264374 KB) **Repeat Data File Name:** REPEAT LN # (-3) 150 TO #
Geophysical Instrumentation: EM61-MK2 **Serial Number:** 02192 7-C
~~Base Station:~~ N/A **Serial Number:** N/A T-0130
Navigation Method: WHEEL MODE INC = 0.665 **Serial Number:** B-0231
Additional Comments: Pulled EAST TO WEST. ; MARK 2 @ (0, 0)

SKIPS	LN	STA TO STA	LN	STA TO STA	LN	STA TO STA	LN	STA TO STA
	12	140 – 143	30	100 – 102	57	103 – 104	114	81 – 84
	15	146 – 142	36	98 – 99	75	30 – 28	135	140 – 130
	18	142 – 145	48	85 – 89	96	80 – 86		
	27	98 – 96	51	83 – 81	99	87 – 75		
	27	66 – 60	51	39 – 37	102	75 – 78		
	30	61 – 66	54	35 – 38	111	67 – 65		

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** COMBAT TRAINING CAMP

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

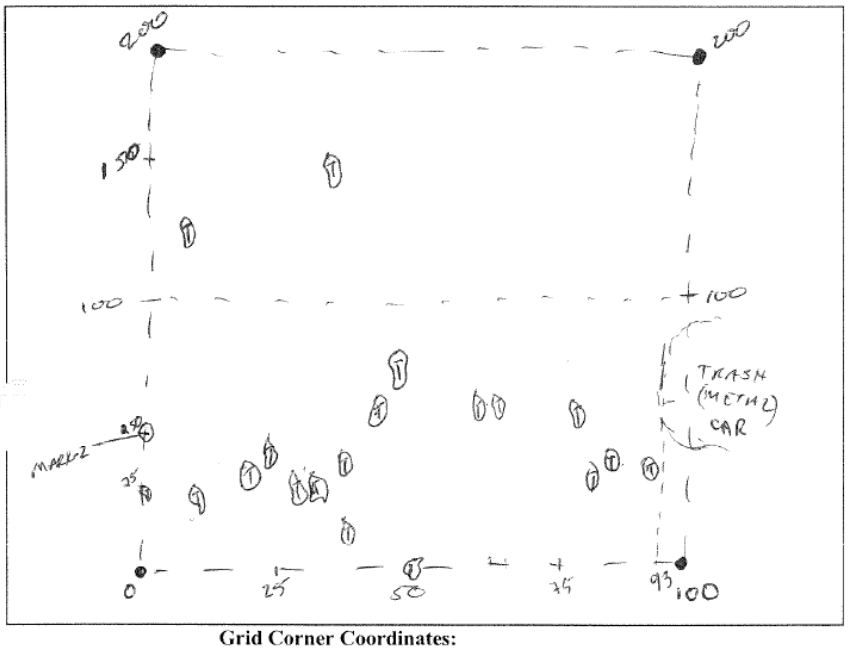
Project Geophysicist: J. HALL **Site Geophysicist:** R. BLOHM

Survey Area ID: GRID 10 **Date:** 5/5/03 **Field Team:** J.V. & R.B.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☐

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



N

Terrain:
☒Level ☐Moderate Slope ☐Stee
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 2
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	1005293.53, 1703674.84	0, 0
NW	1005717.47 1703743.27	0, 200
NE	1006499.06, 1703931.21	200, 200
SE	1006141.12, 1703862.80	0, 100

	Start	End	File Name
Battery Voltage:	12.4	12.1	
Static Background Value:	0.5	____	____, ____
Static Response Value:	168	____	____, ____
Instrument Clock Drift:			

Raw Data File Name: 050503C (231264 KB) **Repeat Data File Name:** REPEAT LN 0(-3)

Geophysical Instrumentation: EM61 MK2 **Serial Number:** 021927-E

Base Station: N/A **Serial Number:** _____

Navigation Method: WHEEL MODE **Serial Number:** T-0130 R-0231

Additional Comments: *WEST HALF OF GRID ON (0,50); FIDS EVERY 50ft; Lines N/S

*CAR @ 86-

SKIP	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
	0	29-32	27	36 - 27	39	33 - 28	69	52-49	87	32 - 29
	9	133-130	30	30 - 34	42	60 - 67	78	54-57	96	70 - 86 (metal TRASH)
	15	25 - 20	36	149-153	48	75-83	81	46 - 43	99	90 - 65
	21	42 - 38	39	114-110	63	64 - 61	84	41 - 45		
	24	40 - 44	31	66 - 62	66	58 - 61	84	64 - 68		

AM Tests for Data Processing

Date: 5/5/03 Page: 3 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050503A Battery Voltage: 12.1 Time: 0938 Samples/Sec: 5

	Static (3)	**Standard** (2)	**Static** (1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	168	1.0	167
Channel 2-Bottom:	0.5	96	0.5	95.5
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	1.0	230	1.0	229

Location: HEEIA KEA GRID #2 36696 KB

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050503D Battery Voltage: 12.1 Time: 0334 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	1.0	166
Channel 2-Bottom:	0.5	94	0.5	93.5
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	0.5	232	0.5	231.5

Location: HEEIA KEA GRID #7 36938 KB
KEA 76

J 4/225

Heeia/ Pali QC Tests

Date: 050503 System: BM61MK2

AM Shake Test

File: 050503a XYZ: 050503_QC5_am_xyz_tml

mV Range	
Ch1:	2.62 ± 2.5
ChT:	-.37 ± 3

PM Shake Test

File: 050503d XYZ: 050503_QC5_pm_xyz_tml

mV Range	
Ch1:	1.42 ± 2
ChT:	.46 ± 2.5

AM Standard Test

File: 050503a XYZ: 050503_QC5_am_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	2.2 ± 2.5	167.73 ± 2	1.83 ± 1.5
ChT:	-1.29 ± 3	231.1 ± 2.5	-1.74 ± 3

PM Standard Test

File: 050503d XYZ: 050503_QC5_pm_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	1.65 ± 5	167.0 ± 1.5	1.03 ± 1.5
ChT:	.45 ± 2.5	232.98 ± 2.5	.46 ± 2

KEA10G Repeat Line Test

File: 050503c XYZ: KEA10G_050503_QC10_xyz_W_tml

Locations	Local	State Plane
Line Start:	0, 0	
Line End:	~~150, 0~~ 0, 200	
Target:	~~10, 0~~ 0, 50	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading	Pass One	Pass Two
Lag:	192.63	174.49

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	48.82	1703691.56	100574.~~78~~41
Pass Two	0	50.00	1703689.14	100577.54

KEA~~10~~2G Repeat Line Test

File: 050503b XYZ: KEA~~10~~2G_050503_QC10_xyz_W

Locations	Local	State Plane
Line Start:	0, 0	
Line End:	~~0, 200~~ 150, 0	
Target:	~~0, 50~~ 10, 0	

Attempted Lags: 0, 1, 2 Actual Lag: 2

Peak Reading	Pass One	Pass Two
Lag:	155.77	162.12

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	9.46	0	1702569.39	102095.56
Pass Two	9.40	0	1702567.16	102093.56

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400. 002

File: 700.015

Daily Checklist

Date: 05/06/03 System: EM61MK2

Processed Data and Spreadsheets KEA106

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/07/03		Raw XYZ on ~~Zap website~~ ftp	05/07/03	
Adjust lines and fiducials	05/07/03	"	Split Files In Excel	05/08/05	"
Create XYZ	05/07/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/08/03		Processed XYZ	05/09/03	
Determine Lag	05/08/03	"	Dig Sheets	05/09/03	"
Create Map	05/08/03	"	Local & SP Maps	05/09/03	"
Grid and Display Data	05/08/03	"	QC_tests.xls		
Auto Pick Targets	05/08/03	"	Processing Log		
Review/Add Targets	05/08/03	"	Zapata spreadsheets		
Targets to Digsheet	05/08/03	"			
Warp Data to SP	05/08/03	"			
Create SP & Local Maps	05/09/03	"			
Correct Format of Files	05/09/03				

Total Area Of Data: .34 Section KEA106 Total Targets: 293

Comments:

1/2 of KEA106

14653.926 ft² → .336

Daily Log and QC Testing

Date: 05/06/03 Page: 1 of 3

Blackhawk Field Personnel: R. Bluthm, T. Wells

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 0745 End Time: 0815
Check Battery Voltage	✓	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/06/03 Page: 2 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050603A Battery Voltage: 12.4 Time: 08'34 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	168	1.0	167
Channel 2-Bottom:	0.5	95	0.5	94.5
Channel 3-Bottom:	0.5	42	0.5	41.5
Channel 4-Top:	0.5	232	0.5	231.5

Location: N.W. CORNER GRID 10

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050603D Battery Voltage: 12.4 Time: 3:26 PM Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	165	1.0	164
Channel 2-Bottom:	0.5	93	0.5	92.5
Channel 3-Bottom:	0.5	42	0.5	41.5
Channel 4-Top:	0.5	229	1.0	228

Location: N.W. Corner Grid 10

PAGE 3/3

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA, OAHU **Project Location:** COMBAT TRAINING CAMP

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

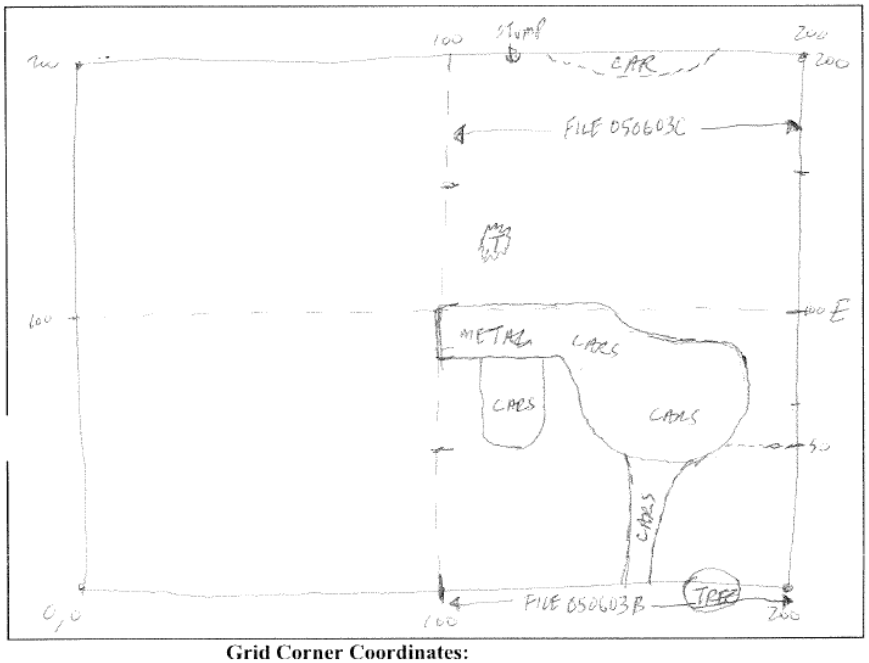
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOHM

Survey Area ID: KEA 1 & 6 **Date:** 05/06/03 **Field Team:** R.B, J.W,

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☒Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

~~UTM~~/State Plane		Local
SW	100529.53, 1703674.86	0, 0
NW	100717.47, 1703743.27	0, 200
NE	100649.06, 1703931.21	200, 200
SE	100461.12, 1703862.80	200, 0

	Start	End	File Name
Battery Voltage:	12.4	12.2	
Static Background Value:	1.0	____	_____, ____
Static Response Value:	168	____	_____, ____
Instrument Clock Drift:	NA		

Raw Data File Name: 050603B SE ¼, 050603C NE ¼ **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 of GRID **Serial Number:** 021927-3

Base Station: MK2 GRENADE PLACED @ 0,50 **Serial Number:** TOP COIL 0130

Navigation Method: WHEEL INC = 0.665 RUN LINES N→S 100'x200' AREA **Serial Number:** BOT COIL 0231

Additional Comments: 050603B FILL-IN DATA SE ¼; 050603C FILL-IN NE ¼

SKIPS IN DATA
603B
...18 LINES

LN	STA TO STA	LN	STA TO STA	LN	STA TO STA
0	25-32	120	050603C 173-127	171	200-190
177	-174 CARS	147	200-198	174	190-200
180	0-5 TREE	150	198-200	177	200-190
183	0-6 "	159	200-194		
186	0-7 "	162	190-200		
189	0-6 "	165	200-190		

LINES 102-135 START @
LINES 138-186 START @
LINES 198-201 START @

Heeia/ Pali QC Tests

Date: 050603 System: BM1dMK2

AM Shake Test

File: 050603a XYZ: 050603-QC5-am-xyz-tml

mV Range	
Ch1:	1.32 ± 2
ChT:	.43 ± 2.5

PM Shake Test

File: 050603d XYZ: 050603-QC5-pm-xyz-tml

mV Range	
Ch1:	.72 ± 2
ChT:	-.56 ± 3

AM Standard Test

File: 050603a XYZ: 050603-QC5-am-xyz-tml

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.56 ± 2	167.88 ± 1.5	1.91 ± 1.5
ChT:	.37 ± 2.5	232.0 ± 2.5	.63 ± 2.5

PM Standard Test

File: 050603d XYZ: 050603-QC5-pm-xyz-tml

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.45 ± 1.5	165.2 ± 2	1.64 ± 1.5
ChT:	-.58 ± 3	228.96 ± 3	-.66 ± 2.5

KEA10G Repeat Line Test

File: 050603b XYZ: KEA10G

Locations		
	Local	State Plane
Line Start:	0, 0	
Line End:	0, 200	
Target:	0, 50	

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:	170.79	155.34

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	49.49	1703691.79	1005716.04
Pass Two	0	51.08	1703689.51	1005778.56

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400. 002

File: 700.015

Daily Checklist

Date: 05/08/03 07

System: EM61 MK2 - 4 hoe

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/08/03		Raw XYZ on ftp Zap website	05/09/03	
Adjust lines and fiducials	05/08/03	"	Split Files In Excel	05/09/03	
Create XYZ	05/08/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/09/03		Processed XYZ	05/09/03	
Determine Lag	05/09/03	"	Dig Sheets	05/09/03	"
Create Map	05/09/03	"	Local & SP Maps	05/09/03	"
Grid and Display Data	05/09/03	"	QC_tests.xls		
Auto Pick Targets	05/09/03	"	Processing Log		
Review/Add Targets	05/09/03	"	Zapata spreadsheets		
Targets to Digsheet	05/09/03	"			
Warp Data to SP	05/09/03	"			
Create SP & Local Maps	05/09/03	"			
Correct Format of Files	05/09/03	"			

Total Area Of Data: .91 .86

KEA 701 Total Targets: 743

Comments:

39560.968 ft²
+ 2291.478 ft² → gaps
total = 37269.49 → .856

Heeia Kea QC Tests

Date: 05/09/05 System: EM61MK2

Shake Test

File: 050703a XYZ: 050703_QC5_am_xyz_tw1_raw

mV Range		
Ch1:	2.5	~~2.5~~ 12
ChT:		

AM Standard Test

File: 050703a XYZ: 050703_QC5_am_xyz_tw1_raw

mV Range	Static 1	Standard	Static 2
Ch1:	.947 ± 2.25	160.89 ± 2	-.116 ± 3
ChT:			

PM Standard Test

File: 050703d XYZ: 050703_QC5_pm_xyz_tw1_raw

mV Range	Static 1	Standard	Static 2
Ch1:	-.268 ± 1.5	165.34 ± 1.5	-1.27 ± 1.5
ChT:			

Grid 7 ~~AM~~ Repeat Line Test

File: 050703b XYZ: KEA7a_050703_QC10_xyz_tw1

Locations	Local	State Plane
Line Start:	~~0,0~~	1703008.63, 1011797.27
Line End:	0, 207	1703058.99, 1013702.82
Target:	0, 80	1703028.74, 1012554.57

Attempted Lags: 1, 2, 1.5, 1.8 Actual Lag: 1.8

Peak Reading	Pass One	Pass Two
Ch1:	148.18	161.73
ChT:	24.37	19.101

Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
Ch1:	0	0	1703028.74	1703025.102, 1012554.59
ChT:	~~79.91~~ 80.67	79.91	~~1012554.57~~ 1012554.57	

~~PM~~ Repeat Line Test

File: tw1 XYZ:

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: Actual Lag:

Peak Reading	Pass One	Pass Two
Ch1:		
ChT:		

Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
Ch1:				
ChT:				

Daily Log and QC Testing

Date: 05/07/03 Page: 1 of 3

Blackhawk Field Personnel: R. Blouin, J. W.

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0730 End Time: 0800
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/07/03 Page: 2 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050703A Battery Voltage: 12.3 Time: 08:48 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	166	0.5	165.5
Channel 2-Bottom:	0.5	94	0.5	93.5
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	1.0	231	0.5	230.5

Location: NE CORNER GRID 7

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050703D Battery Voltage: 12.1 Time: 15:24 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	166	0.5	165.5
Channel 2-Bottom:	0.5	94	0.5	93.5
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	0.5	231	0.5	230.5

Location: NE CORNER GRID 7

☐ QC checked by _____ Date: _____

Field Data Sheet 3/3

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** COMBAT TRAINING CAMP

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

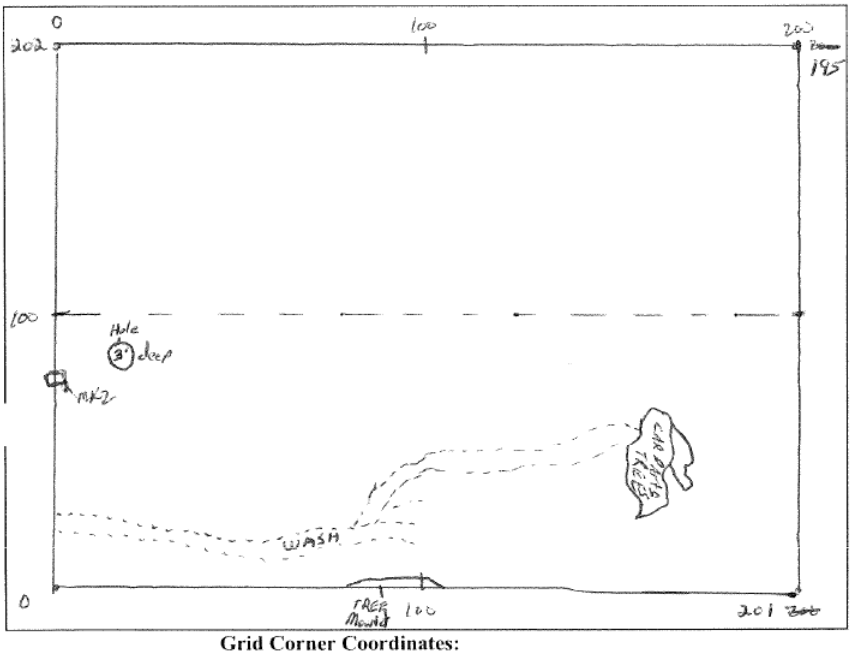
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOOM

Survey Area ID: KEA 7 G **Date:** 05/07/03 **Field Team:** R.B., J.W

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 3c
☐None ☐Light ☒Medium ☒Thi

Brush:
☐None ☐Light ☒Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	~~UTM~~/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 200
NE	_____, _____	200, 200
SE	_____, _____	200, 0

	Start	End	File Name
Battery Voltage:	12.3	11.9	
Static Background Value:	1.0	____	_____, ____
Static Response Value:	16.5	____	_____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 050703B , 050703C **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021927-3

~~**Base Station**~~ MK2 GPS RADIO @ 0/80 **Serial Number:** TOP COIL 0130

Navigation Method: WHEEL INC = 0.665 **Serial Number:** BTM COIL 0231

Additional Comments: SW TO NW 0-202 LN 21 3' HOLE LN 51 200-0

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
	050703B	18	191-196	39	14-8	63	100-92	75	35-17	93	80-74
	92-81	21	107-104	39	2-0	63	46-29	75	2-0	93	10-0
5	53-50	21	50-46	42	90-93	66	24-41	78	0-4	96	0-9
9	55-46	21	16-13	42	115-134	66	50-62	78	20-32	99	59-49
12	47-52	27	153-151	51	96-93	68	72-80	81	31-23	99	8-0
15	197-191	27	123-119	51	3-0	66	90-100	81	8-0		
15	51-46	27	3-0	54	26-24	67	80-69	84	0-9		
15	32-29	30	0-2	54	47-51	69	41-19	84	21-31		
18	46-55	33	2-0	57	4-0	69	2-0	87	12-0		
		36	133-146	60	14-26	72	0-2	90	0-9		

050703C EAST 100' Half

LN	STA - STA	LN	STA-STA
102	63-67	174	70 - 100
105	5-0	177	80 - 69
108	0-5	183	33 - 22
108	77-80	186	20 - 33
111	78-74	189	33-23
111	60-50		
111	5-0		
114	0-4		
114	50-59		
117	5-0		
120	0-3		
120	36-50		
123	61-56		
123	50-37		
123	2-0		
126	39-50		
126	183-191		
129	190-180		
129	124-121		
129	50-40		
132	39-54		
132	189-190		
135	60-38		
138	38-60		
141	116-113		
141	60-93		
144	45-55		
144	96-103		
144	114-117		
147	107-89		
150	88-106		
153	105-54		
153	32-28		
156	50-107		
159	107-50		
162	50-107		
165	106-50		
168	50-100		
171	100-50		

edit out 1st LN 180

Line 198 LAST Line due to offset grid + growth

191-200 edit skip 183-91 to 183-191 on LN 126

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.

File:

Daily Checklist

Date: 05/08/03 System: EM61MK2

Processed Data and Spreadsheets KEA6G & KEA8G

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/08/03		Raw XYZ on Zap website	05/09/03	
Adjust lines and fiducials	05/09/03	"	Split Files In Excel	05/12/03	
Create XYZ	05/09/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/12/03		Processed XYZ	05/12/03	
Determine Lag	05/12/03	"	Dig Sheets	05/12/03	
Create Map	05/12/03	"	Local & SP Maps	05/12/03	
Grid and Display Data	05/12/03	"	QC_tests.xls		
Auto Pick Targets	05/12/03	"	Processing Log	05/12/03	
Review/Add Targets	05/12/03	"	Zapata spreadsheets		
Targets to Digsheet	05/12/03	"			
Warp Data to SP	05/12/03	"			
Create SP & Local Maps	05/12/03	"			
Correct Format of Files	05/12/03	"			

Total Area Of Data: .607 acres Total Targets:

Comments:

KEA8G → 310 → 19055.90 ft² → .44
KEA6G → 34 → 9932.33 ft² → .228

Heeia Kea QC Tests

Date: 05/12/03 System: EM61MK2

AM Shake Test

File: 050803a XYZ: 050803-QC5-am-xyz-tmi..raw

mV Range	
Ch1:	2.6 ± 2
ChT:	.027 ± 3.5

PM Shake Test

File: 050803d XYZ: 050803_QC5-pm-xyz_tmi_raw

mV Range	
Ch1:	2.87 ± 1.5
ChT:	-.073 ± 3

AM Standard Test

File: 050803a XYZ: 050803-QC5_am_xyz_tmi_raw

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.75 ± 1.75	1168.2 ± 1.5	1.2 ± 2
ChT:	-.36 ± 3	233.7 ± 2.5	-.25 ± 2.5

PM Standard Test

File: 050803d XYZ: 050803-QC5pm-xyz_tmi_raw

mV Range			
	Static 1	Standard	Static 2
Ch1:	2.3 ± 2	1660.32 ± 1	3.7 ± 1.75
ChT:	-.31 ± 3.5	288.69 ± 2	-.26 ± 2.5

KEA 86 Repeat Line Test

File: 050803b XYZ: KEA86_050803_QC10-xyz_tmi_raw

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0, 150	
Target:	0, 30	

Attempted Lags: 1, 1.4 Actual Lag: 1.4

Peak Reading		
	Pass One	Pass Two
Ch1:		
ChT:		

→ can't see the anomaly @ 0,30

Ch1 - Peak Reading Locations (after corrections)				
	Pass One	Pass Two	State Plane	State Plane
X				
Y				

KEA 66 Repeat Line Test

File: 050803c XYZ: KEA66_050803_QC10_xyz_tmi_raw

Locations		
	Local	State Plane
Line Start:	0,0	1702658.68, 101772.79
Line End:	0, 100	1702616.42, 101862.42
Target:	0, 30	1702653.96, 101781.92

Attempted Lags: 1, 1.4, 1.2 Actual Lag: 1.2

Peak Reading		
	Pass One	Pass Two
Ch1:	108.30	128.76
ChT:	11.08	11.84

Ch1 - Peak Reading Locations (after corrections)				
	Pass One	Pass Two	State Plane	State Plane
X	0	0	1702654.23	1702654.49
Y	10.53	10.14	101781.35	101781.02

* looked @ other anomalies

Daily Log and QC Testing

Date: 05/08/03 Page: 1 of 4

Blackhawk Field Personnel: K. Bloom, J. W.

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRo 4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 0800 End Time: 0815
Check Battery Voltage	✓	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/08/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050803A Battery Voltage: 12.4 Time: 08:36 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	0.5	166.5
Channel 2-Bottom:	0.5	95	0.5	94.5
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	0.5	233	0.5	232.5

Location: S.W. CORNER GRID 8

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050803D Battery Voltage: 11.8 Time: 14:13 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	2.0	165
Channel 2-Bottom:	1.0	96	1.0	95
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	1.0	228	1.0	227

Location: SW corner grid 6

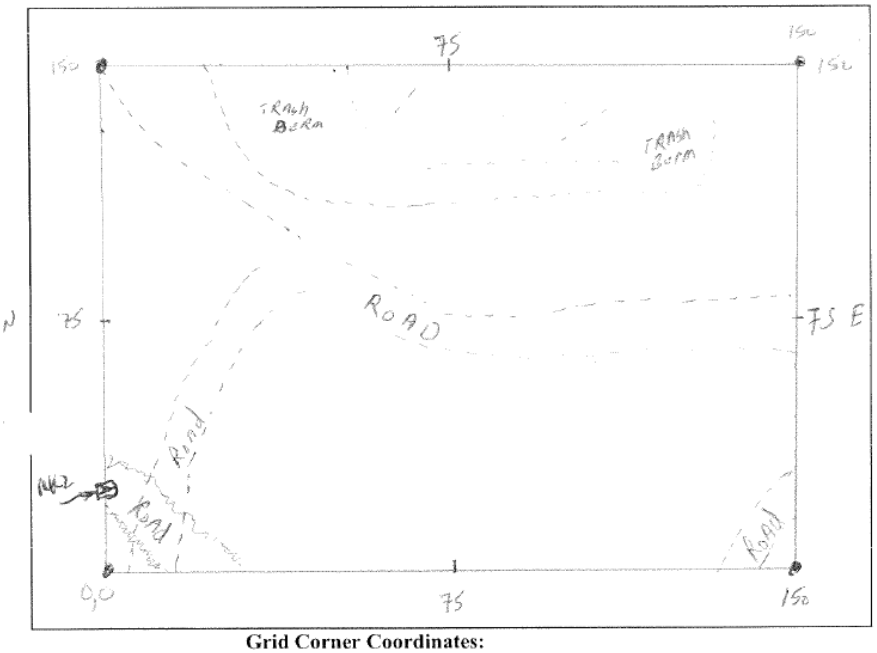
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/4 Date: _____

Project Name: HEEIA KEA
Project Location: FORMER COMBAT TRAINING CA
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: K. BLOHM
Survey Area ID: KEA 8 G **Date:** 05/08/03
Field Team: K.B, J.W
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 150
NE	_____, _____	150, 150
SE	_____, _____	150, 0

	Start	End	File Name
Battery Voltage:	12.4	12.2	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	1.0	0.5	_____, _____

Instrument Clock Drift: N/A
Raw Data File Name: 050803B
Repeat Data File Name: _____
Geophysical Instrumentation: EMU MK2, Proton **Serial Number:** 021927-3
Base Station: MK2 GRENADE @ 0,30 **Serial Number:** 1x0, Top unit, 0,30
Navigation Method: WHEEL INC = 0.66 **Serial Number:** 1x0,5 Bottom unit, 0231
Additional Comments: ~~LN 37 starts 115~~ - @ LN 57 starts 115' 11/16 LN 69 starts 115' LN 132 ends 150

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA
	63 - 56	30	67 - 79	42	0 - 2	56	43 - 50	90	106 - 150	102	101 - 150	120	106		
	70 - 80	30	148 - 150	42	135 - 150	72	112 - ~~115~~ 150	93	150 - 102	105	150 - 107	123	150 -		
	102 - 108	33	150 - 148	45	70 - 60	75	115 - 108	93	21 - 16	105	46 - 41	126	28 -		
9	99 - 89	33	3 - 0	48	53 - 65	78	107 - 150	96	19 - 21	108	109 - 150	~~60~~	~~94~~		
2	91 - 96	36	0 - 3	49	128 - 150	81	150 - 109	96	107 - 150	111	150 - 109	126	100		
5	73 - 67	36	34 - 38	51	~~115~~ 150 - 128	84	26 - 30	99	43 - 40	114	109 - 150	129	150 -		
8	67 - 75	39	144 - 150	51	60 - 51	84	103 - 150	99	23 - 16	117	~~109~~ 150 - 108	129	36 -		
			~~137~~ 150 - 137	54	50 - 56	87	150 - 103	99		117		141	44 - 3		

4/4

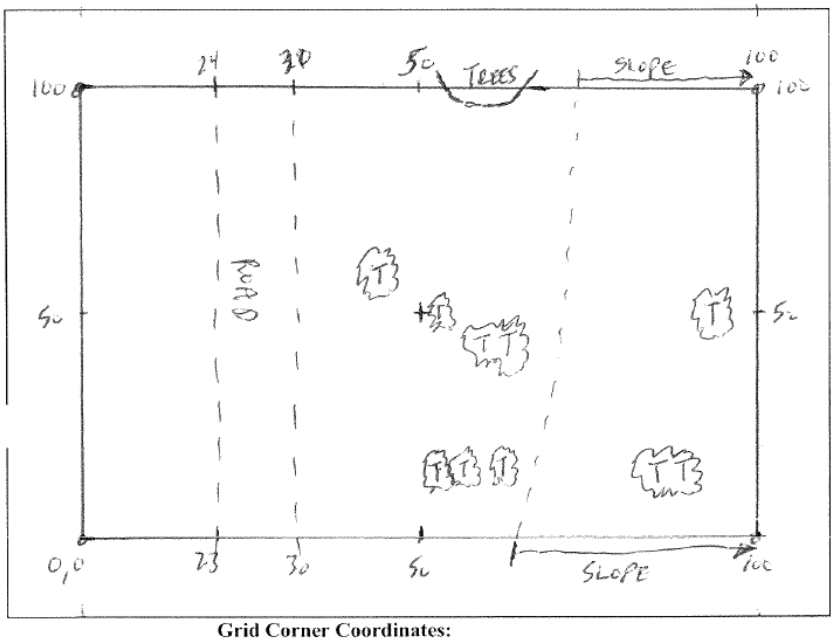
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: FORMER COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA 6 G **Date:** 05/08/03
Field Team: R.B., S.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☒Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	∅, ∅
NW	_____, _____	0, 100
NE	_____, _____	100, 100
SE	_____, _____	100, ∅

	Start	End	File Name
Battery Voltage:	12.1	11.8	
Static Background Value:	0.5	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 050803C
Repeat Data File Name: _____
Geophysical Instrumentation: EM61 MK2 & PRO 4000 **Serial Number:** 021927-3
~~**Base Station:**~~ MK2 GRENADE @ LN∅, STA 10 **Serial Number:** TOP COIL: 1X0.5 0130
Navigation Method: WHEEL INC = 0.66 **Serial Number:** BOT COIL: 023
Additional Comments: PULL LINES N→S DATA GAPS BELOW, LAST LINE IS 99; 102 NOT CLEA

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
29	64-59	57	21-18	75	22-14		
..	53-50	60	5-8	84	6-9		
51	38-34	60	96-100	84	35-41		
51	24-20	66	12-17	87	52-49		
54	20-24	72	12-15	96	63-66		
54	97-100	75	69-65				
57	100-97	75	48-41				

BLACKHAWK UXO Services a division of BlackHawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/09/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/12/03		Raw XYZ on Zap website	05/12/03	
Adjust lines and fiducials	05/12/03	"	Split Files In Excel	05/12/03	"
Create XYZ	05/12/03	"			

Maps and Targets

Oasis	KEA9G Date	Initials	KEA15G On FTP Site	Date	Initials
Review Test Files	05/13/03		5/13/03	Processed XYZ 5/13/03	
Determine Lag	05/16/03	"	5/13/03	Dig Sheets 5/13/03	"
Create Map	5/13/03	"	5/15/03	Local & SP Maps 5/13/03	"
Grid and Display Data	5/13/03	"	5/15/03	QC_tests.xls 5/13/03	"
Auto Pick Targets	5/13/03	"	5/13 &15/03	Processing Log 5/13/03	"
Review/Add Targets	5/13/03	"	5/15/03	Zapata spreadsheets	"
Targets to Digsheet	5/13/03	"	5/15/03		
Warp Data to SP	5/13/03	"	5/15/03		
Create SP & Local Maps	5/13/03	"	5/15/03 & 5/13		
Correct Format of Files	5/13/03	"	5/15/03		

Total Area Of Data

Grids/Transects Collected KEA9G + KEA15G

Total Targets: KEA9G → 311
KEA15G → 214

Comments: KEA9G →

Heeia Kea QC Tests

Date: 050303 System: EM61MK2

PM AM Shake Test

File: 050903d XYZ: 050903-QC5_pm_xyz_tmi

mV Range	
Ch1:	-.06 ± 2.5
ChT:	.13 ± 2

AM PM Shake Test

File: 050903a XYZ: 050903-QC5_am_xyz_t

mV Range	
Ch1:	1.57 ± 2
ChT:	-.71 ± 3

AM Standard Test

File: 050903d XYZ: 050903-QC5_pm_xyz_tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	-.77 ± 2	165.87 ± 1.5	-.86 ± 2
ChT:	.12 ± 2.5	233.28 ± 2	.12 ± 2.5

PM Standard Test

File: 050903a XYZ: 050903-QC5_am_xyz_tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	4.2 ± 2.5	172.17 ± 2	7.47 ± 2
ChT:	-.58 ± 3	233.17 ± 2	-.84 ± 2

* dri

KEA962 Repeat Line Test

File: 050903b XYZ: KEA962-QC10-050903-xyz-10_tmi

Locations		
	Local	State Plane
Line Start:	0,0	1703207.46, 1002163.57
Line End:	0,130	1703251.21, 1003855.96
Target:	0,30	1703217.64, 1002912.13

Attempted Lags: 1, 1.5, 1.4 Actual Lag: 1.4

Peak Reading		
	Pass One	Pass Two
Ch1:	127.61	120.81
ChT:	16.22	15.54

Ch1 - Peak Reading Locations (after corrections)				
	Pass One	Pass Two	State Plane	State Plane
X	0	0	1703217.47	1703217.66
Y	29.73	30.03	1002891.52	1002891.75

KEA1561 Repeat Line Test

File: 050903c XYZ: KEA1561-QC10-050903-xyz-10_tmi

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0,100	
Target:	0,8	

Attempted Lags: 1.4, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Ch1:	112.48	93.89
ChT:	16.22	10.04

Ch1 - Peak Reading Locations (after corrections)				
	Pass One	Pass Two	State Plane	State Plane
X	0	0		
Y	7.96	7.53		

Daily Log and QC Testing

Date: 05/09/03 Page: 1 of 4

Blackhawk Field Personnel: R. BLOHM, J. W.

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 0730 End Time: 0745
Check Battery Voltage	✓	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/09/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050903A Battery Voltage: 12.4 Time: 08:12 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	171	3.0	168
Channel 2-Bottom:	0.5	97	1.0	96
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	0.5	232	0.5	231.5

Location: SW CORNER @ grid 9

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 050903D Battery Voltage: 12.2 Time: 14:06 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	167	0.5	166.5
Channel 2-Bottom:	0.5	95	0.5	94.5
Channel 3-Bottom:	0.5	43	0.5	42.5
Channel 4-Top:	0.5	233	0.5	232.5

Location: SE Corner @ grid 15

3/4

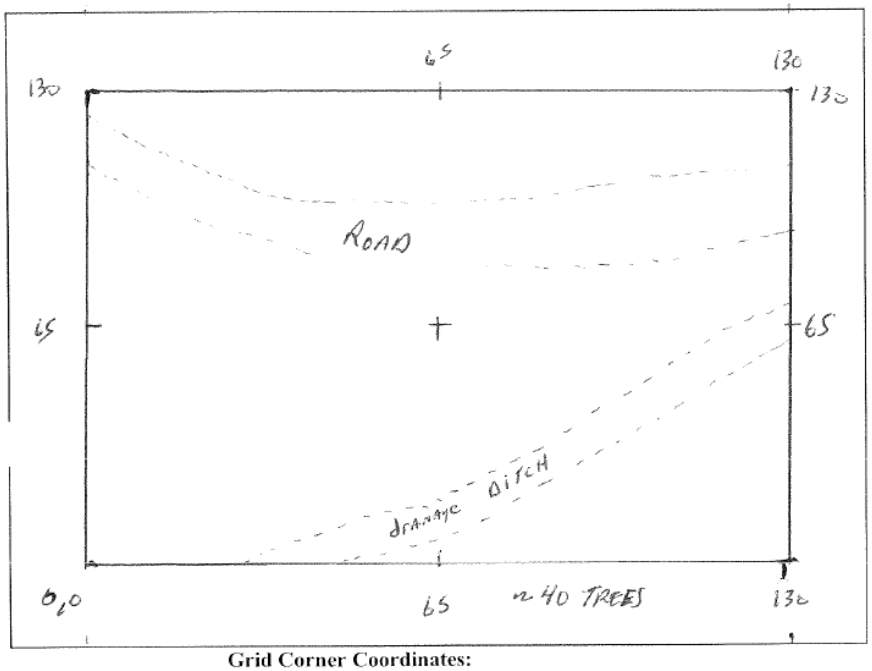
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK **Design Center POC:** _____
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLUHM
Survey Area ID: KEA 96 **Date:** 05/09/03 **Field Team:** R.B., J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☒Light ☒Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 130
NE	_____, _____	130, 130
SE	_____, _____	130, 0

	Start	End	File Name
Battery Voltage:	12.4	12.2	
Static Background Value:	low	low	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: N/A
Raw Data File Name: 050903B **Repeat Data File Name:** _____
Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021727-3
~~**Base Station:**~~ MK2 GRENADE @ LN 0, STA 30 **Serial Number:** TOPCON; 0130
Navigation Method: WHEEL INC = 0.66 **Serial Number:** BOTCON; 0231
Additional Comments: DATA SKIPS BELOW LNS RUN NORTH TO SOUTH LNS STOP AT 130

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	45-50	27	5-0	48	0-20	69	47-44	84	125-130	105	124-118	117	113-110
	~~30-27~~	30	0-5	48	71-74	69	35-31	890	0-12	108	0-3	117	102-95
2	127-122	30	96-100	51	12-0	69	10-0	90	91-96	108	14-19	123	109-105
3	83-59	33	100-97	54	0-11	72	0-10	93	4-0	109	32-35	123	26-22
6	0-2	33	11-0	54	108-111	72	108-114	96	0-3	108	114-123	123	7-3
6	115-121	36	0-11	63	113-109	72	122-130	96	40-42	111	95-92	126	16-28
12	127-130	39	11-0	63	4-0	75	130-129	99	43-40	111	30-28	126	93-98
21	4-0	42	0-11	69	130-129	75	124-115	102	48-50	114	9-11	126	110-114
		42	129-130	69	111-109	75	47-44			114	120-130	126	122-126

4/4

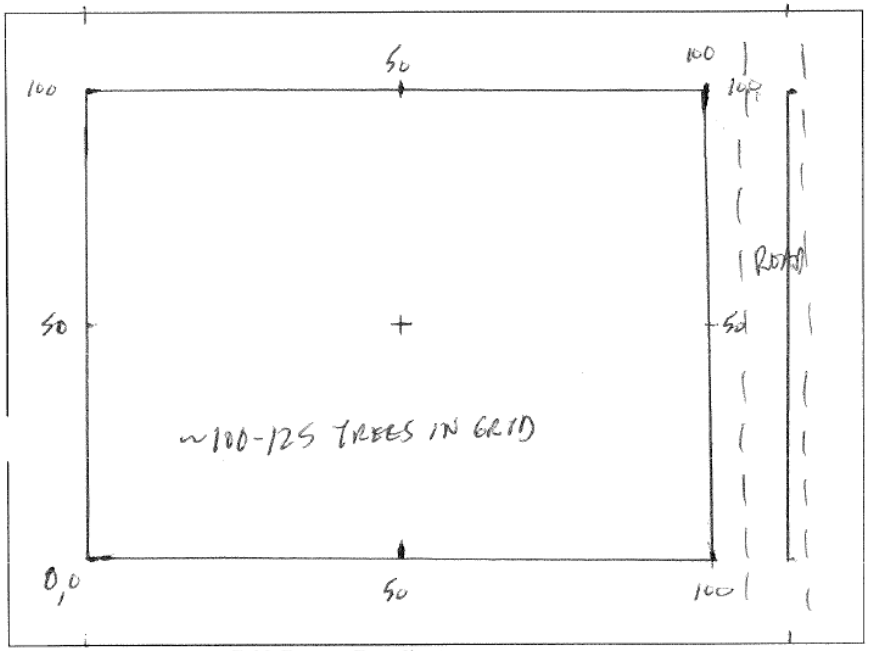
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: FORMER COMBAT TRAINING CAM
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA 156 **Date:** 05/09/03
Field Team: R.B., J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 100
NE	_____, _____	100, 100
SE	_____, _____	100, 0

	Start	End	File Name
Battery Voltage:	12.4	12.2	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 050903 C
Repeat Data File Name: _____
Geophysical Instrumentation: EM61 MK2 + PRO 4000 **Serial Number:** _____
~~**Base Station:**~~ MK2 GRENADE @ LN0 STA 8 **Serial Number:** _____
Navigation Method: WHEEL MODE INC = 0.66 **Serial Number:** _____
Additional Comments: DATA SKIPS LNs RUN North to South 0 to 100 SKIPS ON BACK

LN	STA-STA	LN	STA-STA
0	12-17	57	25-22
3	56-53	57	12-10
3	35-31	60	0-2
6	51-58	60	12-25
9	87-68	60	38-40
9	51-49	60	57-61
9	40-31	60	80-90
9	15-12	63	85-82
9	5-0	63	71-67
12	30-40	63	35-22
12	67-87	63	9-5
15	70-58	66	24-35
15	20-16	66	72-75
18	4-8	69	100-93
18	13-18	69	73-65
18	56-65	69	51-48
21	100-97	69	23-19
21	51-49	72	0-8
21	45-34	72	23-26
21	21-15	72	37-50
24	11-21	72	65-79
24	86-95	72	92-100
30	7-11	75	55-50
30	61-65	75	14-11
33	94-92	81	88-85
33	40-33	81	32-29
33	5-0	81	1-0
36	0-5	84	44-47
36	17-35	84	62-65
36	82-94	84	79-82
39	97-75	84	97-100
39	14-10	87	93-90
42	12-16	87	78-75
42	29-33	87	17-14
45	85-82	87	6-0
48	65-69	90	12-15
51	75-64	90	35-39
51	47-42	93	87-84
51	20-17	93	46-39
51	5-0	93	17-14
54	9-14	96	40-53
54	22-32	96	83-93
54	42-45	99	85-82
54	51-56	99	72-50
54	70-76	99	29-14
57	87-80		

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/12/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/13/03		Raw XYZ on Zap website	5/13/03	
Adjust lines and fiducials	5/13/03		Split Files In Excel	5/13/03	
Create XYZ	5/13/03				

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/14/03 KEA12GT 3T headed		Processed XYZ	5/14/03 KEA12GT KEA3T headed	
Determine Lag	5/14/03		Dig Sheets	5/14/03 5/19/03	
Create Map	5/14/03		Local & SP Maps	5/14/03	
Grid and Display Data	5/19/03		QC_tests.xls		
Auto Pick Targets	5/14/03		Processing Log	5/14/03	
Review/Add Targets	5/19/03		Zapata spreadsheets		
Targets to Digsheet	5/19/03				
Warp Data to SP	5/19/03				
Create SP & Local Maps	5/19/03				
Correct Format of Files	5/19/03				

Total Area Of Data

Grids/Transects Collected KEA12GT & KEA3T

Total Targets: KEA12GT = 244

Comments: KEA12GT = 15680.115 ft² = .36
KEA3T -> recollected 05/19/03

Heeia Kea QC Tests

Date: _____ System: _____

AM Shake Test

File: 051203c XYZ: 051203-QC5_am.xyz.txt

mV Range	
Ch1:	.53 ± 2
ChT:	-.216 ± 3

PM Shake Test

File: 051203d XYZ: 051203-QC5-pm-xyz.txt

mV Range	
Ch1:	1.39 ± 2.5
ChT:	-.75 ± 3

AM Standard Test

File: 051203e XYZ: 051203-QC5-am-xyz.txt

mV Range	Static 1	Standard	Static 2
Ch1:	2.09 ± 2	172.02 ± 2	3.83 ± 2
ChT:	-.31 ± 3.5	235.36 ± 3	-.34 ± 2.5

PM Standard Test

File: 051203d XYZ: 051203-QC5-pm-xyz.txt

mV Range	Static 1	Standard	Static 2
Ch1:	1.64 ± 1.5	168.43 ± 1.5	1.95 ± 2
ChT:	-.69 ± 2	229.37 ± 3	-.78 ± 4

KEA126 Repeat Line Test

File: 051203b XYZ: KEA126-051203-QC10-xyz-W-.txt

Locations	Local	State Plane
Line Start:	0, 0	1702848.49, 996851.09
Line End:	125, 0	1702953.37, 996883.09
Target:	30, 0	1702879.21, 996834.39

Attempted Lags: 1, 1.6, 1.4, 1.6, 1.4 Actual Lag: 1.4

Peak Reading	Pass One	Pass Two
Ch1:	108.93	122.84
ChT:	16.44	13.98

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	~~30.71~~ 29.53	30.26	1702873.09	1702873.92
Y	0	0	996835.17	996834.69

BEA3T Repeat Line Test

File: 051203c XYZ: NONE (Collected)

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading	Pass One	Pass Two
Ch1:		
ChT:		

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X				
Y				

Daily Log and QC Testing

Date: 05/12/03 Page: 1 of 4

Blackhawk Field Personnel: R. Bloom, B. Kinsman

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: Em61 Model: mk2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: Em61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: Em61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 08:45 End Time: 09:00
Check Battery Voltage	✓	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/12/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test) 6 MIN

File Name: 051203A Battery Voltage: 12.4 Time: 0900 Samples/Sec: 5

	Static(1)	**Standard**(3)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	2.0	172	3.0	169
Channel 2-Bottom:	1.0	97	1.0	96
Channel 3-Bottom:	0.5	44	0.0	44
Channel 4-Top:	0.5	235	0.5	234.5

Location: LINE 0, STA 30 GRID 37422 KE

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051203D Battery Voltage: 11.7 Time: 03:30 Samples/Sec: 5

	Static(1)	**Standard**(3)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	165	1.0	164
Channel 2-Bottom:	0.5	94	-0.5	94.5
Channel 3-Bottom:	0.0	43	-0.5	43.5
Channel 4-Top:	-1.0	229	-1.0	230

Location: KEA 3T 34100 STAKE

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING C

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

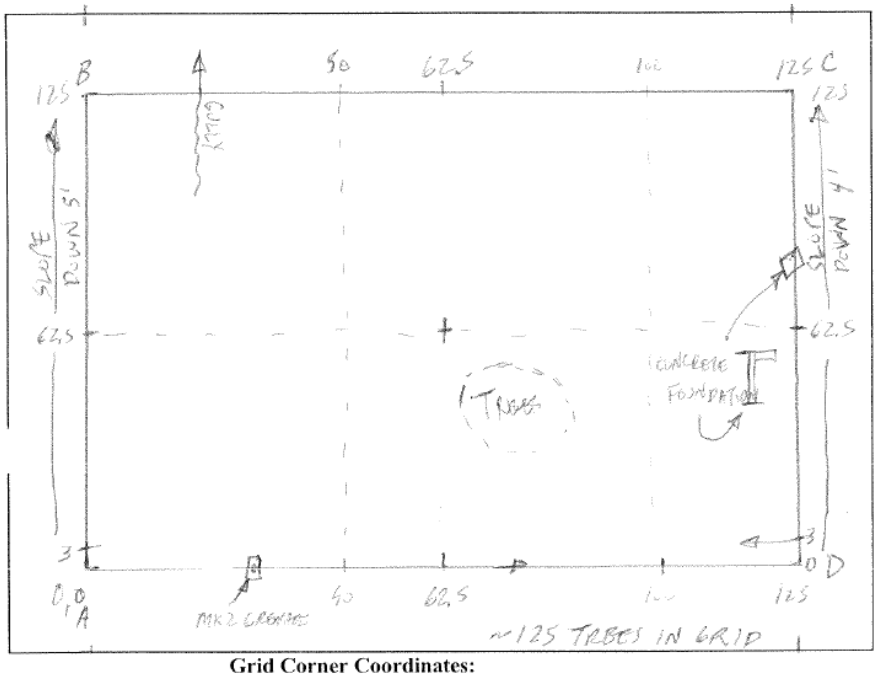
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOHM

Survey Area ID: KEA 12G **Date:** 05/12/03 **Field Team:** R.B. B.K. J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Stee
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 3
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 125
NE	_____, _____	C	125, 125
SE	_____, _____	D	125, 0

	Start	End	File Name
Battery Voltage:	12.4	_____	
Static Background Value:	1.0	_____	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051203 B **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO 4000 175,230 KB **Serial Number:** 021927-3

Base Station: MK2 GRENADE @ LN'0, STA 34 ; 0.1 LINE IS REPEAT OF LN0 **Serial Number:** TOPCON, 0130

Navigation Method: WHEEL MODE = 0.66 **Serial Number:** BOECHLE, 0231

Additional Comments: RUN LINES E=>W, DATA SKIPS BELOW + BACK

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
1	67-70	9	70-68	21	50-48	30	119-125	42	39-42	51	5-0	63	70-64	75	27-23	90	0-5		
2	117-103	12	76-82	21	25-24	33	124-122	42	54-79	54	52-63	66	54-59	78	18-18	90	17-37		
3	68-65	15	86-84	24	56-67	33	116-110	45	75-68	57	63-60	69	38-40	81	51-48	90	75-71		
3	52-50	15	16-9	24	88-92	33	58-50	45	25-29	57	47-45	72	71-78			90	100-10		
6	93-103	18	77-86	24	113-113	33	41-24	51	112-109	60	18-22	72	121-125	84	10-12	93	57-5		
6	116-120	18	113-117	27	89-86	36	55-72	51	55-54	60	54-66	75	119-118	84	45-63	96	0-7		
9	119-115	21	101-103	27	9-6	36	99-106												

LN	STA-STA	LN	STA-STA	LN	STA-STA
96	50-58				
99	106-108				
99	72-71				
99	59-52				
102	40-46				
102	97-99				
105	14-8				
108	52-62				
108	106-113				
111	94-92				
111	42-27				
114	12-16				
114	27-41				
117	67-56				
117	42-35				
117	14-10				
120	48-59				
120	84-92				
123	125-119				
123	14-11				
126	87-74				

4/4

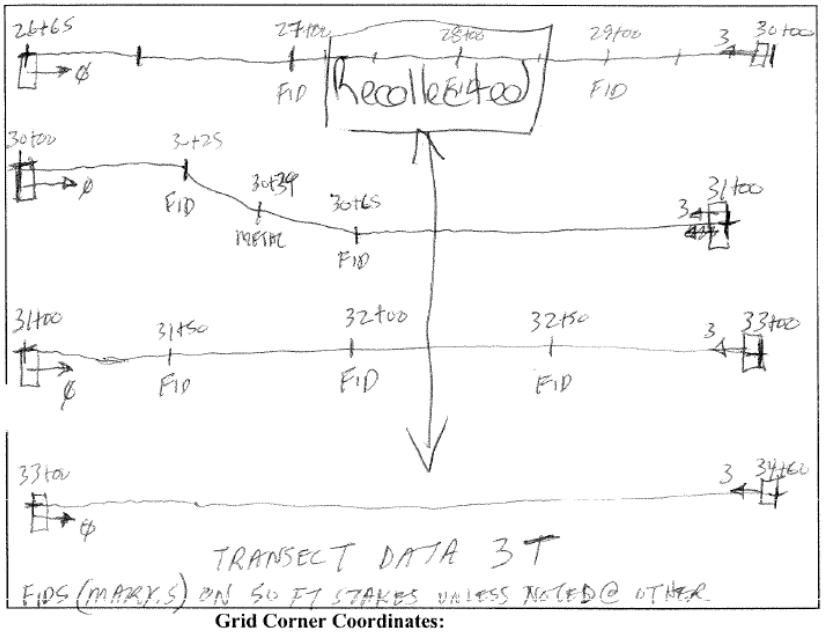
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA
Project Location: FORMER COMBAT TRAINING CAMP
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA 3T **Date:** 05/12/03
Field Team: R.B., B.K., J.W
Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☐ fe

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 40'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	26+65, 0
NW	_____, _____	_____, _____
NE	_____, _____	_____, _____
SE	_____, _____	0, 34+60

	Start	End	File Name
Battery Voltage:	12.1	11.8	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051203C 54,450 KB **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** ~~Trimble~~ 021927

Base Station: RUN 1ST LANE ON SOUTHSIDE OF CENTER TAPE (Ø). **Serial Number:** Top coil; 0130

Navigation Method: WHEEL MODE INC = 0.66 2ND LANE ON NORTHSIDE **Serial Number:** Bot coil; 0231

Additional Comments: SURVEY NAIL @ 26+65 STAKE

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN
	2711 - 2716	3	2881 - 2878	Ø	3436 - 3432	
~	2733 - 2738	3	2808 - 2804	3	3441 - 3436	
Ø	2887 - 2892	3	3198 - 3190	3	3412 - 3407	
3	2988 - 2985	Ø	3332 - 3338	3	3379 - 3376	
3	2964 - 2961	Ø	3375 - 3379			

3198 - 3190
2964 - 2961
2988 - 2985
2881 - 2878
2808 - 2804

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/13/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
KEA11G					
Convert .R61 files	05/15/03	[initials]	Raw XYZ on Zap website	05/15/03	[initials]
Adjust lines and fiducials	05/15/03	"	Split Files In Excel	5/16	[initials]
Create XYZ	05/15/03	"			

Maps and Targets

Oasis	Date (KEA11G)	Date (KEA3T)	Initials	On FTP Site	Date	Date	Initials
Review Test Files	5/16	5/27	[initials]	Processed XYZ	5/16	5/28	[initials]
Determine Lag	5/16	5/27	"	Dig Sheets	5/16	5/28	"
Create Map	5/16	5/27	"	Local & SP Maps	5/16	5/28	"
Grid and Display Data	5/16	5/27	"	QC_tests.xls	5/16	5/16	"
Auto Pick Targets	5/16	5/27	"	Processing Log	5/16	5/28	"
Review/Add Targets	5/16	5/27	"	Zapata spreadsheets			
Targets to Digsheet	5/16	5/27	"				
Warp Data to SP	5/16	5/28	[initials]				
Create SP & Local Maps	5/16	5/28	"				
Correct Format of Files	5/16	5/28	"				

Total Area Of Data: KEA11G =

Grids/Transects Collected: KEA11G, KEA3T

Total Targets: KEA11G → ~~[illegible]~~ 189
KEA3T → 130

Comments: KEA3T = 7590 ft²

Heeia Kea QC Tests

Date: 051303 System: EM61MK2

AM Shake Test

File: 051303a XYZ: 051303-QC5-am-xyz.tmi

mV Range	
Ch1:	-.32 ± 2
ChT:	.023 ± 1.5

PM Shake Test

File: 051303d XYZ: 051303-QC5-pm-xyz.tmi

mV Range	
Ch1:	.15 ± 2.5
ChT:	.09 ± 3

AM Standard Test

File: 051303a XYZ: 051303-QC5-am-xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	1.31 ± 2.5	170.71 ± 2	1.36 ± 1.5
ChT:	-.21 ± 2.5	235.169 ± 2.5	-.34 ± 3

PM Standard Test

File: 051303d XYZ: 051303-QC5-pm-xyz.tmi

mV Range	Static 1	Standard	Static 2
Ch1:	-.08 ± 2.8	166.22 ± 1.5	-.37 ± 3
ChT:	.079 ± 3	232.24 ± 3	-.02 ± 3

KEA116 Repeat Line Test

File: 051303b XYZ: KEA116-051303-QC0-xyz.W.tmi

Locations	Local	State Plane
Line Start:	0,0	1702500.98, 998502.40
Line End:	0,148	1702518.49, 100090[illegible].38
Target:	0,55	1702507.67, 99904.28

Attempted Lags: 1.4, 1.2 Actual Lag: 2

Peak Reading	Pass One	Pass Two
Ch1:	106.80	101.44
ChT:	15.16	12.83

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X	0	0	1702507.51	1702507.69
Y	55.19	55.84	99907.98	99906.63

KEA3T Repeat Line Test

File: 051303c XYZ: NOT COLLECTED

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading	Pass One	Pass Two
Ch1:		
ChT:		

Ch1 - Peak Reading Locations (after corrections)	Pass One	Pass Two	State Plane	State Plane
X				
Y				

Daily Log and QC Testing

Date: 05/13/03 Page: 1 of 4

Blackhawk Field Personnel: R. BLOHM, B. KONSHAK

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 08:10 End Time: 08:30
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1 _____ Line 2 _____ Line 3 _____

Line 4 _____ Line 5 _____ Line 6 _____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/13/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051303A Battery Voltage: 12.4 Time: 08:30 Samples/Sec: 5

	Static (3)	**Standard** (1)	**Static** (1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	170	1.0	169
Channel 2-Bottom:	0.0	96	0.0	96
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	0.5	235	-1.0	236

Location: S.W. CORNER GRID 11

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051303D Battery Voltage: 12.4 Time: 15:11 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0	167	0.5	166.5
Channel 2-Bottom:	0	94	0.5	93.5
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	0.5	231	0.5	230.5

Location: NW Corner of Grid 106

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING CAM

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

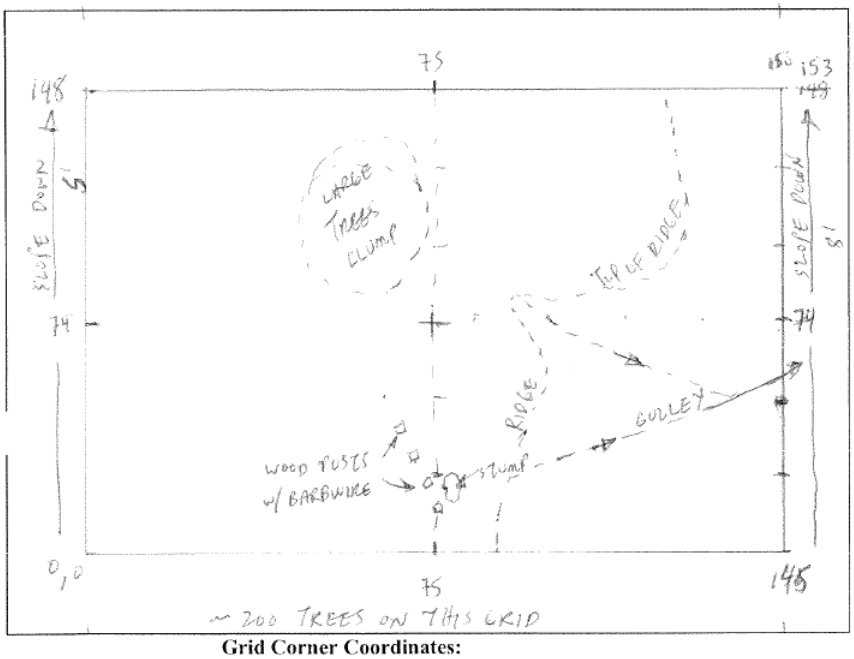
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOHM

Survey Area ID: GRID 11G **Date:** 05/13/03 **Field Team:** R.B., B.K., J.W.

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 148
NE	_____, _____	145 ~~148~~, ~~148~~ 153
SE	_____, _____	150, 0

Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	Start	End	Time File Name
Battery Voltage:	12.4	12.1	8:45 11:30
Static Background Value:	1.0	3.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051303B **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** See Page 1

Base Station: RUN LINES NORTH TO SOUTH; REPEAT LN 0.1 148 TO 0 **Serial Number:** _____

Navigation Method: WHEEL MODE INC = 0.66 LINES 0-96 = 0 TO 148 **Serial Number:** _____

Additional Comments: MK2 GRELAND @ LN 0 STA 55 LINES 99- = 0 TO 150

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
3	3-6	15	98-95	29	87-92	30	144-148	32	86-64	51	134-119	66	24-32	75	11-6
6	112-128	18	29-31	29	120-125	33	93-75	42	69-74	51	107-102	66	109-134	78	6-14
9	145-147	18	57-77	27	146-144	33	56-48	42	139-143	54	119-140	69	139-108	78	48-51
9	127-102	18	96-106	27	120-113	33	7-0	45	31-29	57	140-126	69	55-24	78	62-69
9	53-41	21	110-94	27	87-85	36	47-58	48	42-48	57	39-26	72	15-29	81	96-93
12	100-114	21	77-73	30	50-57	39	141-137	48	53-48	60	23-43	72	118-125	81	91-98

	LN	STA-STA	LN	STA-STA	
	87	75-72	135	72-67	
	90	22-30	138	67-79	
	90	44-48	138	115-125	
	90	71-78	141	86-68	
	90	102-113	~~144~~		
	93	112-108	144	LAST LINE	
	93	84-67			
	93	51-48			
	96	0-8			
	96	23-26			
*	96	125-130			
	99	85-82			
	99	54-51			
	99	8-0			
	102	12-21			
	102	48-51			
	102	148-150			
	105	24-22			
	105	2-0			
	108	0-5			
	108	147-150			
	111	150-145			
	111	110-106			
*	111	48-36			(2) STEEP DRAINAGES + RIDGE TOP
	111	16-10			
*	114	148-150			" " "
	123	115-86			
*	123	70-64			EXTRA DATA (-14) NEED TO EDIT 123
	126	45-50			
	126	84-92			
	126	115-117			
*	132	148-150			EXTRA DATA DUE TO SLOPE

Page 1 of

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: ~~5/15/03~~

Project Name: Heeia Kea **Project Location:** Former Combat Training Camp

Geophysical Contractor: Blackhawk **Design Center POC:** _____

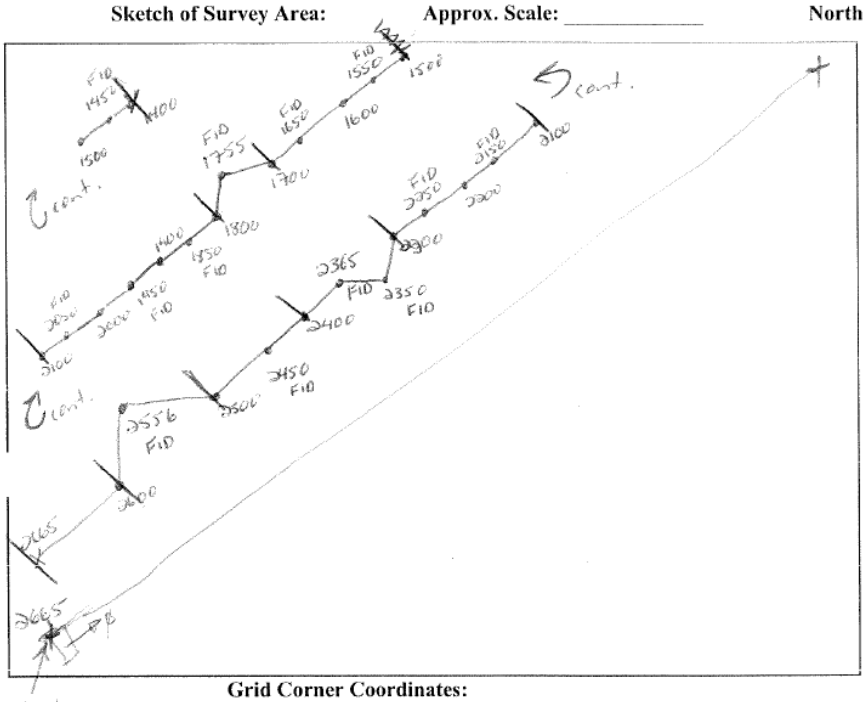
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Kea 3T **Date:** 05/13/03 **Field Team:** BK, JW, RB

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☒Moderate Slope ☒Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☒Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	2665 → 1400
NW	_____, _____	Transect, Kea 3T
NE	_____, _____	_____, _____
SE	_____, _____	_____, _____

	Start	End	File Name
Battery Voltage:	13.4	____	215Am 315
Static Background Value:	____	____	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051303C **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRs 4ccs **Serial Number:** See Page 1

Base Station: _____ **Serial Number:** _____

Navigation Method: WHEEL MODE INC = .66 **Serial Number:** _____

Additional Comments: _____

LN	STA-STA	LN	STA-STA
	2648-2645	0	2114-2100
	2634-2630	0	2100-2090 X
	2613-2600	0	2080-2072
	2450-2433	0	1954-1950
	2433-2450	0	1858-1850 X

LN	STA-STA	LN	STA-STA
X 3	1881-1887	3	~~1565-1580~~
0	1719-1715	3	1565-1571
X 0	1635-1633	3	1631-1626 X
X 0	1536-1530	3	1650-1656 X
	1530-1536		

~ Edit out 1565-1580

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/14/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/15/03	[illegible]	Raw XYZ on Zap website	05/16/03	[illegible]
Adjust lines and fiducials	05/16/03	"	Split Files In Excel	05/19/03	[illegible]
Create XYZ	05/16/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/19/03	[illegible]	Processed XYZ	05/19/03	[illegible]
Determine Lag	5/19/03	"	Dig Sheets	05/19/03	"
Create Map	5/19/03	"	Local & SP Maps	05/19/03	"
Grid and Display Data	5/19/03	"	QC_tests.xls	05/19/03	"
Auto Pick Targets	5/19/03	"	Processing Log	05/19/03	"
Review/Add Targets	5/19/03	"	Zapata spreadsheets		
Targets to Digsheet	5/19/03	"			
Warp Data to SP	5/19/03	"			
Create SP & Local Maps	5/19/03	"			
Correct Format of Files	5/19/03	"			

Total Area Of Data: .34 acres Total Targets: KEA14G - 94

Grids/Transects Collected: KEA14G

Comments:

15833.70 ft²
gaps ≈ 959.8 ft²
= 14873.87 ft² = .34 acres

Heeia Kea QC Tests

Date: 05/14/03 System: EM61MK2

AM Shake Test

File: 051403a XYZ: 051403_QC5_am_xyz_tml

mV Range	
Ch1:	.74 ± 2
ChT:	-.48 ± 2.5

PM Shake Test

File: 051403c XYZ: 051403_QC5_pm_xyz_tml

mV Range	
Ch1:	.05 ± 2
ChT:	~~[illegible]~~ -.37 ± 2

AM Standard Test

File: 051403a XYZ: 051403_QC5_am_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	1.48 ± 1.5	167.22 ± 1.5	-.37 ± 1.5
ChT:	-.50 ± 3	232.36 ± 2.5	-.50 ± 2.5

PM Standard Test

File: 051403c XYZ: 051403_QC5_pm_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	-.23 ± 4	167.2 ± 3	1.46 ± 1.5
ChT:	-2.06 ± 5	231.57 ± 3	-.58 ± 3

* A few jumps in the stati

KEA14G Repeat Line Test

File: 051403b XYZ: KEA14G_051403_QC10_xyz_W_tml

Locations	Local	State Plane
Line Start:	0, 0	1703971.08, 99526.74
Line End:	0, 126	1704089.03, 99568.17
Target:	0, 10	1703980.77, 99530.14

Attempted Lags: 0, 2, 1 Actual Lag: 1

Peak Reading	Pass One	Pass Two
Ch1:	109.81	119.07
ChT:	18.62	22.34

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	9.70	0	1703980.16	99529.93
Pass Two	~~11.17~~ ≈10.7	0	1703981.50	99530.50

Average between pts

_____ Repeat Line Test

File: _____ XYZ: _____

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading	Pass One	Pass Two
Ch1:		
ChT:		

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/14/03 Page: 1 of 3

Blackhawk Field Personnel: K. Bleiler, B. Kenshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 07:30 End Time: 08:45
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/14/03 Page: 2 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051403A Battery Voltage: 12.2 Time: 08:59 Samples/Sec: 5

	Static	**Standard** (1)	**Static** (1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	0.0	167
Channel 2-Bottom:	0.0	94	-1.0	93
Channel 3-Bottom:	0.0	42	0.0	42
Channel 4-Top:	-1.0	232	-1.0	233

Location: CENTER OF GRID 14

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051403C Battery Voltage: 11.7 Time: 14:55 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	167	1.0	166
Channel 2-Bottom:	0.0	95	0.0	95
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	-1.0	231	-1.0	232

Location: CENTER OF GRID 13

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____ 3/3

Project Name: HE'EIA KEA **Project Location:** FORMER COMBAT TRAINING CAMP

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

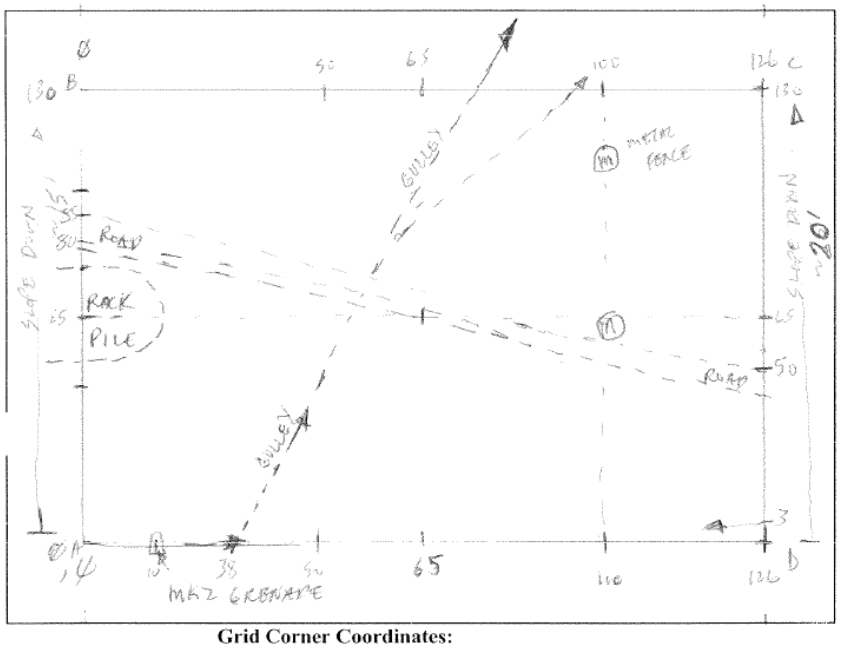
Project Geophysicist: R. BLOHM **Site Geophysicist:** R. BLOHM

Survey Area ID: KEA 146 **Date:** _____ **Field Team:** R.B., B.K., J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☐Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 130
NE	_____, _____	C	126, 130
SE	_____, _____	D	126, 0

	Start	End	File Name
Battery Voltage:	12.2	11.8	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	8.45	12.00	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051403B **Repeat Data File Name:** REPEAT LN 0 ; 0.1

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021927-3

Base Station: MK2 GRENADE @ LN 0 STA 10 ON SURFACE, FID 1 @ 50 & 100 **Serial Number:** TOP COIL: 0136

Navigation Method: WHEEL MODE INC = 0.66 ; REPEAT LINE 0 WITH 0.1 **Serial Number:** BOT COIL: 0231

Additional Comments: RUN LINES EAST → WEST, DATA SKIPS BELOW; REPEAT LN 27; *EDIT OUT 1ST LN 27

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA
0	14-17	6	62-66	12	110-113	21	120-113	27	126-120	30	67-70	39	71-65	~~54~~	
1	41-50	9	96-92	15	104-102	21	81-76	27	102-99	30	97-102	39	47-45	54	27-1
3	60-57	9	80-78	15	61-59	21	64-59	~~27~~	~~32-17~~	33	46-44	48	31-44	57	120-
3	49-46	9	54-54	15	2-0	21	34-15	27	28-17			48	84-88	57	10-
3	28-0	9	32-30	18	5-12	24	56-64	27	5-0	36	44-46	51	54-51	60	0-1
6	0-3	9	12-9	18	60-72			30	9-7.5	36	73-83	54	6-10	60	48-

SKIP IN DATA LINES:

LN	STA - STA	LN	STA - STA	
60	122-126	105	83-68	
63	111-108	108	122-126	
63	93-82	114	25-39	
63	28-0	114	55-61	
66	0-20	114	96-101	
69	126-122	117	109-105	
69	98-96	117	25-18	
69	68-66	120	18-25	
69	20-0	120	95-108	
72	0-20	123	126-124	
72	47-51	123	76-68	STUMPS
72	72-79	126	67-83	
75	83-80			
75	57-55	129	LAST LINE ON GRID	
75	6-0	0.1	58-56	REPEAT OF LN 69 W/ GRENADE
78	42-45	0.1	48-45	
78	51-55	0.1	16-14	
81	117-109			
81	99-96			
84	110-118			
87	119-114			
87	36-29			
87	4-0			
90	24-34			
90	57-69			
90	98-101			
93	65-60			
93	36-24			
96	29-33			
96	63-69			
96	105-107			

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/15/03 System: BMIeIMK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/16/03		Raw XYZ on Zap website	05/16/03	
Adjust lines and fiducials	05/16/03		Split Files In Excel	5/20/03	
Create XYZ	05/16/03				

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/20/03		Processed XYZ	5/20/03	
Determine Lag	5/20/03	"	Dig Sheets	5/20/03	"
Create Map	5/20/03	"	Local & SP Maps	5/20/03	"
Grid and Display Data	5/20/03	"	QC_tests.xls	5/20/03	
Auto Pick Targets	5/20/03	"	Processing Log	5/20/03	"
Review/Add Targets	5/20/03	"	Zapata spreadsheets		
Targets to Digsheet	5/20/03	"			
Warp Data to SP	5/20/03	"			
Create SP & Local Maps	5/20/03	"			
Correct Format of Files	5/20/03	"			

Total Area Of Data: .80 acres

Total Targets: KEA136 = 526

Grids/Transects Collected: KEA136

Comments:

KEA136 → 34717.87 ft²
= .80 acres

Heeia Kea QC Tests

Date: 5/15/03 System: BUD/MK2

AM Shake Test

File: 051503a XYZ: 051503_QC5_am_xyz.tkl

mV Range	
Ch1:	.19 ± 2
ChT:	~~.22 ± 2~~ -.50 ± 2

PM Shake Test

File: 051503d XYZ: 051503_QC5_pm_xyz.tkl

mV Range	
Ch1:	.13 ± 2
ChT:	.116 ± 1.5

AM Standard Test

File: 051503a XYZ: 051503_QC5_am_xyz.tkl

mV Range			
	Static 1	Standard	Static 2
Ch1:	.22 ± 2	161.26 ± 2.5	1.00 ± 2.5
ChT:	-.067 ± 2	232.95 ± 2	-.56 ± 2

PM Standard Test

File: 051503d XYZ: 051503_QC5_pm_xyz.tkl

mV Range			
	Static 1	Standard	Static 2
Ch1:	.87 ± 3	1605.73 ± 2	1.73 ± 2
ChT:	-.02 ± 2	232.29 ± 1.5	-.11 ± 1.5

KEA13/7-1 Repeat Line Test

File: 051503b XYZ: KEA13/7_051503_QC10-1_xyz.tkl

Locations	Local	State Plane
Line Start:	0,0	1703679.46, 99791.83
Line End:	0', 200	1703548.24, 99941.45
Target:	0', 30	1703659.26, 99814.85

Attempted Lags: 0, 1, 2, 1.4, 1.2 Actual Lag: 1.2

Peak Reading	Pass One	Pass Two
~~Ch1:~~ log	131.70	127.94
~~ChT:~~		

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	30.11	1703659.70	99814.35
Pass Two	0	29.36	1703660.28	99813.83

KEA13/7-2 Repeat Line Test

File: 051503c XYZ: KEA13/7_051503_QC10_2_xyz.tkl

Locations	Local	State Plane
Line Start:	0,0	1703679.46, 99791.83
Line End:	0', 200	1703548.24, 99941.45
Target:	0', 30	1703659.26, 99814.85

Attempted Lags: 0, 1, 2, 1.4 Actual Lag: 1.4

Peak Reading	Pass One	Pass Two
~~Ch1:~~ log	160.22	151.44
~~ChT:~~		

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	30	1703659.77	99814.26
Pass Two	0	29.96	1703659.87	99814.30

Daily Log and QC Testing

Date: 05/15/03 Page: 1 of 3

Blackhawk Field Personnel: R. Bluhm, B. Benshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: EM61 Model: MK2 SN: 02192 7-3
Controller: PRO4000 Model: ~~P4216-EH3~~ SN: ~~1584~~ 1596 Model: 490 ES
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes) ✓ Start time: 07:40 End Time: 07:55
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/15/03 Page: 2 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051503A Battery Voltage: 13.0 Time: ~~0810~~ 0834 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.5	~~165~~ 167	0.5	~~165~~ 166.5
Channel 2-Bottom:	0.5	~~94~~ 95	0	~~94~~ 95
Channel 3-Bottom:	~~X~~ 0	~~43~~ 43	0	~~43~~ 43
Channel 4-Top:	0	~~233~~ 233	0.5	~~233~~ 232.5

Location: West Side of Grid 13 (15, 135)

Note: Switched Pre-4000, Re-collected QC & 1st Lines

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051503D Battery Voltage: 11.4 Time: 14:49 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	165	1.0	164
Channel 2-Bottom:	0.0	95	0.0	95
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	0.0	232	0.0	232

Location: WEST SIDE OF GRID 13 (15,135)

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING LA

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

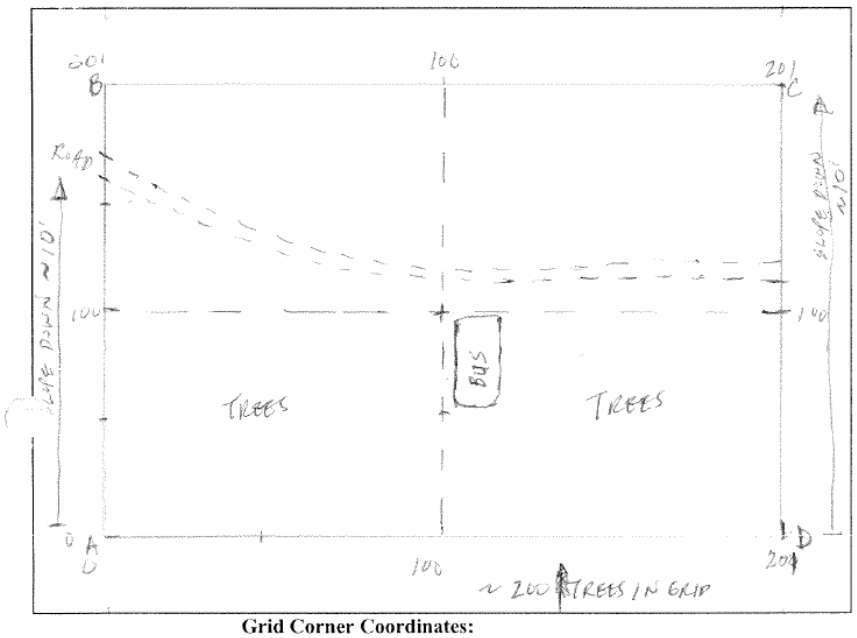
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLUM

Survey Area ID: KEA 136 **Date:** 05/15/03 **Field Team:** R.B., B.K., J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 201
NE	_____, _____	201, 201
SE	_____, _____	201, 0

	Start	End	File Name
Battery Voltage:	12[illegible]	10.0	0501538
Static Background Value:	1.0	1.0	0515030
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 0515038, 0515030 **Repeat ~~Data~~ LINE File Name:** Line 1

Geophysical Instrumentation: EM61 MK2 + PROVUE FID's @ 50, 100 & 150 **Serial Number:** 0219273

Base Station: MK2 GRENADE @ (0, 30) FILE 0515038 CONTAINS LINES 8-99 **Serial Number:** TOPCON: 0130

Navigation Method: WHEEL MADE INC = .665/FILE 0515030 LINES 102-201 **Serial Number:** BUTLER: 0231

Additional Comments: DATA SKIPS AS BELOW + BACK

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	S
0	63-83	6	30-31	12	56-101	15	93-97	27	49-46	33	86-84	39	40-97	45			
0	116-120	6	55-75	15	88-68	21	100-85	27	33-14	33	36-30	39	67-56	48			
3	110-104	6	118-138	15	37-21	21	59-56	30	10-34	36	0-6	39	3-0	48			
3	55-51	9	41-46	15	5-0	24	86-84	30	50-50	36	30-30	42	60-75	51			
3	28-27	9	11-8	18	0-2	27	100-89	30	71-95	36	43-51	42	106-134	51			
6	5-9			18	67-71	27	77-71	30	103-107	36	94-105	45	89-54	54			

DATA SKIPS ON GRID 13

* NEED TO ADJUST SEGMENT

LN	STA - STA	LN	STA - STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
54	34 - 59	8[illegible]7	88-56	129	91-89	189	3-0		
54	70 - 77	8[illegible]7	43-37	129	75-60	192	14-18		
57	84 - 80	8[illegible]7	19-15	132	0-4				
57	58 - 55	[illegible]90	14-27	132	50-77	*195	97-93		
57	46 - 31	[illegible]90	56-62	135	78-48	195	16-13		
57	10 - 0	[illegible]90	79-88	135	31-28	198	45-50		
60	4 - 9			138	47-89	198	57-60		
LN	STA - STA	LN	STA - STA	141	88-85	198	81-101		
60	33 - 35	[illegible]90	103 - 108	144	25-33	201	104-83		
60	40 - 45	93	80-74	147	72-70	*201	49-46	LAST LINE	
60	57 - 40	93	61-45	147	29-24	0.1	118-117		
60	154 - 159	93	36-24	150	24-30	0.1	82-74		
63	160 - 155	[illegible]6	0-4	150	77-80				
63	104 - 86	96	24-28	153	80-29				
63	66 - 59	96	45-49	153	20-14				
63	44 - 24	96	74-80	156	28-58				
63	9 - 0	99	100-55	159	77-74				
66	0 - 8	99	20-8	159	58-45				
66	41-43	01	120-116	*162	49-53				
66	53 - 106	01	83-74	162	154-155				
69	91 - 68	05/503B		*165	79-77				
69	33 - 29	05/503C ↓		165	11-0				
69	21 - 9	0	5-9	168	0-12				
72	9 - 10	0	78-83	168	159-161				
72	55 - 86	0	114-120	171	90-77				
LN	STA - STA	LN	STA - STA	171	65-59				
72	106 - 111	102	52-100	174	0-10				
75	111 - 108	105	100-50	174	21-33				
75	102 - 55	105	36-29	174	54-82				
75	40 - 37	108	0-5	174	87-90				
75	13 - 6	108	54-100	177	54-52				
78	34-39	111	98-56	177	29-21				
78	58 - 91	111	37-32	180	10-28				
78	106 - 113	114	71-100	180	52-57				
81	83 - 61	117	99-47	180	80-86				
81	46 - 35	117	20-18	183	34-31				
81	4 - 0	120	58-61	186	0-5				
84	0 - 6	123	58-57						
84	21-45	123	47-43						
84	55-92	123	13-11						

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/16/03 System: 4 EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/19/03		Raw XYZ on Zap website	5/19/03	"
Adjust lines and fiducials	5/19/03	"	Split Files In Excel	~~5/19/03~~ 5/21	"
Create XYZ	5/19/03	"			

Maps and Targets

Oasis	Date 1T	Date 2T	Date 3T	Initials	On FTP Site	Date 1T	Date 2T	Date 3T	Initials
Review Test Files	5/21	5/21	5/21		Processed XYZ	5/22	5/22	5/22	
Determine Lag	5/21	5/21	5/21	"	Dig Sheets	5/22	5/22	5/22	"
Create Map	5/21	5/21	5/21	"	Local & SP Maps	5/22	5/22	5/22	"
Grid and Display Data	5/21	5/21	5/21	"	QC_tests.xls	5/27	5/27	5/27	
Auto Pick Targets	5/21	5/21	5/21	"	Processing Log	5/27	5/27	5/27	
Review/Add Targets	5/21	5/21	5/21	"	Zapata spreadsheets				
Targets to Digsheet	5/21	5/21	5/21	"					
Warp Data to SP	5/22	5/22	5/22	"					
Create SP & Local Maps	5/22	5/22	5/22	"					
Correct Format of Files	5/22	5/22	5/22	"					

Total Area Of Data: 10,800 ft²

Total Targets:

Grids/Transects Collected: KEA1T, 3T, 2T

Comments:

KEA1T = 20, 13 = 33
KEA2T = 38
KEA3T = 47

Heeia Kea QC Tests

Date: 05/16/03 System: EM61 MK2

AM Shake Test

File: 05163a XYZ: 051603_QC5-am-xyz.txt

mV Range	
Ch1:	1.29 ± 2
ChT:	-.10 ± 2

PM Shake Test

File: 05163i XYZ: 051603_QC5_pm_xyz.txt

mV Range	
Ch1:	-1.10 ± 2.5
ChT:	-.11 ± 3

AM Standard Test

File: 05163a XYZ: 051603_QC5_am_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.5 ± 1.75	169.98 ± 2.5	1.87 ± 2
ChT:	-.24 ± 2	235.2 ± 2.5	-.23 ± 2

PM Standard Test

File: 05163i XYZ: 051603_QC5_pm_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	-1.5 ± 2.5	162.4 ± 2.5	-.82 ± 2.5
ChT:	-.22 ± 3	229.28 ± 4	-.13 ± 3.5

KEA - T Repeat Line Test

File: 05163c XYZ: DS1603_QC10_xyz.txt

Locations		
	Local	State Plane
Line Start:	0 0	
Line End:	0, 40	
Target:	0, 20	

Attempted Lags: 0, 1.4, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
~~Ch1:~~	108.59	80.51
~~ChT:~~		

Log

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	20		
Pass Two	0	20		

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
~~Ch1:~~		
~~ChT:~~		

Log

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/16/03 Page: 1 of 4

Blackhawk Field Personnel: R. Bluhm, B. Konshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: EM61/1X0.5 SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1X0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0730 End Time: 0745
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length

Notes: Sax
303-278-0789

AM Tests for Data Processing

Date: 05/16/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051603A Battery Voltage: 12.4 Time: 0803 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	169	1.0	168
Channel 2-Bottom:	0.0	96	0.0	96
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	-0.5	235	0.5	234.5

Location: KEA 2T NEAR ROAD @ 13+50

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051603L Battery Voltage: 11.7 Time: 14.45 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	-1.0	162	-1.0	163
Channel 2-Bottom:	0.5	94	0.5	93.5
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	-1.0	230	-1.0	231

Location: KEA 3T 14+00

☐ QC checked by ____________
Date: ____________

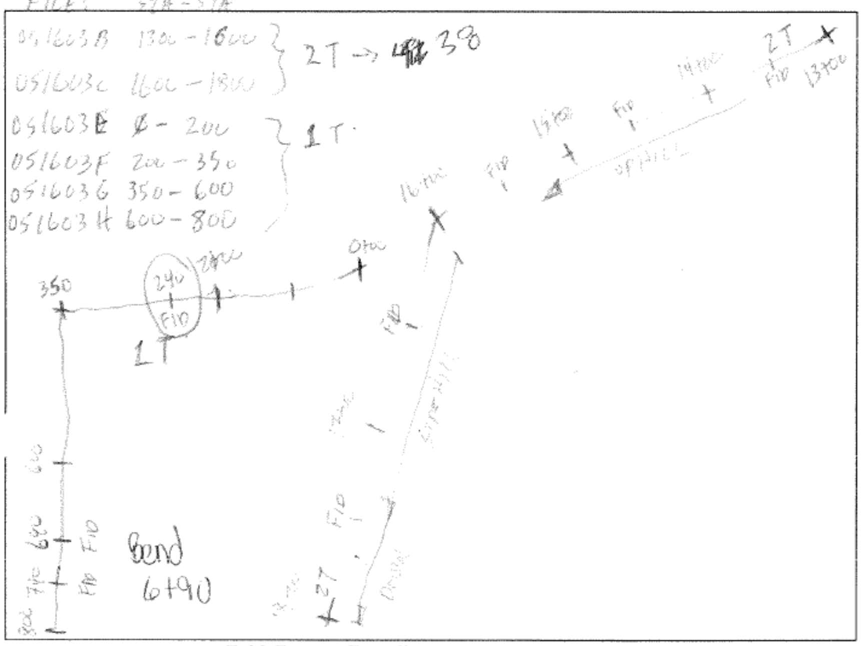
Field Data Sheet

☐ QA checked by 3/4
Date: ____________

Project Name: HEEIA KEA
Project Location: FORMER COMBAT TRAINING CA[MP]
Geophysical Contractor: BLACKHAWK
Design Center POC: ____________
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KEA 2T, 1T **Date:** 05/16/03
Field Team: R.B., B.K., J.N.
Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other ____________
Coordinate System: ☐UTM ☐State Plane NAD ______ ☐Local ☐Other ____________
Unit of Measure: ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** ____________ **North Arrow:**

FILE: STA - STA



Terrain:
☐Level ☒Moderate Slope ☒Stee[p]
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 3[illegible]
☐None ☐Light ☐Medium ☒Thi[ck]

Brush:
☐None ☒Light ☐Medium ☐Thi[ck]

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	______, ______	18[illegible], Ø 2T
NW	______, ______	______, ______
NE	______, ______	Ø, 13[illegible] 2T
SE	______, ______	______, ______

	Start	End	File Name
Battery Voltage:	12.[illegible]	12.0	
Static Background Value:	[illegible]	1.0	______, ______
Static Response Value:			______, ______
Instrument Clock Drift:	N/A		

Raw Data File Name: 051603 B, C, E, F, G, H
Repeat Data File Name: ____________
Geophysical Instrumentation: EM61 MK2 + PRONTO
Serial Number: 021[illegible]
Base Station: FID'S @ 50' / 051603F 1st FID@240 /
Serial Number: Ju[illegible] 0130
Navigation Method: WHEEL MODE INC = 0.[illegible]
Serial Number: [illegible] 0231
Additional Comments: DATA SKIPS BELOW

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	
1.5	383-? 051603B		051603C		051603E		051603E		051603G		051603H	FID @ 69
1.5	1384-1390	-1.5	1762-1755	1.5	178-184	1.5	243-266	1.5	350-352			FID @ 74
1.5	1579-1594	-1.5	1694-1688	-1.5	184-156	1.5	323-325	1.5	396-407			
1.5	1578-1580	-1.5	1694-1638	-1.5	54-45	-1.5	324-319	1.6	417-434			
						-1.5	262-248	-1.5	433-416			

4/4

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING CA

Geophysical Contractor: BLACK HAWK **Design Center POC:** _____

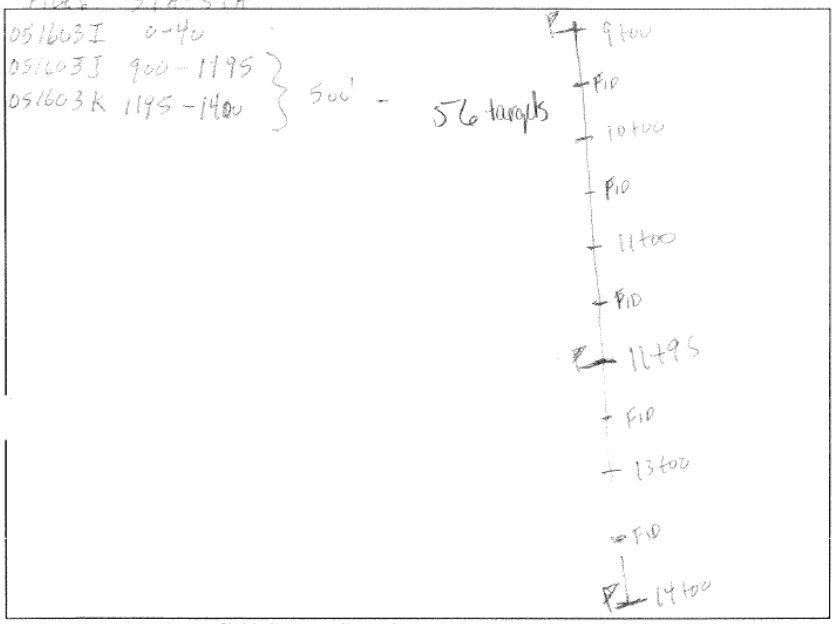
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOHM

Survey Area ID: KEA 3T **Date:** 05/16/03 **Field Team:** R.B, B.K, J.W.

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____ ATV

Coordinate System: ☐UTM ☐State Plane NAD _____ ☐Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 35
☐None ☐Light ☐Medium ☒Thi

Brush:
☐None ☐Light ☒Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 9 too
NW	_____, _____	_____, _____
NE	_____, _____	_____, _____
SE	_____, _____	0, 14 too

	Start	End	File Name
Battery Voltage:	11.8	11.7	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051603J & K **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + FREQUIC **Serial Number:** 021927-3

Base Station: 051603I FILE OVER MK2 GRENADE @ 20' on 76' LINE **Serial Number:** [illegible]

Navigation Method: WHEEL MODE INC.=0.66 FID's @ 50' INTERVALS **Serial Number:** BUSHNELL 223

Additional Comments: _____

051603J

LN	STA-STA
1.	934-947
1.5	944-930

LN	STA-STA
	051603K
1.5	1260-1290
1.5	1326-1345
-1.5	1341-1326
-1.5	1289-1262
-1.5	1232-1277

LN	STA-STA
-1.5	1203-1195

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/19/03 System: BMel MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/20/03		Raw XYZ on ~~Zap website~~ STP	5/20/03	
Adjust lines and fiducials	5/20/03	"	Split Files In Excel		
Create XYZ	5/20/03	"			

Maps and Targets

Oasis	Date 2T	Date 3T	Initials	On FTP Site	Date		Initials
Review Test Files	5/23	5/23		Processed XYZ	5/23	5/28	
Determine Lag	5/23	5/23	"	Dig Sheets	5/23	5/28	"
Create Map	5/23	5/27	"	Local & SP Maps	5/23	5/28	"
Grid and Display Data	5/23	5/27	"	QC_tests.xls	5/27	5/28	"
Auto Pick Targets	5/23	5/27	"	Processing Log	5/27	5/28	"
Review/Add Targets	5/23	5/27	"	Zapata spreadsheets			
Targets to Digsheet	5/23	5/27	"				
Warp Data to SP	5/23	5/27	"				
Create SP & Local Maps	5/23	5/27	"				
Correct Format of Files	5/23	5/27	"				

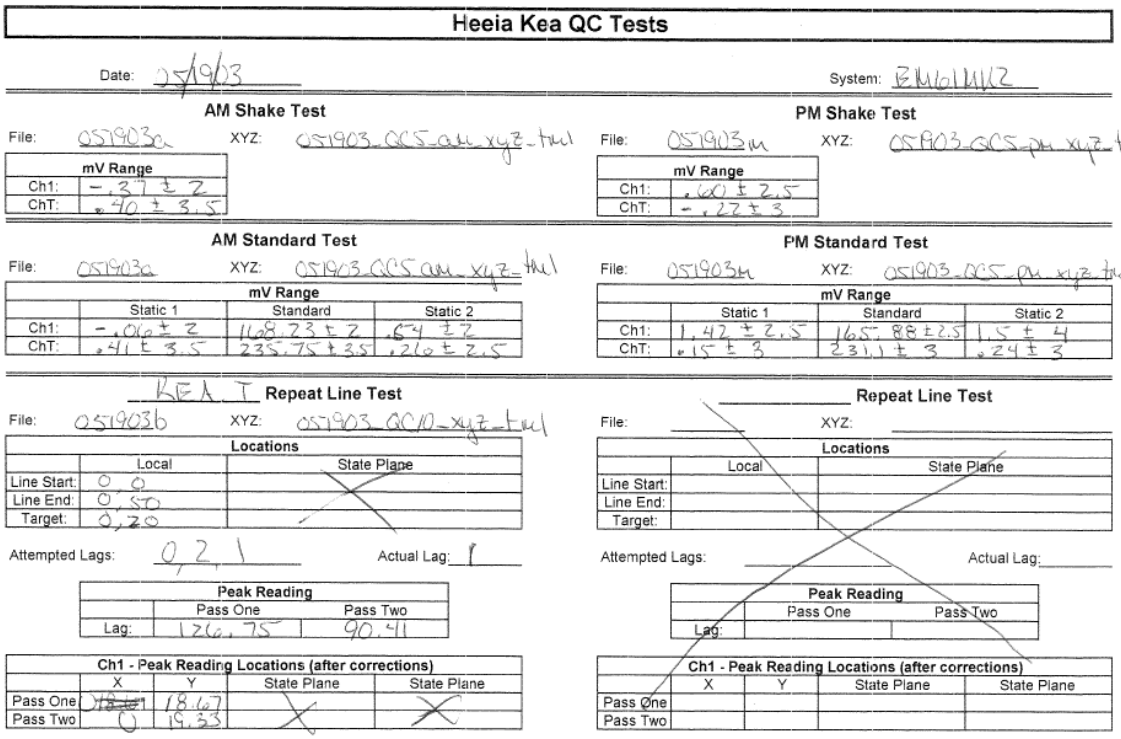
Total Area Of Data: 12,570 ft² total

Grids/Transects Collected: KEA2T, 3T

Total Targets: KEA2T = 74

KEA3T = 70

Comments:



Heeia Kea QC Tests

Date: 05/19/03 System: EM61MK2

AM Shake Test

File: 051903a XYZ: 051903_QC5_am_xyz_tm1

mV Range	
Ch1:	−.37 ± 2
ChT:	.40 ± 3.5

PM Shake Test

File: 051903m XYZ: 051903_QC5_pm_xyz_tm1

mV Range	
Ch1:	.60 ± 2.5
ChT:	−.22 ± 3

AM Standard Test

File: 051903a XYZ: 051903_QC5_am_xyz_tm1

mV Range			
	Static 1	Standard	Static 2
Ch1:	−.06 ± 2	168.23 ± 2	.54 ± 2
ChT:	.41 ± 3.5	235.75 ± 3.5	.26 ± 2.5

PM Standard Test

File: 051903m XYZ: 051903_QC5_pm_xyz_tm1

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.42 ± 2.5	165.88 ± 2.5	1.5 ± 4
ChT:	.15 ± 3	231.1 ± 3	.24 ± 3

KEA_T Repeat Line Test

File: 0519036 XYZ: 051903_QC10_xyz_tm1

Locations		
	Local	State Plane
Line Start:	0, 0	
Line End:	0, 50	
Target:	0, 20	

Attempted Lags: 0, 2, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	126.75	90.41

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	~~0~~	18.67		
Pass Two	0	19.33		

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/19/03 Page: 1 of 4

Blackhawk Field Personnel: R. Bloom, B. Konshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: Em61 Model: mk2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: Em61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: Em61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0900 End Time: 0915
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/19/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051903A Battery Voltage: 12.4 Time: 09:22 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	167	0.0	167
Channel 2-Bottom:	0.0	96	0.0	96
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	-1.0	235	-1.0	234

Location: NORTH END OF GRID 8

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 051903M Battery Voltage: 12.0 Time: 14:36 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	165	1.0	164
Channel 2-Bottom:	0.0	95	0.0	95
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	-1.0	234	-1.0	235

Location: NORTH END OF GRID 13 (NORTHWEST CORNER)

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/4 Date: _____

Project Name: HEEIA KEA **Project Location:** HOOMEE COMBAT TRAINING

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

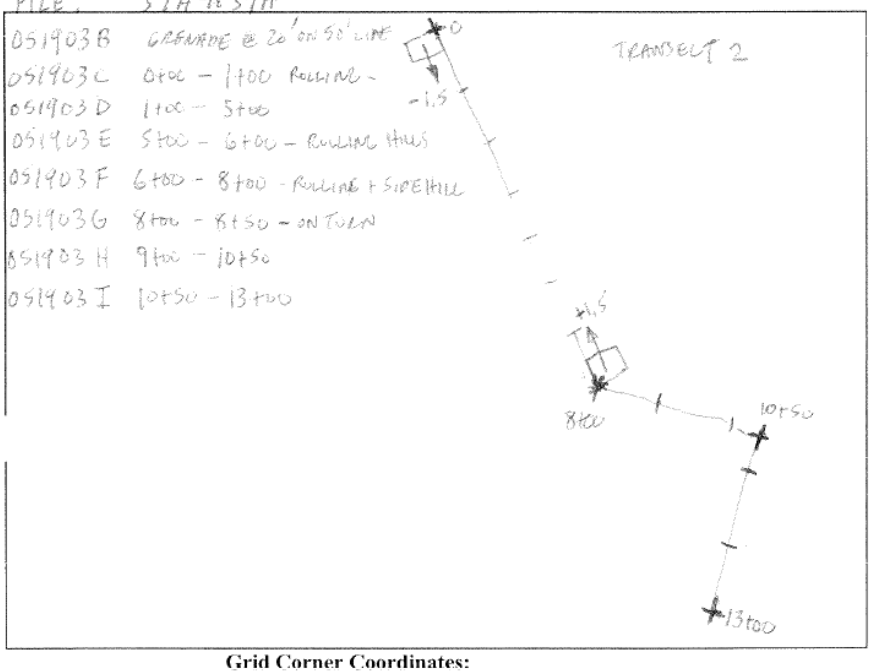
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOOM

Survey Area ID: KEA 2T **Date:** 05/19/03 **Field Team:** K.B., B.K., J.W.

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 3
☐None ☐Light ☒Medium ☐Th

Brush:
☐None ☒Light ☐Medium ☐Th

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	_____, _____
NW	_____, _____	0, 0
NE	_____, _____	_____, _____
SE	_____, _____	0, 1300

	Start	End	File Name
Battery Voltage:	12.4	12.2	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051903B, C, D → I **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021127-3

Base Station: * NEED TO CHECK STATION **Serial Number:** TX unit: 0132

Navigation Method: WHEEL MODE INC = 0.66 FID'S ON 50'S **Serial Number:** RX unit: 0231

Additional Comments: MK2 GRENADE @ 20' OF 50' LINE ; DATA SKIPS BELOW

051903C

LN	STA-STA
-1	89-94
1.5	94-89

051903D

LN	STA-STA
1.5	187-192
1.5	230-234

LN	STA-STA
-1.5	243-248
1.5	236-226

051903E

LN	STA-STA
-1.5	633-642
-1.5	719-750
1.5	685-683
1.5	640-637

LN	STA-STA
-1.5	1018-1046
1.5	1043-1018
1.5	976-975
1.5	918-913

051903I

LN	STA-STA
-1.5	1178-1181
-1.5	1210-1244
1.5	1241-1212
1.5	1180-1173

LN	STA-STA
1.5	1069-1067

4/4

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA **Project Location:** FORMER COMBAT TRAINING CA

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

Project Geophysicist: J. HILD **Site Geophysicist:** R. BLAIR

Survey Area ID: KEA 3I **Date:** 05/19/03 **Field Team:** R.B., B.K., J.W.,

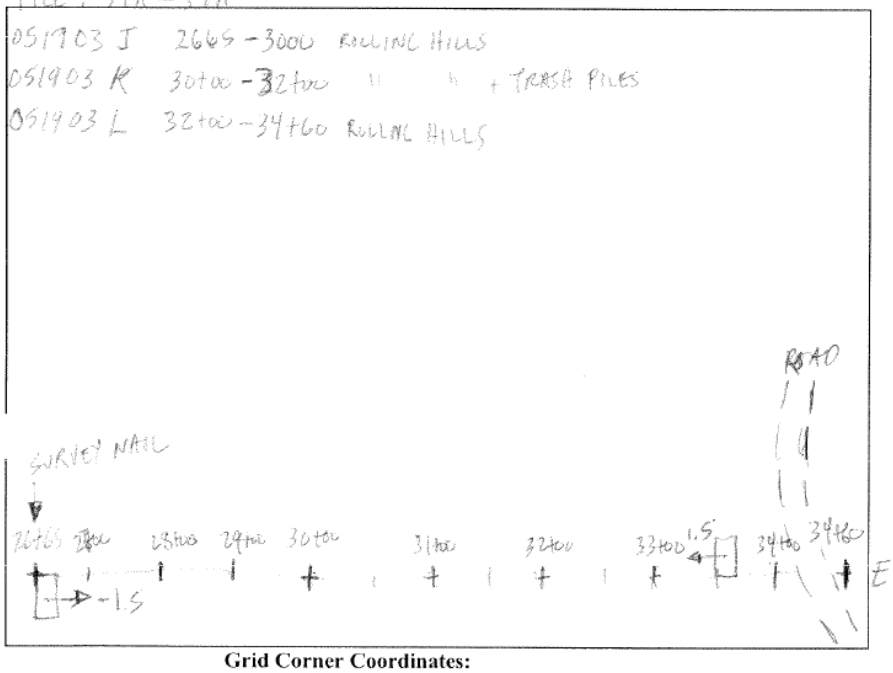
Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☐Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**

FILE: STA - STA

051903 J 2665 - 3000 ROLLING HILLS
051903 K 3000 - 3200 " " + TRASH PILES
051903 L 3200 - 3460 ROLLING HILLS



Terrain:
☐Level ☒Moderate Slope ☐Ste
☒Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerou

Tree Cover: **Tree Height:** 3
☐None ☐Light ☒Medium ☒Th

Brush:
☐None ☒Light ☐Medium ☐Th

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	2665, 0
NW	_____, _____	_____, _____
NE	_____, _____	_____, _____
SE	_____, _____	0, 3460

	Start	End	File Name
Battery Voltage:	12.1	12.0	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 051903 J, K, L, M **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PROXIMO **Serial Number:** 02192?-3

Base Station: LINE -1.5 ON SOUTHSIDE OF LINE, LINE 1.5 ON NORTHSIDE **Serial Number:** [illegible]

Navigation Method: WHEEL MODE INC = 0.66 FID'S ON EACH 50 & 100 **Serial Number:** [illegible]

Additional Comments: START ON WEST SIDE OF LINE

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
1.	2711-2717	1.5	2811-2809	1.5	3195-3190		051903L	1.5	3409-3405
1.5	2734-2739		051903K	1.5	3092-3042	-1.5	3335-3338	1.5	3377-3374
-1.5	2888-2893	-1.5	3005-3037	1.5	3026-3018	-1.5	3374-3379	1.5	3337-3332
1.5	2980-2985	-1.5	3044-3069			-1.5	3434-3440		
1.5	2882-2877	-1.5	3080-3088			+1.5	3438-3436		

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 5/20/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/21/03		Raw XYZ on FTP	05/21/03	
Adjust lines and fiducials	05/21/03		Split Files In Excel	05/28/03	
Create XYZ	05/21/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/28/03		Processed XYZ	5/28/03	
Determine Lag	"	"	Dig Sheets	"	"
Create Map	"	"	Local & SP Maps	"	"
Grid and Display Data	"	"	QC_tests.xls	"	"
Auto Pick Targets	"	"	Processing Log	"	"
Review/Add Targets	"	"	Zapata spreadsheets	"	"
Targets to Digsheet	"	"			
Warp Data to SP	"	"			
Create SP & Local Maps	"	"			
Correct Format of Files	"	"			

Total Area Of Data: 12017.27 ft²

Grids/Transects Collected: KAH136 KAH146

Total Targets: KAH136 = 55
KAH146 = 18

Comments:

KAH136 = 9649.19 ft²
KAH146 = 2648.45 ft²
-280.37
2368.08 ft²

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/20/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	05/21/03		Raw XYZ on ~~Zap website~~ FTP	05/21/03	
Adjust lines and fiducials	05/21/03	"	Split Files In Excel		
Create XYZ	05/21/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/23/03		Processed XYZ		
Determine Lag	5/23/03		Dig Sheets		
Create Map	5/23/03		Local & SP Maps		
Grid and Display Data	5/23/03		QC_tests.xls		
Auto Pick Targets	5/23/03		Processing Log		
Review/Add Targets	5/23/03		Zapata spreadsheets		
Targets to Digsheet	5/23/03				
Warp Data to SP					
Create SP & Local Maps					
Correct Format of Files					

Total Area Of Data

Grids/Transects Collected

Total Targets: KAH 13/0 = 55

KAH 14/0 = 18

Comments:

Heeia Kea QC Tests

Date: _____ System: _____

AM Shake Test

File: 052003a XYZ: 052003_QCS_am_xyz_tm

mV Range	
Ch1:	e4 E 4
ChT:	.7 E 3.5

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: 052003a XYZ: 052003_QCS_am_xyz_tm

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.55 E 3.5	170.3 E 2.5	3.9 E 4
ChT:	.60 E 3.5	233.59 E 3.5	.605 E 2.5

PM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

KAH 136 Repeat Line Test

File: 052003b XYZ: KAH136_052003_QCW_xyz_tm

Locations		
	Local	State Plane
Line Start:	0,0	1687233.46, 1005816.58
Line End:	0,100	1687133.46, 1005816.58
Target:	0,25	

Attempted Lags: 0, 1, 2, 3, 1 Actual Lag: 3

Peak Reading		
	Pass One	Pass Two
Lag:	174.95	169.40

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	24.14	1687209.31	1005816.58
Pass Two	0	24.20	1687209.44	1005816.68

KAH 146 Repeat Line Test

File: 052003c XYZ: KAH146_052003_QCW_xyz_tm

Locations		
	Local	State Plane
Line Start:	0,0	1687227.36, 1007779.29
Line End:	0,[illegible]53	1687174.56, 1007779.29
Target:	0,25	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	130.39	127.25

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	25.14	1687203.47	1007779.29
Pass Two	0	24.57	1687204.13	1007779.39

Daily Log and QC Testing

Date: 05/20/03 Page: 1 of 4

Blackhawk Field Personnel: R. Bluhm B. Kunshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PRO4000 Model: P4208-ES SN: 1598
Top Coil: EM61 Model: 1x0.5T SN: 013c Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 08:30 End Time: 08:45
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/20/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052003A Battery Voltage: 12.3 Time: 09:11 Samples/Sec: 5

	Static (3)	**Standard** (4)	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	170	2.0	168
Channel 2-Bottom:	0.0	97	1.0	98
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	-1.0	233	0.0	233

Location: KAHALUU AREA GRID 13

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052003D Battery Voltage: 11.5 Time: 14:44 Samples/Sec: 5

	Static (3)	**Standard** (4)	**Static** (1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	166	2.0	164
Channel 2-Bottom:	0.0	94	0.0	94
Channel 3-Bottom:	-0.5	43	0.5	42.5
Channel 4-Top:	-0.5	230	0.5	229.5

Location: GRID 11 KAHALU'U

☐ QC checked by _____ Date: _____

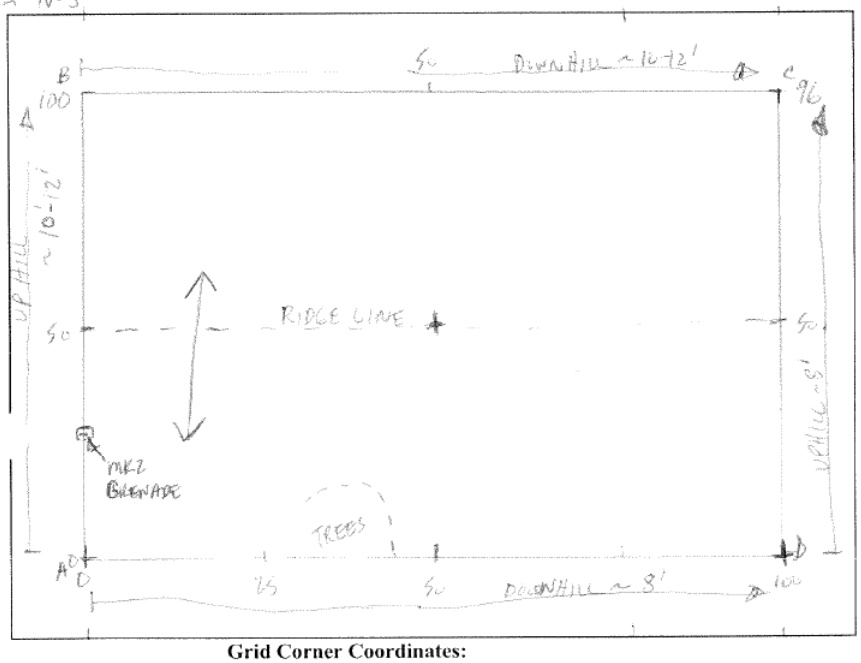
Field Data Sheet

☐ QA checked by 3/4 Date: _____

Project Name: KAHALUU
Project Location: KAHALUU
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLUHM
Survey Area ID: KAH 136 **Date:** 05/20/03
Field Team: R.B., B.K., J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Grid Run N-S

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	Ø, Ø
NW	_____, _____	B	0, 100
NE	_____, _____	C	100, 96
SE	_____, _____	D	100, 0

	Start	End	File Name
Battery Voltage:	12.3	12.1	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052003B
Repeat Data File Name: LINE Ø & 0.1
Geophysical Instrumentation: EM61 MK2 + PRO4WD
Serial Number: EM61 Console 02
Base Station: FID'S ON 50'S / LINES Ø-48 FROM Ø-100 / LINES 51-102 FROM Ø-98'
Serial Number: Pro-4000 - 15
Navigation Method: WHEEL MODE 0.66 / EDIT OUT 1ST LN 66 /
Serial Number: Ø130, 231 - C
Additional Comments: GRENADE @ Ø, 25 : DATA SKIPS BELOW * CHECK START END STATION / RUN LINES N-

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
Ø	-13	6	93-100	*30	38-40	33	11-0	42	0-14	48	0-8	63	89-86	75	86-100
Ø	64-81	12	10-12	30	47-50	36	0-14	42	26-31	48	48-53	63	68-66	75	72-69
3	100-99	12	35-40	30	67-73	36	37-40	42	64-68	48	66-70	63	13-0	78	51-54
3	94-74	15	92-89	33	86-84	39	69-64	45	86-82	54	81-84	66	0-7	78	83-86
6	68-69	15	45-38	33	66-63	39	31-27	45	74-67	57	66-58	*66	86-100	81	87-83
[illegible]	[illegible]	[illegible]	[illegible]	33	39-25	39	18-0	45	58-56	*60	52-66	69	100-73	81	67-58

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 4/4 Date: _____

Project Name: He'eia Kahalu'u **Project Location:** Kahalu'u

Geophysical Contractor: Blackhawk **Design Center POC:** _____

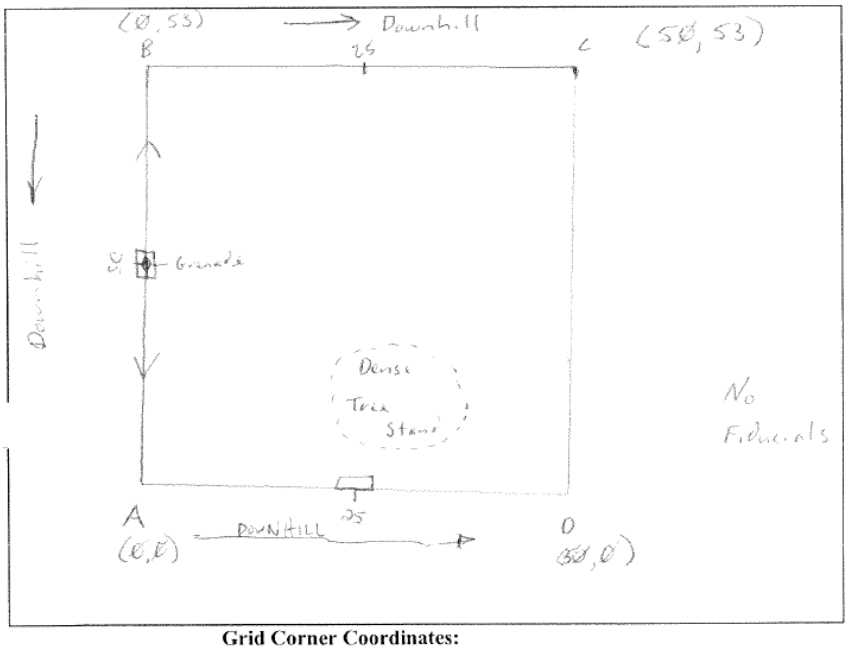
Project Geophysicist: J Hild **Site Geophysicist:** R Bloom

Survey Area ID: KAH 146 **Date:** 05/20/03 **Field Team:** DK, KB, JH

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Grid Ran N-S **Sketch of Survey Area:** **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 5
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☐Light ☒Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Stake	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 53
NE	_____, _____	C	50, 53
SE	_____, _____	D	50, 0

	Start	End	File Name
Battery Voltage:	11.9	11.8	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052003C **Repeat Data File Name:** Line 1 repeat of L

Geophysical Instrumentation: EM61 MKII w/ Pro-4000 **Serial Number:** 031937-3

Base Station: _____ **Serial Number:** Pro-4000 1598 / 1613

Navigation Method: Wheel Mode 0.66 **Serial Number:** 031 C

Additional Comments: Grenade at (0,25), Redo Line 27, use 2nd attempt STA 5 → 0

	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
3	20 - 19	9	46 - 40	27	19 - 5	43	27 - 32	51	25 - 28
6	4 - 8	12	42 - 46	30	7 - 24	45	32 - 28	51	11 - 6
6	29 - 32	18	5 - 21	30	40 - 43	45	11 - 0		
6	39 - 45	21	24 - 7	33	28 - 11	48	0 - 10		
		24	13 - 23	39	32 - 36	48	49 - 50		

LN	STR-STR
84	53-67
84	84-89
87	92-87
87	69-61
87	29-19
90	16-36
90	67-73
93	55-44
0.1	83-73
0.1	68-64
0.1	15-10

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/21/03 System: BM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/23/03		Raw XYZ on Zap website	5/23/03	
Adjust lines and fiducials	5/23/03	"	Split Files In Excel	5/28/03	"
Create XYZ	5/23/03	"			

Maps and Targets

Oasis	KAH 12 11 10 8 Date	Initials	On FTP Site KAH 12 11 10 8 Date	Initials
Review Test Files	5/28 5/28 5/28 5/28		Processed XYZ	5/29 5/29 5/29 5/29
Determine Lag	5/28 5/28 " "	"	Dig Sheets	" " " "
Create Map	5/28 " " "	"	Local & SP Maps	" " " "
Grid and Display Data	5/28 " " "	"	QC_tests.xls	" " " "
Auto Pick Targets	5/28 " " "	"	Processing Log	" " " "
Review/Add Targets	5/28 " " "	"	Zapata spreadsheets		
Targets to Digsheet	5/28 5/29 5/29 5/29	"			
Warp Data to SP	" " " "	"			
Create SP & Local Maps	" " " "	"			
Correct Format of Files	" " " "	"			

Total Area Of Data

Grids/Transects Collected

Total Targets: KAH106I = 151
KAH116I = 60
KAH126I = 22
KAH86I = 36

Comments:
KAH 106I = 11275, 76 ft²
KAH 116I = 2545, 94 ft²
KAH 126I = 2560, 43 ft²
KAH 86I = 11098, 28 ft²

Heeia Kea QC Tests

Date: 052103 System: EM61MK2

AM Shake Test

File: 052103a XYZ: 052103_QC5_am_xyz_tmi

mV Range	
Ch1:	2.01 ± 4.5
ChT:	-.60 ± 3

PM Shake Test

File: 052103b XYZ: 052103_QC5_pm_xyz_tmi

mV Range	
Ch1:	.24 ± 2
ChT:	-.19 ± 3

AM Standard Test

File: 052103a XYZ: 052103_QC5_am_xyz_tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.74 ± 4	170.50 ± 7	2.24 ± 3
ChT:	-.64 ± 4	235.1 ± 25	-.606 ± 2.5

PM Standard Test

File: 052103b XYZ: 052103_QC5_pm_xyz_tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	-1.24 ± 2	160 ± 2.5	-1.19 ± 2.5
ChT:	-2.576 ± 3	227.8 ± 3.5	-.98 ± 4

KAH126 Repeat Line Test

File: 052103c KAH XYZ: KAH126_052103_QC10_xyz_tmi

Locations		
	Local	State Plane
Line Start:	0,0	1687417.05, 1001666.53
Line End:	0,57	1687383.66, 1000705.75
Target:	0,30	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	107.27	44.40

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	29.61	1687397.23	1006688.53
Pass Two	0	30.67	1687396.60	1006689.38

KEA116 Repeat Line Test

File: 052103d KAH XYZ: KAH116_052103_QC10_xyz_tmi

Locations		
	Local	State Plane
Line Start:	0,0	1687700.58, 1011949.74
Line End:	70,0	1687751.78, 1011997.48
Target:	75,0	

Attempted Lags: 0, 1, 1.4, 1.6 Actual Lag: 1.6

Peak Reading		
	Pass One	Pass Two
Lag:	157.33	172.26

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	25.39	0	1687719.15	1011967.06
Pass Two	25.75	0	1687719.35	1011967.37

Heeia/ Pali QC Tests

Date: _____ Systern: _____

AM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: _____ XYZ: _____

	mV Range		
	Static 1	Standard	Static 2
Ch1:			
ChT:			

PM Standard Test

File: _____ XYZ: _____

	mV Range		
	Static 1	Standard	Static 2
Ch1:			
ChT:			

KEA 106 / RAH Repeat Line Test

File: 052103 XYZ: RAH106_052103_QC10.xyz_tm

Locations		
	Local	State Plane
Line Start:	0,0	1688135.16, 1015732.69
Line End:	0, 110	1688080.16, 1016017.45
Target:	0,100	1688085.94, 1016009.53

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	122.22	113.66

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	100.27	1688085.14	1016009.53
Pass Two	0	98.91	1688085.20	1016008.35

KEA 86 / RAH Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:	0 0	1688756.48 1021178
Line End:	0, 101	1688736.51, 1022158.0
Target:	0, 30	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	244.21	244.75

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	28.00	1688750.89	1021450.00
Pass Two	0	30.52	1688750.98	1021447.47

Daily Log and QC Testing

Date: 05/21/03 Page: 1 of 6

Blackhawk Field Personnel: B. Konshak, R. Blohm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 MKII Model: MK2 SN: 021927-3
Controller: Pro 4000 Model: P4208-ET SN: 1586
Top Coil: EM61 Model: 1x1.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x1.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 07:40 End Time: 07:55
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/21/03 Page: 2 of 6

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052103A Battery Voltage: 13.0 Time: 08:00 Samples/Sec: 5

	Static (5)	**Standard** (1)	**Static** (1)	**Residual** (standard minus static)
Channel 1-Bottom:	2.0	170	1.0	169
Channel 2-Bottom:	1.0	96	0.0	96
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	0.0	235	0.5	234.5

Location: CENTER OF GRID KAH 12 G 40128

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052103G Battery Voltage: 11.7 Time: 15:10 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	161	0.0	161
Channel 2-Bottom:	0.0	93	0.0	93
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	-1.0	229	-1.0	228

Location: NEAR GRID 8 KAH 40194

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: 3/6

Project Name: KAHALUU **Project Location:** KAHALUU TRAINING AREA

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

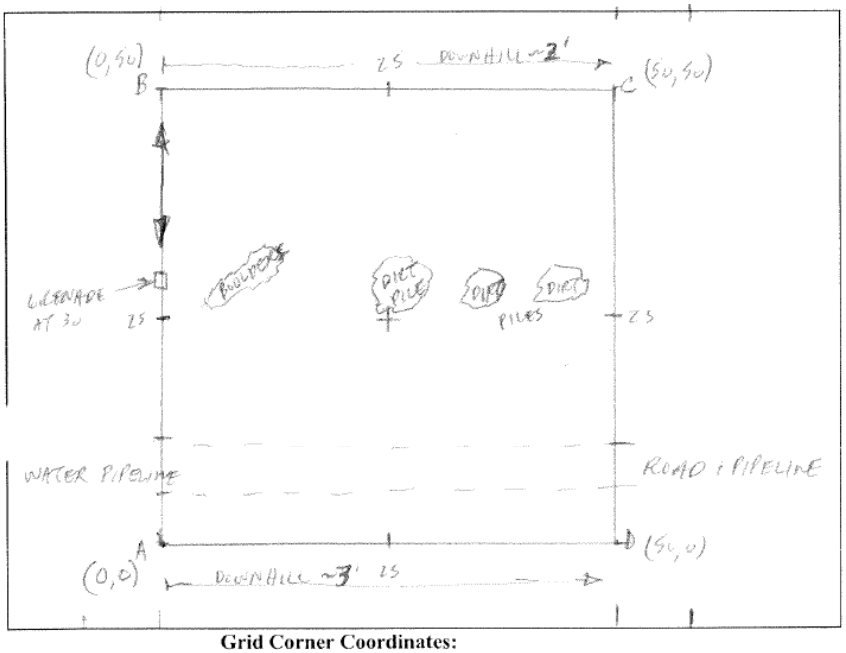
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLEHM

Survey Area ID: KAH 126 **Date:** 05/21/03 **Field Team:** K.B., B.K., J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 3c
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 50
NE	_____, _____	C	50, 50
SE	_____, _____	D	50, 0

	Start	End	File Name
Battery Voltage:	12.9	12.8	
Static Background Value:	1.0	2.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052103B&C **Repeat Data File Name:** _____

Geophysical Instrumentation: EM61 MK2 + PRO 4000 **Serial Number:** 021927-3

Base Station: MK2 GRENADE @ 0,30 FILE 052103C INCLUDES LINES 0,1 **Serial Number:** TOP UNIT: 0130

Navigation Method: WHEEL MODE INC = 0,66 **Serial Number:** BOT UNIT: 0231

Additional Comments: RUN LINES NORTH-SOUTH; DATA SKIPS BELOW

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN
3	50-45	48	44-48					
6	35-38	51	47-44					
9	50-45							
18	42-45							
21	50-49							

☐ QC checked by _____ Date: _____

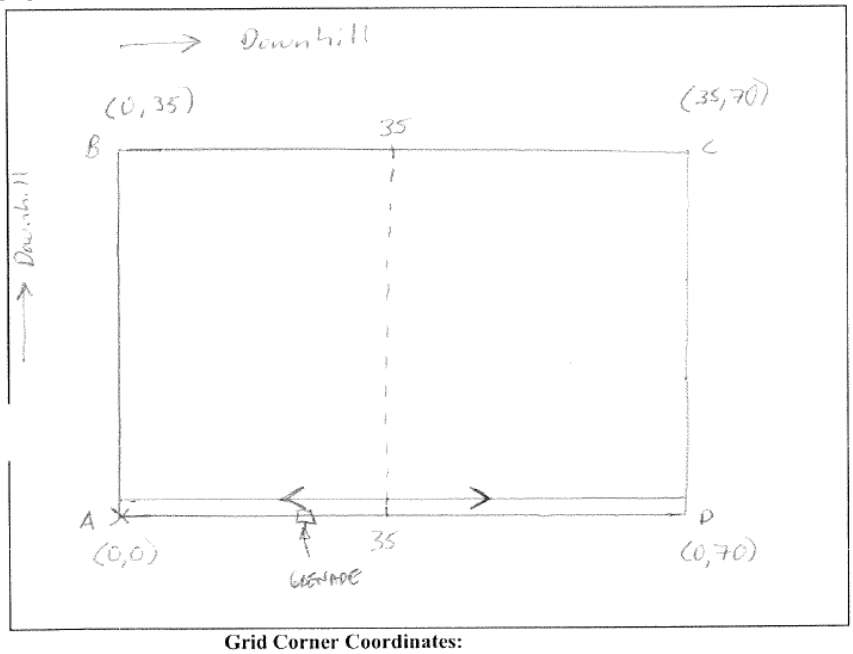
Field Data Sheet

☐ QA checked by 4/6 Date: _____

Project Name: Kahaluu
Project Location: Kahaluu Training A
Geophysical Contractor: Blackhawk
Design Center POC: _____
Project Geophysicist: J Hilo
Site Geophysicist: R. Blohm
Survey Area ID: KAH 11G **Date:** 05/21/05
Field Team: BK, RB, JW
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Grid Run E-W

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ___
☒None ☐Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 35
NE	_____, _____	C	35, 70
SE	_____, _____	D	0, 70

	Start	End	File Name
Battery Voltage:	12.9	12.8	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052103D
Repeat Data File Name: _____
Geophysical Instrumentation: EM61 MK II w/ Pro 4000 **Serial Number:** _____
Base Station: MK2 Grenade @ 0,25 **Serial Number:** Consolid 021927-3
Navigation Method: Wheel Mode: .66 FID @ 35' **Serial Number:** Top Coil: 130 Bot Coil: 023
Additional Comments: Run links E-W, No data skips

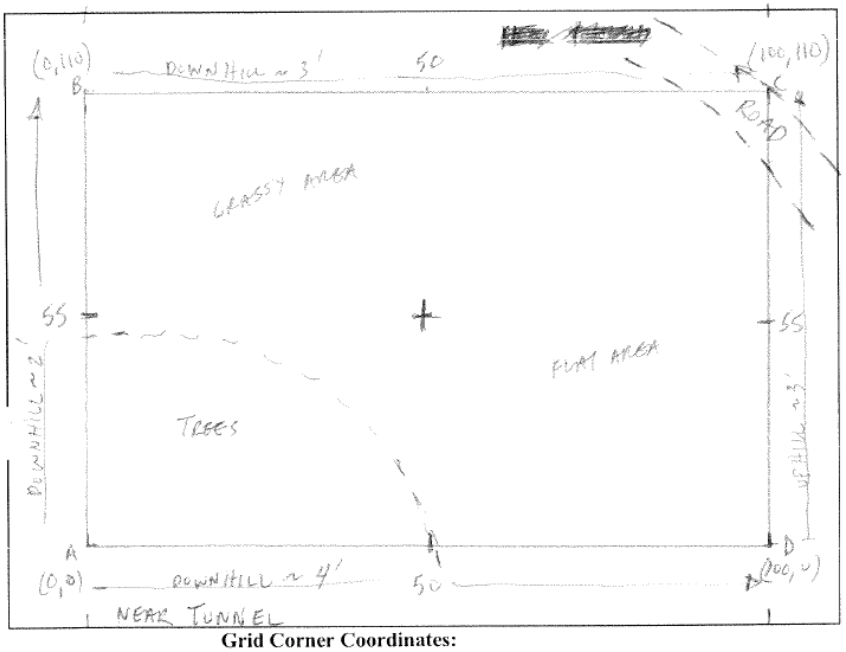
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 5/6 Date: _____

Project Name: KAHALU'U
Project Location: KAHALU'U TRAINING AREA
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 10G **Date:** 05/21/03
Field Team: R.B., B.K., J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☒Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	Ø, Ø
NW	_____, _____	B	Ø, 110
NE	_____, _____	C	100, 110
SE	_____, _____	D	100, Ø

	Start	End	Time File Name
Battery Voltage:	12.6	12.3	11:20
Static Background Value:	1.0		,
Static Response Value:			,

Instrument Clock Drift: N/A

Raw Data File Name: 052103E
Repeat Data File Name: _____

Geophysical Instrumentation: EM61 MK2 + PRO4000
Serial Number: 021927-3
Base Station: LOCKWADE @ LN Ø, 100 / EDIT OUT 1ST LN 69 USE 2ND
Serial Number: TOP COIL: 0130
Navigation Method: WHEEL MODE INC = 0.66 FID @ 50' LNS Ø – 102
Serial Number: BOT COIL: 0231

Additional Comments: RUN LINES NORTH ↔ SOUTH, DATA SKIPS BELOW * CHECK START & STOP

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
Ø	[illegible]-23	21	2-Ø	36	22-30	51	5-Ø		
6	Ø-53	24	20-28	34	28-22	54	Ø-1		
9	41-35	24	37-44	39	10-7	60	*83-87		
12	34-51	27	*33-31	42	7-22	64	*69-66		
15	*49-46	30	30-34	45	*15-10	61	23-20		
[illegible]	[illegible]	[illegible]	[illegible]	45	1-Ø				

6/6

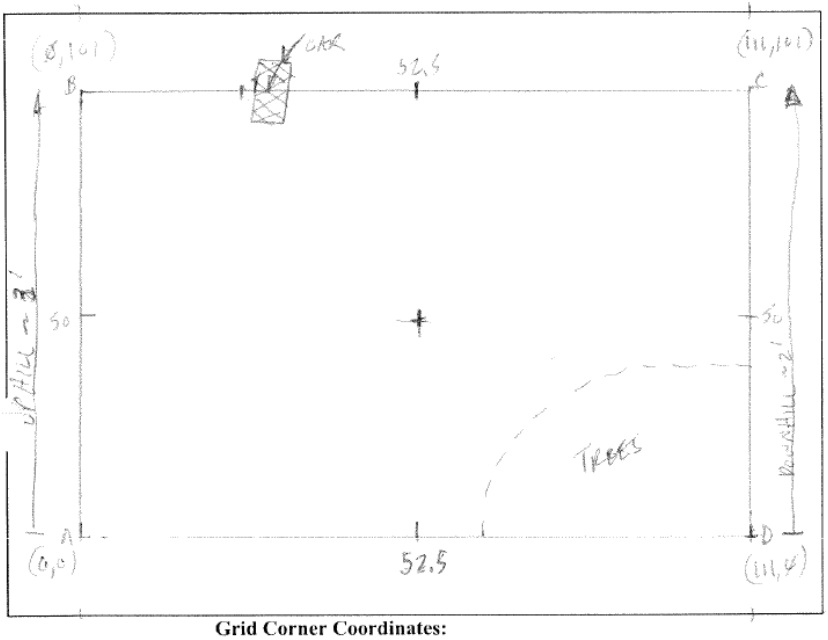
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: KAHALU'U
Project Location: KAHALU'U TRAINING AREA
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 8 G **Date:** 05/21/03
Field Team: R.B., B.K., J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 30
☐None ☒Light ☐Medium ☐Thi
~~THICK MAT~~

Brush:
☐None ☒Light ☒Medium ☐Thi
THICK MAT ON GROUND

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	X Local Y
SW	_____, _____	A	Ø, Ø
NW	_____, _____	B	Ø, 101
NE	_____, _____	C	111, 101
SE	_____, _____	D	111, Ø

	Start	End	File Name
Battery Voltage:	12.1	11.7	15:00
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A
Raw Data File Name: 052103F
Repeat Data ~~File Name~~ LINE: (LN Ø, .1)
Geophysical Instrumentation: EM61 MK2 + PRO4000
Serial Number: 021927-3
~~Base Station~~: GRENADE @ LN Ø, 30 / LINES Ø-111
Serial Number: Top Coil: 0130
Navigation Method: WHEEL MODE INC = 0.66 FID @ 50'
Serial Number: Bot Coil: 0231
Additional Comments: RUN LINES NORTH ↔ SOUTH / DATA SKIPS LISTED BELOW

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
7	1-90	75	10-8	90	12-18	108	0-8				
0	86-101	78	5-10	90	24-29	0.1	REPEAT				
3	101-90	81	35-27	99	4-Ø						
6	98-101	81	5-3	102	Ø-11						
2	11-14	87*	19-13	105	7-Ø						

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 5/22/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/23/03		Raw XYZ on ~~Zap website~~ FTP	5/23/03	
Adjust lines and fiducials	5/23/03	"	Split Files In Excel	5/30/03	
Create XYZ	5/23/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	5/30/03		Processed XYZ	5/30/03	
Determine Lag	"	"	Dig Sheets	"	"
Create Map	"	"	Local & SP Maps	"	"
Grid and Display Data	"	"	QC_tests.xls	"	"
Auto Pick Targets	"	"	Processing Log	"	"
Review/Add Targets	"	"	Zapata spreadsheets		
Targets to Digsheet	"	"			
Warp Data to SP	"	"			
Create SP & Local Maps	"	"			
Correct Format of Files	"	"			

Total Area Of Data: 26583.87

Total Targets: KAH156 = 57, KAH166 = 78

Grids/Transects Collected: KAH156 & KAH166

Comments:

KAH156 = 11308.6 - 973.2 = 10335.4
KAH166 = 1624 8.47

Heeia Kea QC Tests

Date: 052203 System: EM61MK2

AM Shake Test

File: 052203a XYZ: 052203_QC5_am_xyz_tml

mV Range	
Ch1:	2.48 ± 2.5
ChT:	-.44 ± 2.5

PM Shake Test

File: 052203d XYZ: 052203_QC5_pm_xyz_tml

mV Range	
Ch1:	-1.13 ± 3
ChT:	-.42 ± 2

AM Standard Test

File: 052203a XYZ: 052203_QC5_am_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	2.20 ± 4	172.97 ± 3.5	4.4 ± 3
ChT:	-.47 ± 3	235.44 ± 3.5	-.52 ± 3.5

PM Standard Test

File: 052203d XYZ: 052203_QC5_pm_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	-.73 ± 3	163.98 ± 2.5	-.48 ± 3.5
ChT:	-.69 ± 2.5	231.38 ± 2	-.43 ± 2

KAH15G Repeat Line Test

File: 052203b XYZ: KAH15G_052203_QC10_xyz_tml

Locations	Local	State Plane
Line Start:	0,0	1689138.22, 102192.98
Line End:	0,100	1689156.56, 102290.28
Target:	0,30	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading	Pass One	Pass Two
Lag:	105.27	96.16

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	29.61	1689143.62	102221.80
Pass Two	0	30.67	1689143.91	102222.81

KAH16G Repeat Line Test

File: 052203c XYZ: KAH16G_052203_QC10_xyz_tml

Locations	Local	State Plane
Line Start:	0,0	~~1689138.22, 102192.98~~
Line End:	100,0	~~1689236.57, 102174.55~~
Target:	15,0	

1689215
101973.5
1689310.
102001.0

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading	Pass One	Pass Two
Lag:	99.22	104.93

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	14.31	0	~~1689152.29~~	~~102190.34~~
Pass Two	15.77	0	~~1689153.74~~	~~102190.17~~
			1689229.23	101977.29
			1689229.99	101977.79

Daily Log and QC Testing

Date: 05/22/03 Page: 1 of 4

Blackhawk Field Personnel: R. BLUHM, B. KONSHAK

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 02/927-3
Controller: PRO4000 Model: P4208-EJ SN: 1586
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 09.05 End Time: 0920
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/22/03 Page: 2 of 4

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052203A Battery Voltage: 13.0 Time: 0927 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1	171	3	168
Channel 2-Bottom:	-.5	96	1	95
Channel 3-Bottom:	0	44	0	44
Channel 4-Top:	-1	235	-1	237

Location: (3, 41) KAH GRID 15

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052303P Battery Voltage: 12.0 Time: 1601 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	-1	164	0	164
Channel 2-Bottom:	0	94	0	94
Channel 3-Bottom:	0	43	0	43
Channel 4-Top:	0	231	0.5	230.5

Location: KAH Grid 15 West side

17

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: KAHALUU **Project Location:** KAHALUU TRAINING AREA

Geophysical Contractor: BLACK HAWK **Design Center POC:** _____

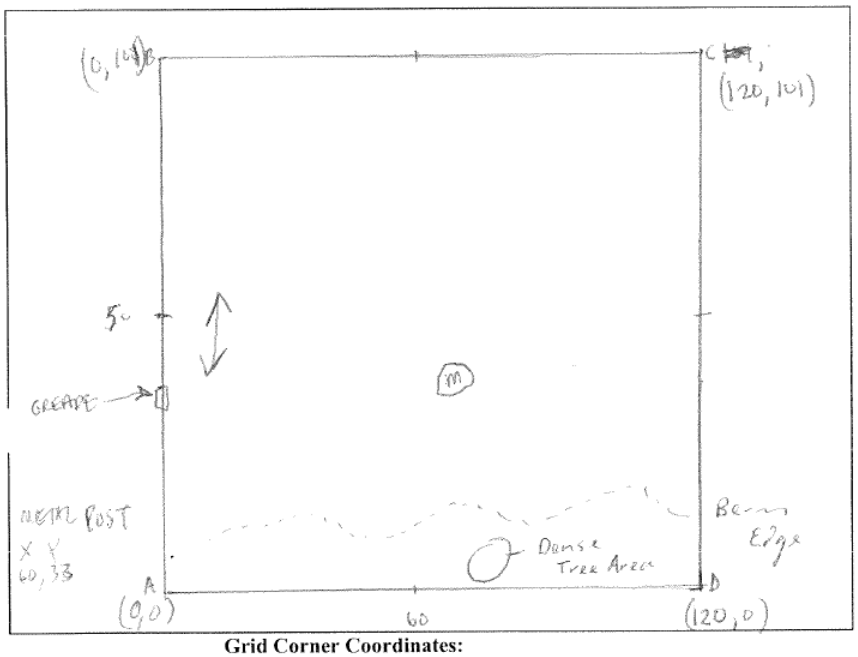
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLUHM

Survey Area ID: KAH 15G **Date:** 05/22/03 **Field Team:** R.B., B.K., J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ ft

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Grid Corner Coordinates:

	UTM/State Plane		STAKE	Local	
SW	_____	_____	A	0	0
NW	_____	_____	B	0	101
NE	_____	_____	C	120	101
SE	_____	_____	D	120	0

Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☒Gullies
☒Rocky ☐Swampy ☒Dangerous

Tree Cover: **Tree Height:** 3
☐None ☐Light ☒Medium ☒Thic

Brush:
☐None ☒Light ☐Medium ☐Thic

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	Start	End	TIME File ~~Name~~
Battery Voltage:	13.0	12.6	12:21
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 052203B **Repeat Data LINE File Name:** (0 & 1)

Geophysical Instrumentation: EM61 MK2 w/ RC-4000 **Serial Number:** 021927-3

Base Station: MK2 @ 30' Direction N to S / EDIT LN (72) FROM 100-114 * **Serial Number:** TOPCON: 0130

Navigation Method: Wheel Mode: .66 FID @ 50' **Serial Number:** TOPCON: 0231

Additional Comments: *SLOPE CHECK START & STOP STATION / PATH SKIPS BELOW T BACK

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
2	57-69	12	34-35	24	36-71	36	56-58	51	81-67	63	25-36	72	86-92	78	83-91
3	5-95	14	51-63	27	100-98	36	78-83	51	32-22	66	21-34	72*	99-100*	81	100-75
3	90-81	15	57-50	27	90-41	39	74-21	54	26-29	66	43-61	75	100-80	81	65-52
3	67-52	18	0-6	30	7-11	42	33-38	54	96-100	69	17-13	75	67-54		
3	31-25	18	27-29	30	53-55 *	42	77-89	57	100-95					81	19-19
6	7-31	18	49-81	30	84-100	45	85-82	57	15-0	72	0-4	75	16-13	84	13-27
6	57-70	21	37-25	33	100-76	49	0-2	60	73-89 *	72	11-22	78	0-2		
7	96-74	21	6-0	33	50-35	48	53-58	63	86-73	72	71-73*			84	48-64

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 4/4 Date: _____

Project Name: Kahaluu **Project Location:** Kahaluu

Geophysical Contractor: Blackhawk **Design Center POC:** _____

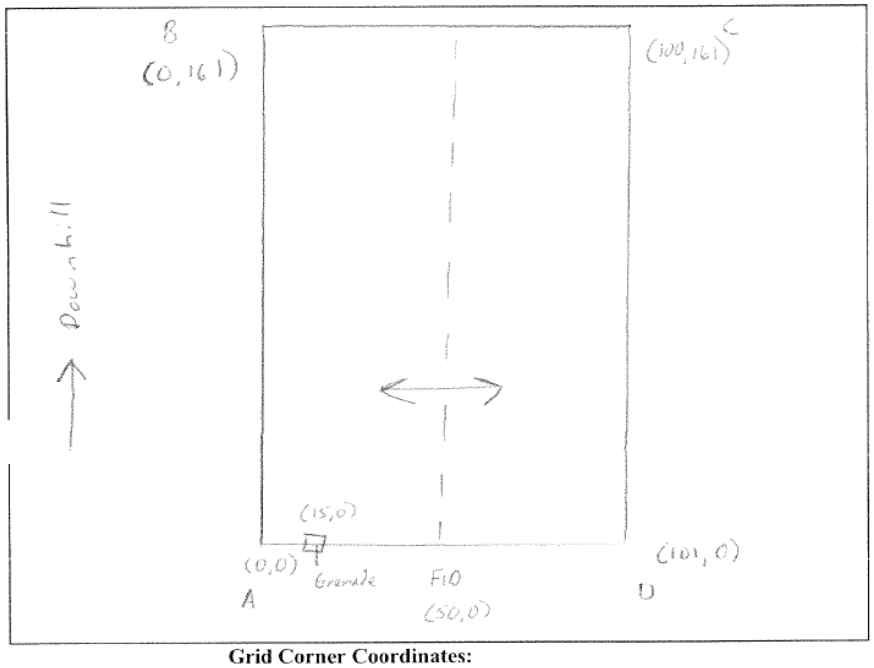
Project Geophysicist: Jim Hild **Site Geophysicist:** Rich Blohm

Survey Area ID: KAH 16 G **Date:** 05/22/03 **Field Team:** BK, JW, RB

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 3
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	0, 0
NW	_____, _____	0, 161
NE	_____, _____	100, 161
SE	_____, _____	101, 0

	Start	End	File Name
Battery Voltage:	12.5	12.0	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: NA

Raw Data File Name: 052203C – 186538K **Repeat Data ~~File~~ Line Name:** 04.1

Geophysical Instrumentation: EM61 MK2 w/ Pos-4000 **Serial Number:** _____

~~Base Station~~: Exit out 1st LN 75, **Serial Number:** _____

Navigation Method: Wheel Mode .66 **Serial Number:** _____

Additional Comments: 6.0 run E-W, MK2 Grenade @ (15,0)

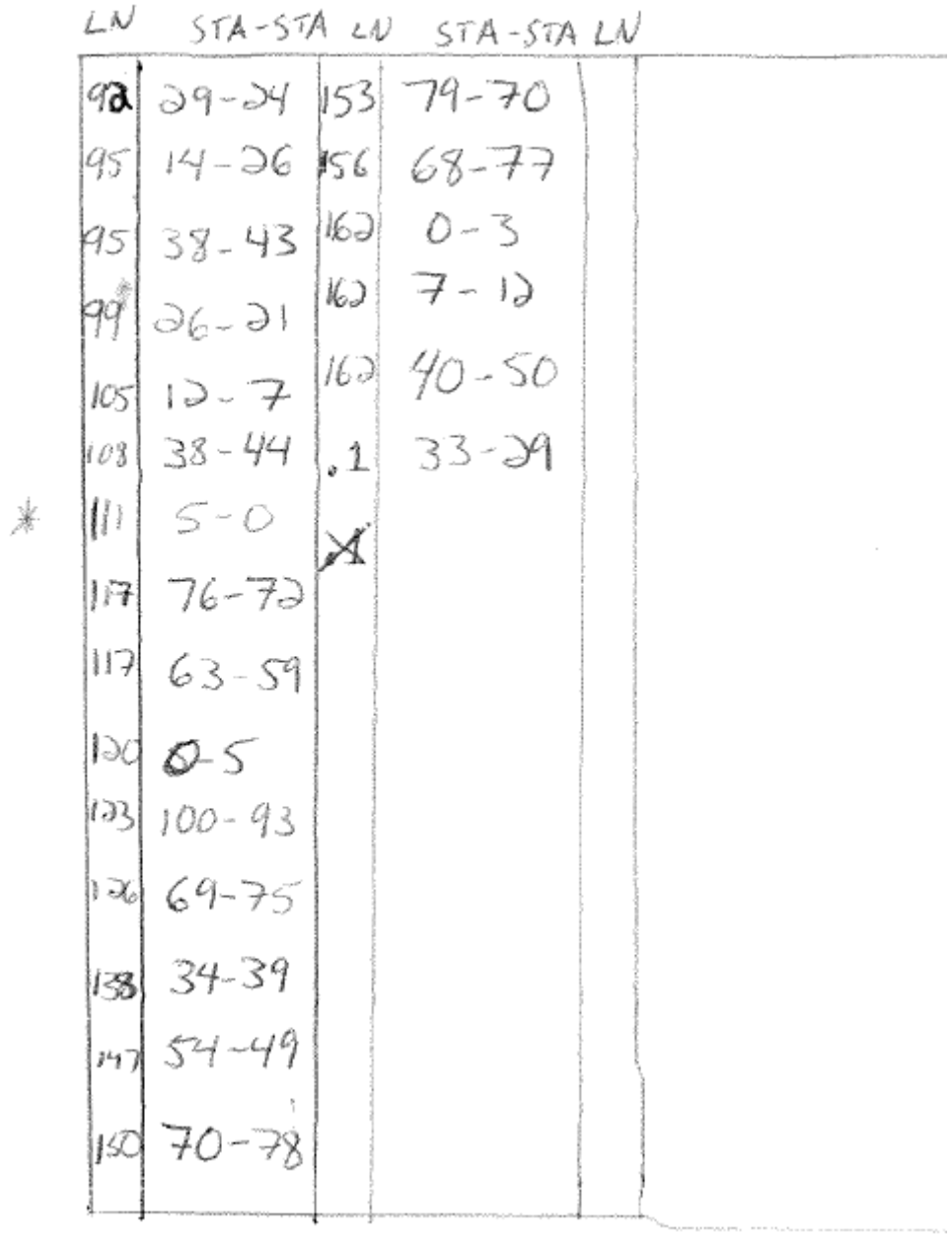
LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	27-33	15	67-65	21	81-78	33	72-69	63	31-16	69	53-47	84	0-2
3	57-[redacted]60	18	7-12	21	16-9	33	60-57	66	31-35	69	36-33	84	10-14
3	9-4	18	58-64	30	16-22	33	54-17	66	46-51	72	47-49	84	19-24
6	12-17	18	72-84	30	45-50	36	75-81	66	84-94	72	55-61	87	67-62
6	63-68			33	84-80	42	81-86	69	93-90	78	89-94	87	15-10

DATA SKIPS ON LINES; * NEED TO CHECK START & STOP STATIONS

LN	STA-STA	LN	STA-STA	LN	STA-STA	
84	94-100	0.1	94-84			
87	85-70	0.1	68-58			
87	30-~~7~~					
90	6-27					
90	51-54					
90	71-75					
93	85-82					
93	55-48					
93	21-9					
96	0-8					
96	64-95					
99	100-99					
99	92-90 *					
*99	90-(-7)*					
102	58-60					
102	68-72					
102	91-100					
105	64-62					
105	45-42					
105	29-24					
108	30-36					
108	62-67					
108	94-96					
111	86-84					
111	69-65					
111	49-47					
111	12-0					
114	81-91 *					
114	98-100					
117	100-98					
120	11-15					
120	27-31					
120	88-100					

70-72
* 102 @ ~~101~~ = METAL POST + FENCING

* 81-91 SKIP IS GOOD
81-89 IS BAD REGAN 91-98 GOOD



LN	STA-STA	LN	STA-STA	LN
92	29-24	153	79-70	
95	14-26	156	68-77	
95	38-43	162	0-3	
99	26-21	162	7-12	
105	12-7	162	40-50	
108	38-44	.1	33-29	
111	5-0	X		
117	76-72			
117	63-59			
120	0-5			
123	100-93			
126	69-75			
138	34-39			
147	54-49			
150	70-78			

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 5/23/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/27/03		Raw XYZ on FTP	5/27/03	
Adjust lines and fiducials	5/27/03	"	Split Files In Excel	5/30/03	
Create XYZ	5/27/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	05/30/03		Processed XYZ	6/2/03	
Determine Lag	05/30/03	"	Dig Sheets	6/2/03	"
Create Map	05/30/03	"	Local & SP Maps	6/2/03	"
Grid and Display Data	05/30/03	"	QC_tests.xls	6/3/03	"
Auto Pick Targets	05/30/03	"	Processing Log	6/9/03	
Review/Add Targets	06/01/03		Zapata spreadsheets		
Targets to Digsheet	06/01/03	"			
Warp Data to SP	06/01/03	"			
Create SP & Local Maps	06/01/03	"			
Correct Format of Files	06/01/03	"			

Total Area Of Data: 18864.11

Total Targets: KAH 36G = 19
KAH 76G = 71
KAH 96G = 60

Grids/Transects Collected: KAH36G, KAH76G, KAH96G

Comments:

KAH 36G = 2433.85 SQ FT
KAH 76G = 7012.28 SQ FT
KAH 96G = 9417.98 SQ FT

Heeia/ Pali QC Tests

Date: 052303 System: EM61 MK2

AM Shake Test

File: 052303a XYZ: 052303_005_amxyz.tmi

mV Range	
Ch1:	.78 ± 2.5
ChT:	-.13 ± 2.5

PM Shake Test

File: 052303e XYZ: 052303_005_pm_xyz.tmi

mV Range	
Ch1:	-.38 ± 3
ChT:	-.02 ± 2.5

AM Standard Test

File: 052303a XYZ: 052303_005_am_xyz.tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.35 ± 3	1169.5 ± 2	2.7 ± 3.5
ChT:	-.24 ± 2.5	233.95 ± 2.5	-.25 ± 2

PM Standard Test

File: 052303e XYZ: 052303_005_pm_xyz.tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	.25 ± 3.5	1162.79 ± 2.5	.21 ± 3
ChT:	-.067 ± 2.5	228.4 ± 2.5	.057 ± 2

KAH961 Repeat Line Test

File: 052303b XYZ: KAH961_052303_0010_xyz.tmi

Locations		
	Local	State Plane
Line Start:	0, 8	
Line End:	0, 99	
Target:	0, 25	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	152.85	142.80

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	24.05		
Pass Two	0	25.32		

KAH761 Repeat Line Test

File: 052303c XYZ: KAH761_052303_0010_xyz.tmi

Locations		
	Local	State Plane
Line Start:	0 0	
Line End:	0 8.0	
Target:	0, 10	

Attempted Lags: 0, 1, 2 Actual Lag: 2

Peak Reading		
	Pass One	Pass Two
Lag:	85.37	88.51

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	9.33		
Pass Two	0	9.36		

Heeia/ Pali QC Tests

Date: _____ System: _____

AM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

PM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

KAH307 Repeat Line Test

File: 052303J XYZ: KAH307_052303_QC10_xyz_tm

Locations		
	Local	State Plane
Line Start:	0, 0	
Line End:	0, 30	
Target:	0, 10	

Attempted Lags: 0, 1, 1.5 Actual Lag: 1.5

Peak Reading		
	Pass One	Pass Two
Lag:	1609.02	1510.34

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	8.97		
Pass Two	0	10.49		

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/23/03 Page: 1 of 5

Blackhawk Field Personnel: R. Bjollm, B. Konshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

System: EM61 Model: MK2 SN: 021927-3
Controller: PR4000 Model: P4208-EJ SN: 1586
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes) ✓ Start time: 08:00 End Time: 08:15
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____Line 2_____Line 3_____

Line 4_____Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/23/03 Page: 2 of 5

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052303A Battery Voltage: 12.4 Time: 08:46 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	169	2.0	167
Channel 2-Bottom:	0.5	96	0.0	96
Channel 3-Bottom:	0.5	44	0.5	43.5
Channel 4-Top:	-1.0	233	1.0	232

Location: KAH GRID 9 (13,2) 40,128 KB

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052303E Battery Voltage: 12.1 Time: 14:04 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**(1)	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	163	1.0	162
Channel 2-Bottom:	0.0	94	0.0	94
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	-0.5	227	-1.0	225

Location: KAH GRID 3 (28,40) 39,996 KB

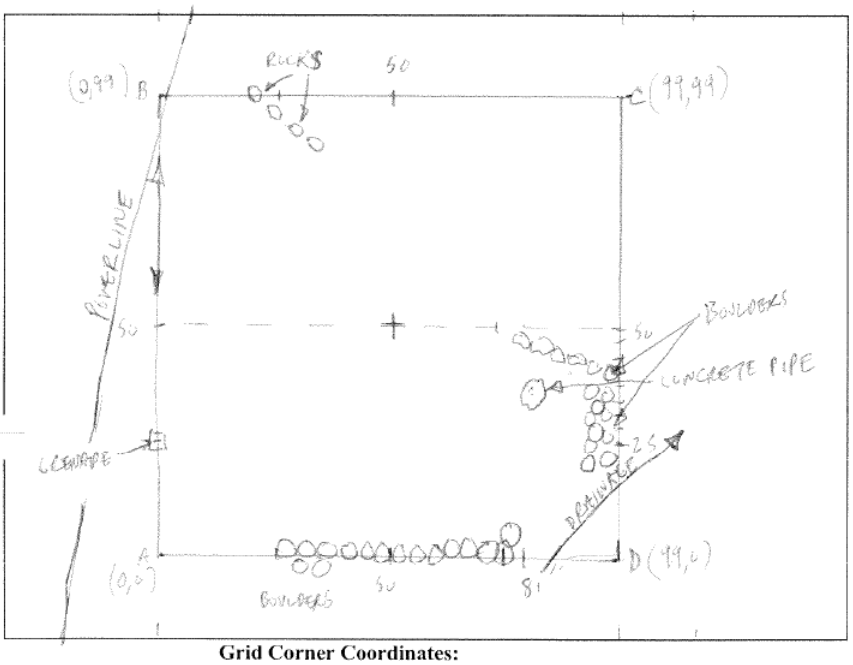
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/5 Date: _____

Project Name: KAHALU'U
Project Location: KAHALU'U TRAINING AREA
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 9G **Date:** 05/23/03
Field Team: R.B, B.K, J.W.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☒Rocky ☒Swampy ☐Dangerous
GRID

Tree Cover: **Tree Height:** 3
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☒Medium ☐Thi
THICK MAT ON GRID

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	Ø, Ø
NW	_____, _____	B	Ø, 99
NE	_____, _____	C	99, 99
SE	_____, _____	D	99, Ø

	Start	End	File Name
Battery Voltage:	12.9	12.5	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052303B
Repeat Data ~~File~~ LINE Name: (0.1)

Geophysical Instrumentation: EM61MK2 + PRO4000 **Serial Number:** 021927-3
Base Station: MK2 GRENADE @ Ø,25 / * CHANGE LINES Ø & 3 TO Ø-99' **Serial Number:** TOP COIL: 0130
Navigation Method: WHEEL MODE INC = 0.66 FID @ 50' / ~~[illegible]~~ **Serial Number:** BOTCOIL: 0231
Additional Comments: RUN LINES NORTH ↔ SOUTH / DATA SKIPS BELOW (OVERHEAD POWERLINE ON B)
* CHECK START & STOP STATIONS

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN
27	93-91	69	11-0	93	46-Ø	
57	45-42	72	0-9	96	0-43	
60	95-99	75*	7-0	99	41-0	
63	99-94	78	0-12	0.1	* DISREGARD 1ST LINE of (99-146)	
66*	98-99	81	33-30			
		84	31-33			

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 4/5 Date: _____

Project Name: Kahalu'u **Project Location:** Kahalu'u Training Area

Geophysical Contractor: Blackhawk **Design Center POC:** _____

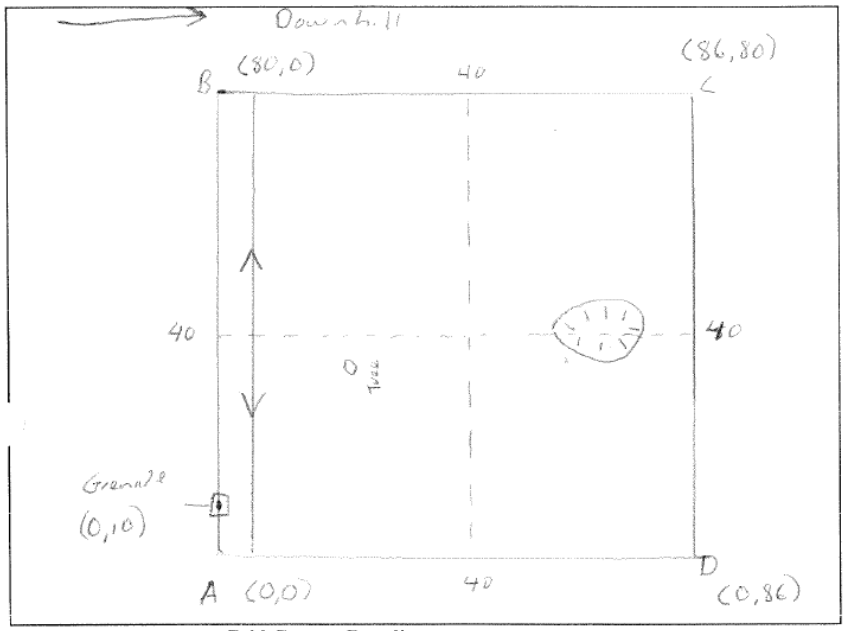
Project Geophysicist: J. Hild **Site Geophysicist:** K Bleha

Survey Area ID: KAH 7G **Date:** 05/23/03 **Field Team:** RB, BK, JW

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



N

Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☒None ☐Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	_____	_____	A 0	0
NW	_____	_____	B 80	0
NE	_____	_____	C 86	80
SE	_____	_____	D 0	86

	Start	End	File Name
	1130 START		
Battery Voltage:	12.4	12.3	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: NA

Raw Data File Name: 052303C **Repeat Data File Name:** .01 repeat of .00

Geophysical Instrumentation: EM61 MK2 + Pro 4000 **Serial Number:** 021927-3

Base Station: _____ **Serial Number:** Top Coll. 0130

Navigation Method: Wheel Mode .66, FID @ 40' **Serial Number:** Bot Coil. 0231

Additional Comments: MK2 Grenade @ (10,0), Grid run N-S

LN	STA - STA
21	34-30

Disregard 1st .1 line (35 feet) (80-78)

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 5/5 Date: _____

Project Name: KAHALU'U **Project Location:** KAHALU'U TRAINING AREA

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

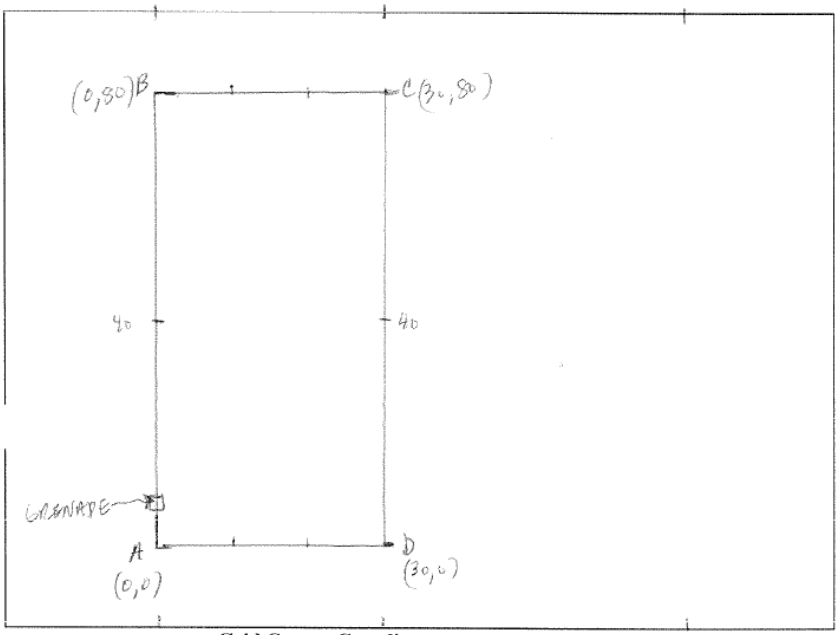
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOOM

Survey Area ID: KAH 36 **Date:** 05/23/03 **Field Team:** R.B., B.K., J.W.

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fe

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick
THICK GRASS MAT

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 30
NE	_____, _____	C	30, 30
SE	_____, _____	D	30, 0

	Start	End	File Name
Battery Voltage:	12.3	12.3	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052303D **Repeat Data ~~File~~ LINE Name:** (0.1)

Geophysical Instrumentation: EM61 MK2 + PRO4600 **Serial Number:** 021927-3

~~Base Station:~~ MK2 GRENADE @ 10' LINE 0 **Serial Number:** TOPCON: 0130

Navigation Method: WHEEL MADE INC = 0.66, FIDE 40 FT **Serial Number:** BOTCON: 0231

Additional Comments: RUN LINES NORTH ↔ SOUTH NO TREES ON GRID

BLACKHAWK UXO Services
a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 5/27/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/28/03	[illegible]	Raw XYZ on FTP	5/28/03	[illegible]
Adjust lines and fiducials	5/28/03	"	Split Files In Excel	6/1/03	[illegible]
Create XYZ	5/28/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	6/1/03	[illegible]	Processed XYZ	6/2/03	[illegible]
Determine Lag	6/1/03	"	Dig Sheets	6/2/03	"
Create Map	6/1/03	"	Local & SP Maps	6/2/03	"
Grid and Display Data	6/1/03	"	QC_tests.xls	6/3/03	[illegible]
Auto Pick Targets	6/1/03	"	Processing Log	6/9/03	[illegible]
Review/Add Targets	6/2/03	"	Zapata spreadsheets		
Targets to Digsheet	6/2/03	"			
Warp Data to SP	6/2/03	"			
Create SP & Local Maps	6/2/03	"			
Correct Format of Files	6/2/03	"			

Total Area Of Data:

Grids/Transects Collected:

Total Targets: KAH176 = 311
KAH56 = 43
KAH66 = 64

Comments:
KAH56 = 3621.428ft²
KAH66 = 9649.288ft² − 311.44 = 9337.84
KAH176 = 2129.698ft²

Heeia/ Pali QC Tests

Date: 05/27/03 System: EM61MK2

AM Shake Test

File: 052703a XYZ: 052703_QC5_am_xyz_tml

mV Range	
Ch1:	1.46 ± 2.5
ChT:	-.53 ± 2.5

PM Shake Test

File: 052703e XYZ: 052703_QC5_pm_xyz_tml

mV Range	
Ch1:	.76 ± 4.5
ChT:	-.89 ± 3.5

AM Standard Test

File: 052703a XYZ: 052703_QC5_am_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	2.3 ± [illegible]	167.7 ± 4.5	1.1 ± 4.5
ChT:	-.23 ± 3	230.96 ± 4	-.49 ± 3

PM Standard Test

File: 052703e XYZ: 052703_QC5_pm_xyz_tml

mV Range	Static 1	Standard	Static 2
Ch1:	.95 ± 6	160.58 ± 6	1.06 ± 5.5
ChT:	-1.53 ± 4	220.34 ± 4	-1.29 ± 4

KAH6G Repeat Line Test

File: 052703b XYZ: KAH6G_052703_QC10_xyz_tml

Locations	Local	State Plane
Line Start:	0, 0	
Line End:	0, 99	
Target:	0, 20	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading	Pass One	Pass Two
Lag:	109.49	134.13

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	19.47		
Pass Two	0	21.10		

KAH5G Repeat Line Test

File: 052703c XYZ: KAH5G_052703_QC10_xyz_tml

Locations	Local	State Plane
Line Start:	0, 0	
Line End:	50, 0	
Target:	10, 0	

Attempted Lags: 1, 0, [illegible] Actual Lag: [illegible] 1-[illegible]

Peak Reading	Pass One	Pass Two
Lag:	111.02	106.12

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	8.78	0		
Pass Two	10.67	0		

Heeia/ Pali QC Tests

Date: 052703 System: EM61MK2

AM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: _____ XYZ: _____

mV Range	Static 1	Standard	Static 2
Ch1:			
ChT:			

PM Standard Test

File: _____ XYZ: _____

mV Range	Static 1	Standard	Static 2
Ch1:			
ChT:			

KAH176 Repeat Line Test

File: 0527030 XYZ: KAH176-052703_QC0_xyz.tmi

Locations	Local	State Plane
Line Start:	0,0	
Line End:	0,70	
Target:	0,10	

Attempted Lags: 0, 1, 2, 1.5 Actual Lag: 1.5

Peak Reading	Pass One	Pass Two
Lag:	31.44	81.94

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One	0	8.67		
Pass Two	0	10.00		

_____ Repeat Line Test

File: _____ XYZ: _____

Locations	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/27/03 Page: 1 of 5

Blackhawk Field Personnel: B. Konshak, R. Blohm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 MK2 Model: MK2 SN: 021927-3
Controller: Pro-4000 Model: P4208-ES SN: 1586
Top Coil: EM61 Model: 1X05T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1X05B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 0840 End Time: 0855
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/27/03 Page: 2 of 5

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052703A Battery Voltage: 13.6 Time: 0920 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	1.0	166
Channel 2-Bottom:	0.0	95	0.0	95
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	0.0	232	0.0	232

Location: GRID KAH 5 (30, 80) 40,524 KB

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052703E Battery Voltage: 12.3 Time: 15:03 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	161	1.0	160
Channel 2-Bottom:	0.0	90	0.0	90
Channel 3-Bottom:	0.0	42	0.0	42
Channel 4-Top:	-1.0	221	0.0	221

Location: GRID KAH 3 (10, 50) 40,370 KB

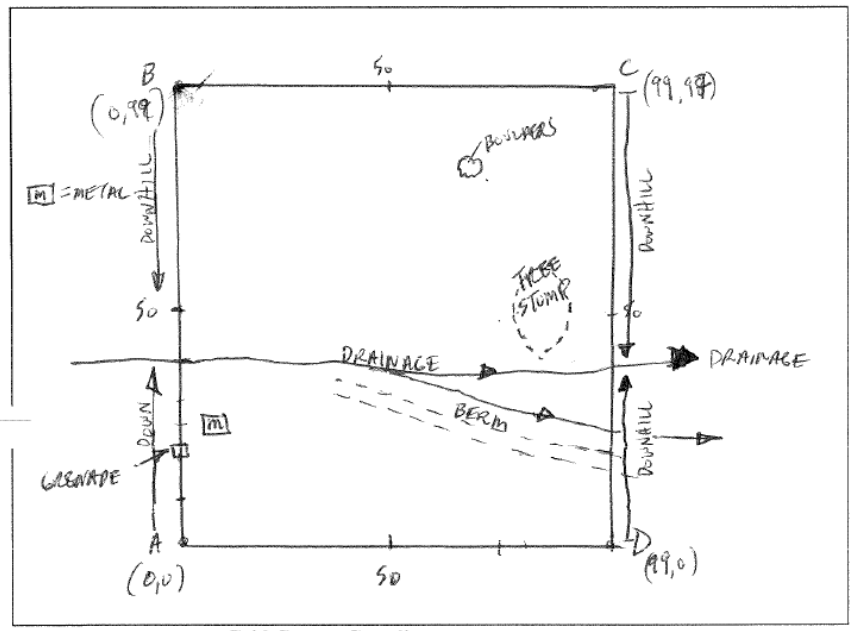
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/5 Date: _____

Project Name: Heeia Kahalu'u
Project Location: Kahalu'u
Geophysical Contractor: Blackhawk
Design Center POC: _____
Project Geophysicist: J Hild
Site Geophysicist: R. Blohm
Survey Area ID: KAH 6G **Date:** 05/27/03
Field Team: BK, RB, TF
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☒Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	Ø, Ø
NW	_____, _____	B	Ø, 99
NE	_____, _____	C	99, 97
SE	_____, _____	D	99, Ø

	Start	End	File Name
Battery Voltage:	13.0	12.7	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052703B
Repeat Data ~~File~~ LINE Name: (.1) REPEAT OF Ø

Geophysical Instrumentation: EM61 MK2 + PRO4000
Serial Number: 021927-3
~~**Base Station:**~~ MK2 GRENADE @ 20' / *EDIT OUT 1ST LN 69 (67-49?)
Serial Number: TOP COIL: 0130
Navigation Method: WHEEL MODE INC = 0.66, FID @ 50'
Serial Number: BOT COIL: 0231
Additional Comments: RUN LINES NORTH - SOUTH LINES Ø-48 = 0 TO 99' / LINES 51-99 = 0 TO 97'

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
Ø	[illegible]-14	9	90-86	21	48-41	30	93-99	54	82-87	63	72-68	75	88-85	87	6-0
Ø	31-36	9	34-27	21	21-19	33	99-92	57	59-57	63	48-44	81	62-32	90	20-22
3	35-30	15	47-36	21	12-0	36	59-64	57	40-37	63	26-23	84	3-8	90	32-40
3	5-0	18	27-34	27	6-0	42	31-36	60	30-36	63	2-Ø	84	32-59	90	66-69
6	14-20	18	77-80	30	35-37	42	67-69	60	83-89	69	*	87	80-77	90	94-97
6	35-42	21	[illegible]	30	[illegible]	46	[illegible]	62	[illegible]	72	82-85	87	60-29	96	91-95

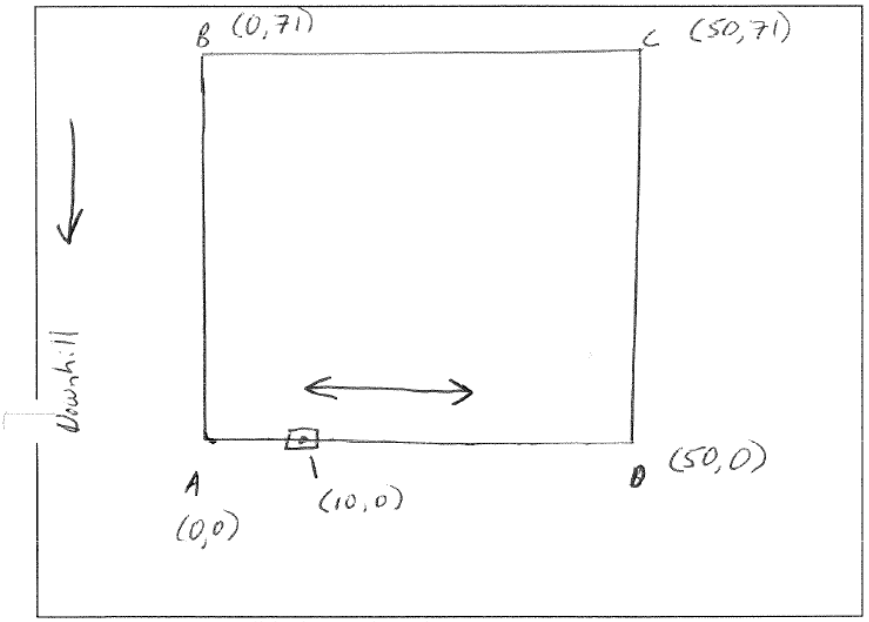
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 4/5 Date: _____

Project Name: Heeia Kahalu'u
Project Location: Kahalu'u
Geophysical Contractor: Blackhawk
Design Center POC: _____
Project Geophysicist: [redacted] J. Hild
Site Geophysicist: R. Blohm
Survey Area ID: KAH 5G **Date:** 05/27/03
Field Team: BK, RB, TF
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Stee
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ___
☐None ☒Light ☐Medium ☐Thi

Brush:
☐None ☐Light ☒Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☐Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0[redacted], [redacted]71
NE	_____, _____	C	50, 71
SE	_____, _____	D	50, 0

	Start	End	File Name
Battery Voltage:	12.6	12.4	
Static Background Value:	[redacted]		
Static Response Value:			

Instrument Clock Drift: NA

Raw Data File Name: 052703C-44946K
Repeat Data ~~File~~ Line Name: .1 Repeat of Ø
Geophysical Instrumentation: EM61 MK2 + Pro-4000 **Serial Number:** 021927.
~~Base Station~~: MK2 Grenade @ (10,0) **Serial Number:** Top coil: 0130
Navigation Method: Wheel Mode .66 **Serial Number:** Bot coil: 0231
Additional Comments: Ran lines E-W

LN	STA-STA	LN	STA-STA	LN	STA-STA
6	23-28	36	48-50	57	24-20
6	33-43	39	50-48	60	18-24
9	28-23	42	48-50	72	13-18
				72	24-29

Note:
Rotated Grid Stak
one station Counter-
-clockwise ie A goes
to [illegible]

5/5

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KEA KAHALU'U **Project Location:** KAHALU'U TRAINING AREA

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

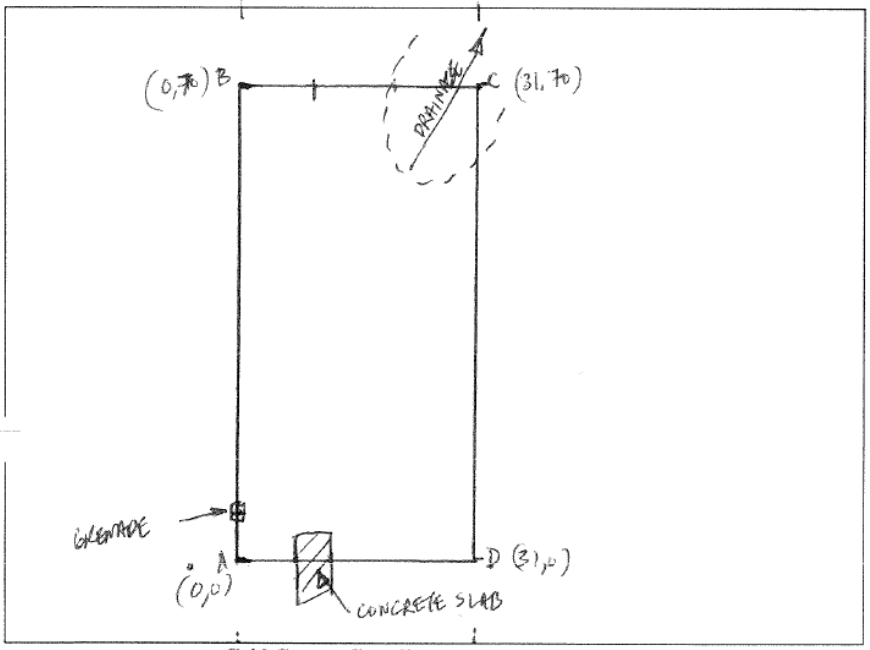
Project Geophysicist: J. HILD **Site Geophysicist:** R. Bloithm

Survey Area ID: KAH 176 **Date:** 05/27/03 **Field Team:** R.B., BK, TF

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** 1" = 20' **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Stee
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:**
☒None ☐Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi
THICK GRASS MAT

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 70
NE	_____, _____	C	31, 70
SE	_____, _____	D	31, 0

	Start	End	File Name
Battery Voltage:	12.4	12.3	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052703 D 29,260 KB **Repeat Data ~~File~~ LINE Name:** (.1) REPEAT OF 0

Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021927-3

~~Base Station~~: GRENADE @ (0,10) **Serial Number:** TX COIL: 0130

Navigation Method: WHEEL MODE INC = 0.66 **Serial Number:** RX COIL: 0231

Additional Comments: RUN LINES NORTH ↔ SOUTH LINES 0 – 30

NO DATA SKIPS

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/28/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initial
Convert .R61 files	5/29/03		Raw XYZ on FTP	5/29/03	
Adjust lines and fiducials	5/29/03	"	Split Files In Excel	6/2/03	
Create XYZ	5/29/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initial
Review Test Files	6/2/03		Processed XYZ	6/3/03	
Determine Lag	6/2/03	"	Dig Sheets	6/3/03	"
Create Map	6/2/03	"	Local & SP Maps	6/3/03	"
Grid and Display Data	6/2/03	"	QC_tests.xls	6/3/03	"
Auto Pick Targets	6/2/03	"	Processing Log	6/9/03	
Review/Add Targets	6/2/03	"	Zapata spreadsheets		
Targets to Digsheet	6/2/03	"			
Warp Data to SP	6/3/03				
Create SP & Local Maps	6/3/03	"			
Correct Format of Files	6/3/03	"			

Total Area Of Data:

Grids/Transects Collected:

Total Targets: KAH2T = 14
KAH3T = 6
KAH4G1 = 24

Comments:
KAH2T = 2778.998 ft²
KAH3T = 2073.04 ft²
KAH4G1 = 6250.70 ft²

Heeia/ Pali QC Tests

Date: 052803 System: EM61MK2

AM Shake Test

File: 052803a XYZ: 052803_QC5_am_xyz.tmi

mV Range	
Ch1:	.18 ± 20
ChT:	.22 ± 3

PM Shake Test

File: 052803f XYZ: 052803_QC5_pm_xyz.tmi

mV Range	
Ch1:	-.27 ± 2.25
ChT:	-.47 ± 3

AM Standard Test

File: 052803a XYZ: 052803_QC5_am_xyz.tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.67 ± 2.5	167.4 ± 2.5	3.0 ± 1.5
ChT:	-.19 ± 2.5	230 ± 3	.089 ± 3

PM Standard Test

File: 052803f XYZ: 052803_QC5_pm_xyz.tmi

mV Range			
	Static 1	Standard	Static 2
Ch1:	-.17 ± 2	164.4 ± 2	11 ± 2.5
ChT:	-.50 ± 2.25	230.98 ± 2	-.30 ± 2

KAH4G Repeat Line Test

File: 052803b XYZ: KAH4G 052803_QC10_xyz.tmi

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0,80	
Target:	8,10	

Attempted Lags: 0, 1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	81.91	93.44

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	10.17		
Pass Two	0	10.79		

KAH3T Repeat Line Test

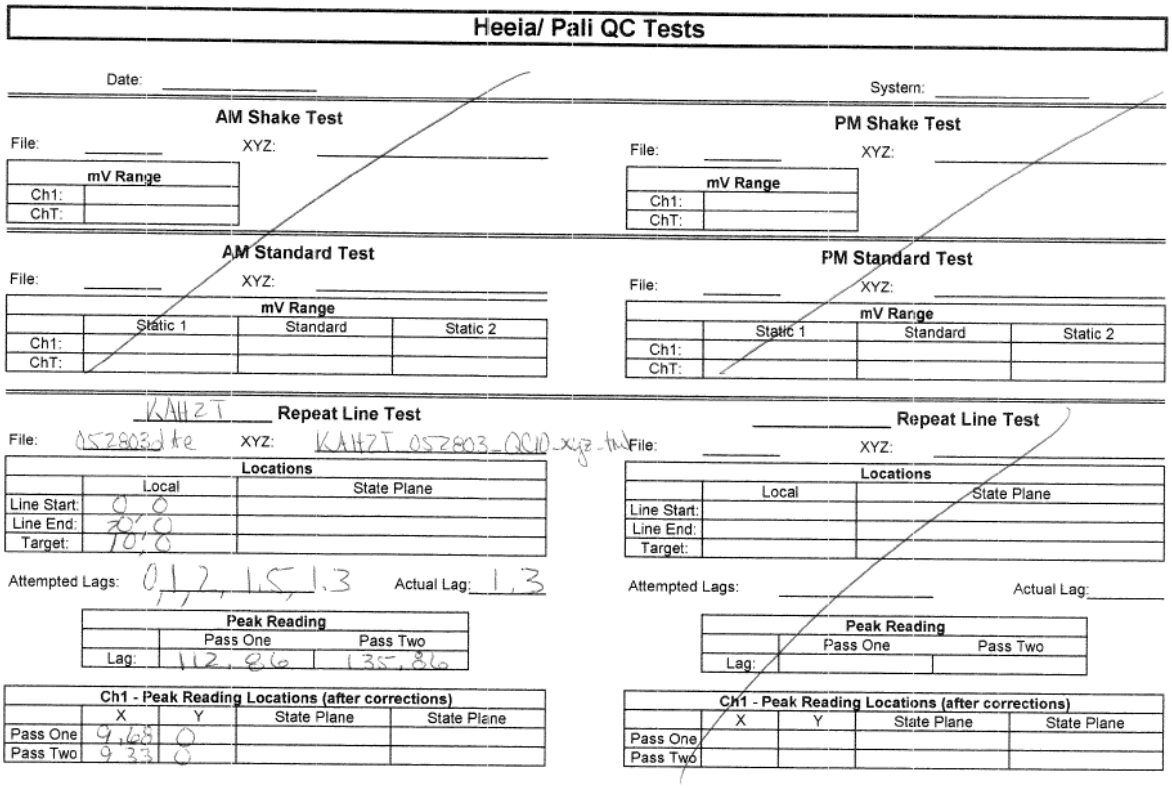
File: 052803c XYZ: KAH3T_052803_QC10_xyz.tmi

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0,136	
Target:	0,10	

Attempted Lags: 0 - See QC10 Actual Lag: 0 - data

Peak Reading		
	Pass One	Pass Two
Lag:	91.76	95.73

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	9.24		
Pass Two	0	11.23		



Heeia/ Pali QC Tests

Date: _____ System: _____

AM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

PM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

KAH2T Repeat Line Test

File: 052803.dte XYZ: KAH2T_052803_QC1_xyz.txt

Locations		
	Local	State Plane
Line Start:	0, 0	
Line End:	78, 8	
Target:		

Attempted Lags: 0, 1.2, 1.5, 1.3 Actual Lag: 1.3

Peak Reading		
	Pass One	Pass Two
Lag:	112, 86	135, 86

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	9.68	8		
Pass Two	9.33	8		

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/28/03 Page: 1 of 5

Blackhawk Field Personnel: R. BLOHM, B. KONSHAK

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: Em61 Model: MK2 SN: 02197-3
Controller: PRO4000 Model: P4208-EJ SN: 1586
Top Coil: Em61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: Em61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist

Equipment Warm-up (15 minutes)	✓	Start time: 07.45 End Time: 08.00
Check Battery Voltage	✓	
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Null Instrument After Warm-up	✓	
Personnel Test (remove metal)	✓	
Vibration Test (cable shake)	✓	

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/28/03 Page: 2 of 5

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052803A Battery Voltage: 13.0 Time: 08'51 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	2.0	165
Channel 2-Bottom:	0.0	94	0.0	94
Channel 3-Bottom:	0.0	42	0.0	42
Channel 4-Top:	-1.0	230	-1.0	231

Location: KAH GRID 4 (20,35) 40,744 KB

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052803F Battery Voltage: 12.0 Time: 15'32 Samples/Sec: 5

	Static	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	165	1.0	164
Channel 2-Bottom:	0.0	94	0.0	94
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	0.0	230	0.0	230

Location: KAH GRID 15 (0,80) 42,812 KB

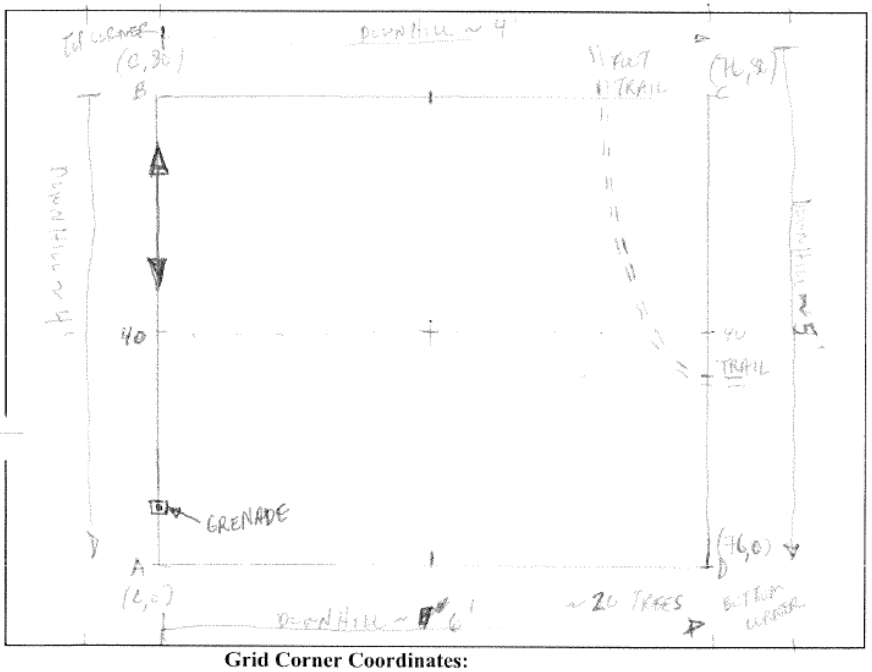
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/5 Date: _____

Project Name: HEEIA KEA KAHALU'U
Project Location: KAHALU'U
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 4G **Date:** 05/24/03
Field Team: R.B., B.K.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Stee
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 2
☐None ☐Light ☒Medium ☐Th

Brush:
☐None ☒Light ☐Medium ☐Th

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		STAKE	Local
SW	_____, _____	A	0, 0	
NW	_____, _____	B	0, 80	
NE	_____, _____	C	76, 80	
SE	_____, _____	D	76, 0	

	Start	End	File Name
Battery Voltage:	12.9	12.	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: EM61 MK2 + PRO4000
Repeat Data File Name: LINE 0.1 REPEAT OF LINE 0
Geophysical Instrumentation: 052803B 74206 KB
Serial Number: 021927-3
Base Station: MK2 GRENADE @ (0,10)
Serial Number: TOP COIL: 0130
Navigation Method: WHEEL MODE INC = 0.66 FID @ 40'
Serial Number: BOT COIL: 0231
Additional Comments: RUN LINES NORTH ↔ SOUTH / DATA SKIPS BELOW LINES 0 – 78

STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
4-80	6	23-30	21	21-18	45	15-8	66	78-80
80-75	6	62-65	24	57-61	51	13-11	75	71-68
52-46	9	34-26	27	40-37	54	0-5	0.1	80-74
31-24	15	4-0	33	51-46	60	13-18		
10-15	18	79-80	42	29-36	63	53-50		
	21	65-56	[illegible]	[illegible]				

4/5

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: Heeia Kahalu'u **Project Location:** Kahalu'u

Geophysical Contractor: Blackhawk **Design Center POC:** _____

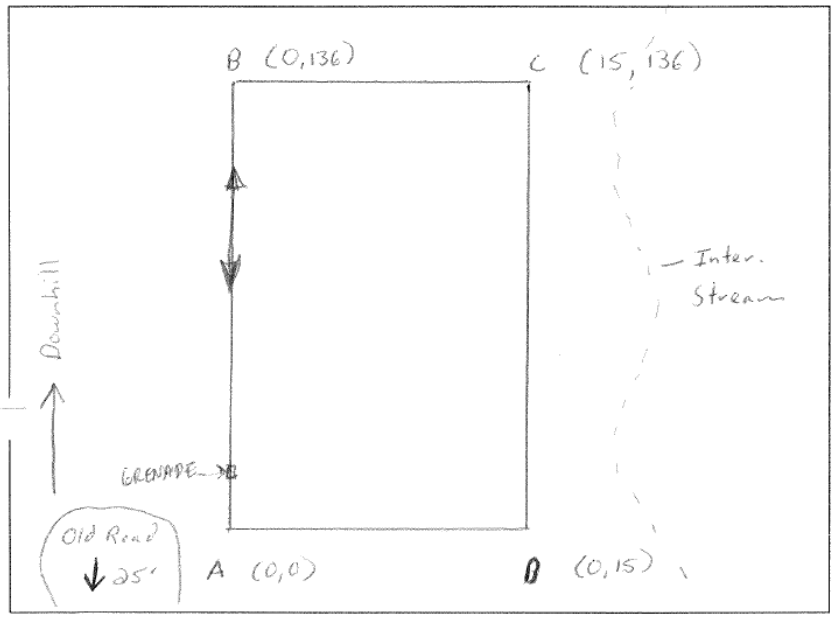
Project Geophysicist: J. Hild **Site Geophysicist:** R. Bloom

Survey Area ID: KAH 3T **Date:** 5/28/03 **Field Team:** BK, RB, RH

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 36
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	A 0, 0
NW	_____, _____	B 0, 136
NE	_____, _____	C 15, 136
SE	_____, _____	D 0, 15

	Start	End	File Name
Battery Voltage:	12.6	12.4	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: NA

Raw Data File Name: 052803C 30184 **Repeat Data File Name:** .1 Repeat of C

Geophysical Instrumentation: EM61 MK2 w/ Pro-4000 **Serial Number:** 021951-3

Base Station: Ram Links N-S **Serial Number:** TC01 & 02

Navigation Method: Wheel Mode @ .66 **Serial Number:** BC01 & 02

Additional Comments: MK2 Grenade @ (0,10), * = Ed.t to end at 100

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	72-76	3	67-60	9	102-98	15	27-21
0	118-124	3	30-23	9	72-68	.1	136-118
0	130-134	6	0-7	12	65-71	.1	77-72
3	103-100	6	23-30	15	102-99		
		6	101-103				

5/5

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KAHALU'U **Project Location:** KAHALU'U

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

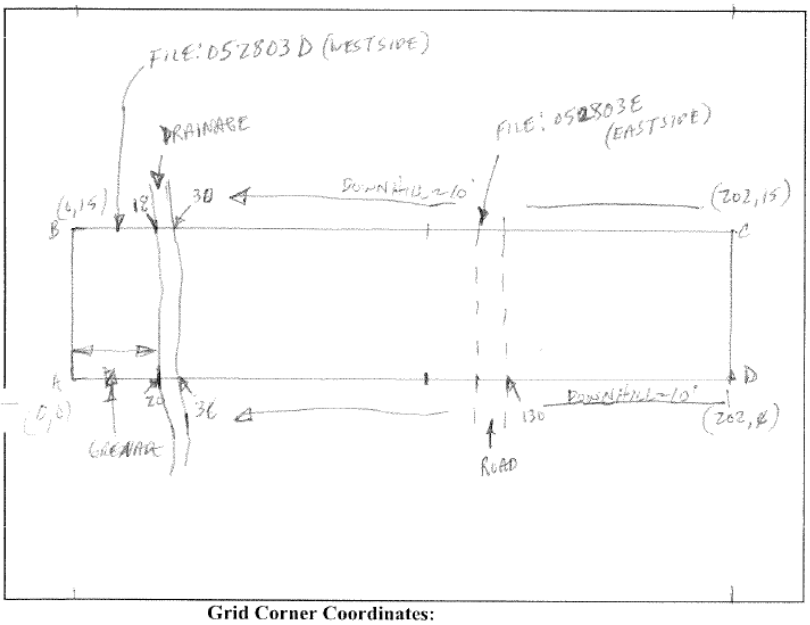
Project Geophysicist: J. HILD **Site Geophysicist:** R. Bullm

Survey Area ID: KAH 2I **Date:** 5/28/03 **Field Team:** R.B, BK, RH

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Th

Brush:
☐None ☒Light ☐Medium ☐Th

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	A 0, 0
NW	_____, _____	B 0, 15
NE	_____, _____	C 202, 15
SE	_____, _____	D 202, 0

	Start	End	File Name
Battery Voltage:	12.4	12.0	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 052803D & E 4862 31638 **Repeat Data File Name:** 0.1 REPEAT OF LINE 0

Geophysical Instrumentation: EM61 MK2 & PRO4000 **Serial Number:** 02/927-3

Base Station; MK2 LEEWARD @ (10,0) **Serial Number:** TOTAL: 0130

Navigation Method: WHEEL MODE INC = 0.66 / FID'S @ 50, 100, 150 **Serial Number:** BETWEEN: 0123

Additional Comments: RUN LINES EAST → WEST / SKIPS BELOW LISTED

LN	STA-STA (052803D)	LN	STA-STA (052803E)	LN	STA-STA	LN	STA-STA
0				9	191-186	12	134-138
12	3-7	0	101-106	9	107-102	15	202-198
15	9-5	3	136-130	9	93-38	15	154-150
		3	109-107			15	121-115
		3	70-63	12	38-41		
		[illegible]		12	50-62	15	72-52

BLACKHAWK UXO Services a division of Blackhawk GeoServices
MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/29/03 System: EM61 MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	5/30/03		Raw XYZ on FTP	5/30/03	
Adjust lines and fiducials	5/30/03	"	Split Files In Excel	6/3/03	
Create XYZ	5/30/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	6/3/03		Processed XYZ	6/6/03	
Determine Lag	6/3/03	"	Dig Sheets	6/6/03	"
Create Map	6/3/03	"	Local & SP Maps	6/6/03	"
Grid and Display Data	6/3/03	"	QC_tests.xls	6/9/03	
Auto Pick Targets	6/3/03	"	Processing Log	6/9/03	
Review/Add Targets	6/3/03	"	Zapata spreadsheets		
Targets to Digsheet	6/3/03	"			
Warp Data to SP	6/6/03				
Create SP & Local Maps	6/6/03	"			
Correct Format of Files	6/6/03	"			

Total Area Of Data: ~~KAH~~

Grids/Transects Collected:

Total Targets: KAH1G1 = 601
KAH1T = 32
KAH2G1 = 21
KAH4T = 80

Comments:

KAH1G1 = 3702.76 ft²
KAH1T = 2386.37 ft²
KAH2G1 = 752.42 ft²
KAH4T = 2805.50 ft²

Heeia/ Pali QC Tests

Date: 052903 System: EM61MK2

AM Shake Test

File: 052903a XYZ: 052903_QC5_am_xyz.txt

mV Range	
Ch1:	1.15 ± 2.5
ChT:	.41 ± 2.5

PM Shake Test

File: 052903f XYZ: 052903_QC5_pm_xyz.txt

mV Range	
Ch1:	1.32 ± 6
ChT:	.73 ± 3

* Para Lina

AM Standard Test

File: 052903a XYZ: 052903_QC5_am_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	.8 ± 3	168.28 ± 2	1.0 ± 3
ChT:	~~.41 ± 2.5~~ .17 ± 3	233.9 ± 3	-.02 ± 3.25

PM Standard Test

File: 052903f XYZ: 052903_QC5_pm_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.2 ± 6.5	163.8 ± 6	.32 ± 6
ChT:	.78 ± 3.5	229.6 ± 3.5	.87 ± 4

KAH1T Repeat Line Test

File: 052903b XYZ: KAH1T_052903_QC10_xyz.txt

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0,201	
Target:	0,10	

Attempted Lags: 0,1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	116.40	122.48

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	8.78		
Pass Two	0	10.39		

KAH2G Repeat Line Test

File: 052903c XYZ: KAH2G_052903_QC10_xyz.txt

Locations		
	Local	State Plane
Line Start:	0,0	
Line End:	0,35	
Target:	0,25	

Attempted Lags: 0,1 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	80.79	69.65

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	24.43		
Pass Two	0	24.23		

Heeia/ Pali QC Tests

Date: _____ System: _____

AM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

PM Shake Test

File: _____ XYZ: _____

mV Range	
Ch1:	
ChT:	

AM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

PM Standard Test

File: _____ XYZ: _____

mV Range			
	Static 1	Standard	Static 2
Ch1:			
ChT:			

KAH 1G Repeat Line Test

File: 052903d XYZ: KAH1G_052903_QC10.xyz.txt

Locations		
	Local	State Plane
Line Start:	0.0	
Line End:	0.761	
Target:	0.10	

Attempted Lags: 0 - QC10 Actual Lag: Lab = 1

Peak Reading		
	Pass One	Pass Two
Lag:	179.02	176.72

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	9.39		
Pass Two	0	9.28		

KAH 4T Repeat Line Test

File: 052903e XYZ: KAH4T_052903_QC10.xyz.txt

Locations		
	Local	State Plane
Line Start:	0.0	
Line End:	0.721	
Target:	0.10	

Attempted Lags: 0 - QC10 Actual Lag: Lab = 1

Peak Reading		
	Pass One	Pass Two
Lag:	152.36	133.24

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	9.21		
Pass Two	0	9.30		

Daily Log and QC Testing

Date: 05/29/03 Page: 1 of 5

Blackhawk Field Personnel: R. Bloom, B. Konshak

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: Mk 2 SN: 021927-3
Controller: PRO4000 Model: P4208-EJ SN: 1586
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 07:45 End Time: 08:00
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/29/03 Page: 2 of 5

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052903A Battery Voltage: 12.9 Time: 08:48 Samples/Sec: 5

	Static(3)	**Standard**(1)	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	0.0	168	1.0	167
Channel 2-Bottom:	0.0	95	0.0	95
Channel 3-Bottom:	0.0	94	0.0	94
Channel 4-Top:	0.0	233	-1.0	234

Location: KAH ~~EE~~ TRANSECT 2T (21,-5) 40,150 KB

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 052903F Battery Voltage: 12.0 Time: 15:57 Samples/Sec: 5

	Static(3)	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	164	2.0	162
Channel 2-Bottom:	-1.0	94	0.0	94
Channel 3-Bottom:	0.0	43	0.0	43
Channel 4-Top:	1.0	230	1.0	229

Location: KAH TRAIL TO GRID 1 40,502 KB

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: 5/6

Project Name: HE'EIA KAHALU'U **Project Location:** KAHALU'U

Geophysical Contractor: BLACKHAWK **Design Center POC:** _____

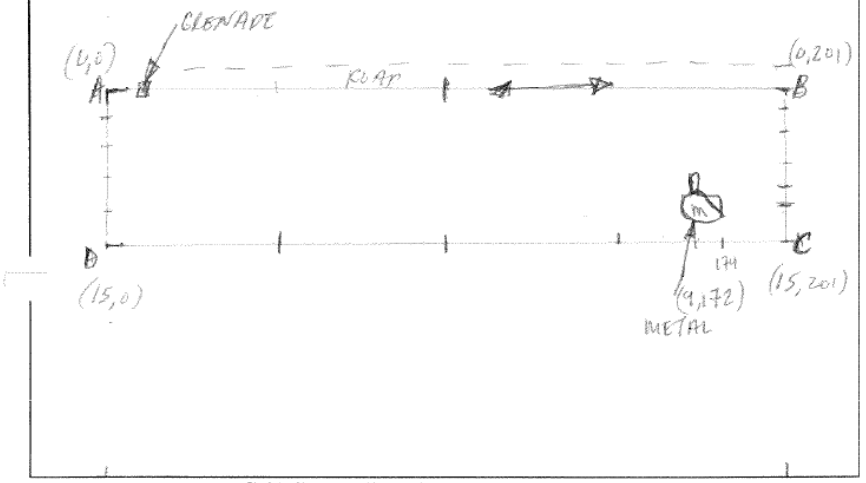
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOHM

Survey Area ID: KBH 2T **Date:** 05/29/03 **Field Team:** R.B, B.K., RH

Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Stee
☐Rolling ☐Ruts ☐Gullies
☒Rocky ☐Swampy ☒Dangerous
☒ BOULDERS

Tree Cover: **Tree Height:** 35
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 201
NE	_____, _____	C	15, 201
SE	_____, _____	D	15, 0

	Start	End	File Name
Battery Voltage:	12.9	_____	
Static Background Value:	2.0	_____	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052903B **Repeat Data ~~File~~ Name:** 0.1 REPEAT OF LINE 0

Geophysical Instrumentation: EM61 MK2 + PROLOG **Serial Number:** 021927-3

~~Base Station~~: MK2 GRENADE @ (0,10) **Serial Number:** TOTAL: 0152

Navigation Method: WHEEL MODE INC = 0.65 / F10 @ 50, 100, 150 **Serial Number:** TOTAL: 6231

Additional Comments: LINES RUN NORTH ↔ SOUTH / DATA SKIPS LISTED BELOW * CHECK STOP STAT

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	57-169	3	19-17	9	182-178	9	6-5	12	154-148	LN	25-21
3	178-175	3	1-0	9	172-151	9	1-0	15	147-139	.1	159-154
3	158-155	6	57-84	9	126-122	12	7-12	15	138-147		
3	134-131	6	115-124	9	114-103	12	20-25	15	136-133		
3	66-55	6	159-171	9	86-59	12*	50-114	15	114-48		

4/6

☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KAHALU'U **Project Location:** KAHALU'U

Geophysical Contractor: BLACK HAWK **Design Center POC:** _____

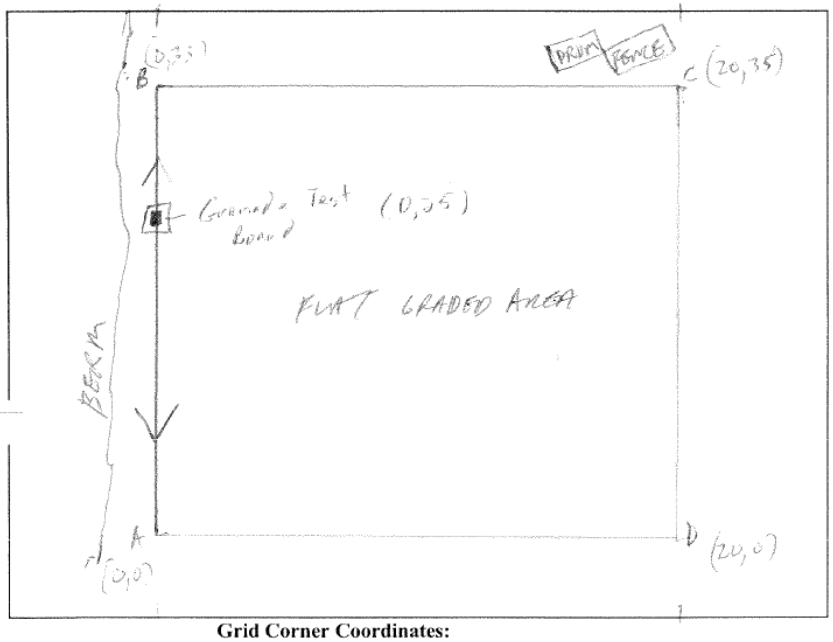
Project Geophysicist: J. HILD **Site Geophysicist:** R. BLOTTER

Survey Area ID: KAH 26 **Date:** 05/29/03 **Field Team:** B.K., R.B, R.H

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ___
☒None ☒Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 35
NE	_____, _____	C	20, 35
SE	_____, _____	D	20, 0

	Start	End	File Name
Battery Voltage:	12.7	12.7	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:	_____	_____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052903C 11550 KB **Repeat Data File Name:** 01 REPEAT OF LINE 0

Geophysical Instrumentation: EM61 MK2 + PROXIMO **Serial Number:** 031927-3

Base Station: MK2 GRENADE @ (0,25) **Serial Number:** Top Coil: 01

Navigation Method: WHEEL MODE INC = 0.61 / NO FID'S **Serial Number:** Bottom Coil: _____

Additional Comments: RUN LINES NORTH ↔ SOUTH, Trash, Glass and Vehicle Parts in nearby areas

NO TREES, NO SKIPS

7/6

☐ QC checked by _____ Date: _____

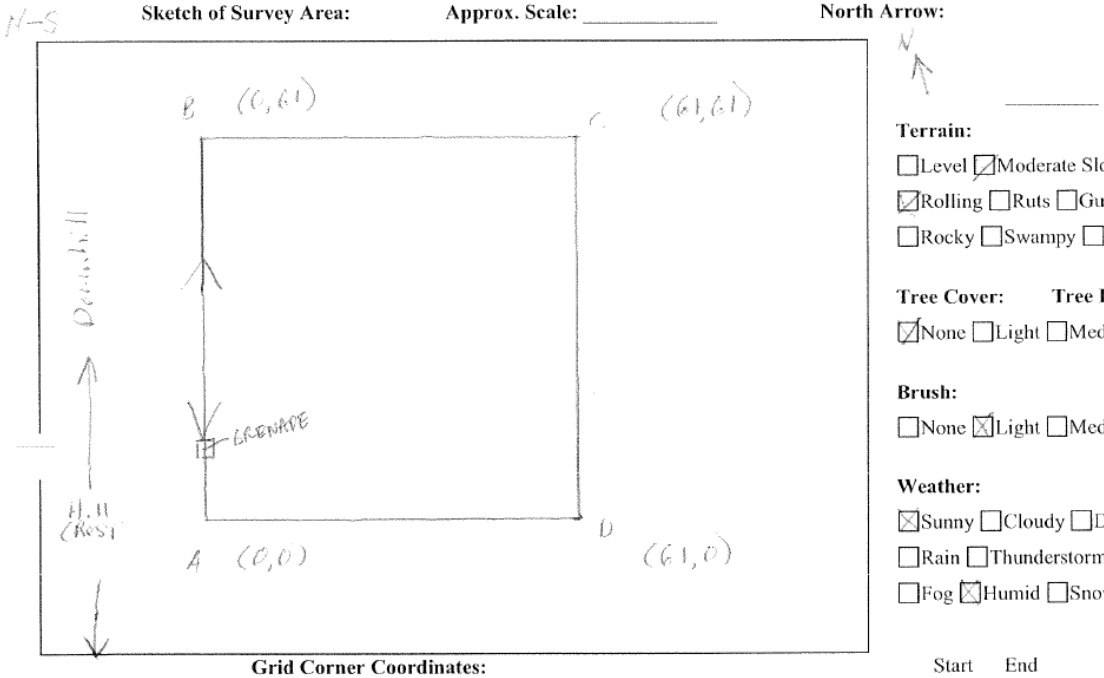
Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: Heeia Kahalu'u
Project Location: Kahalu'u
Geophysical Contractor: Blackhawk
Design Center POC: _____
Project Geophysicist: T. Hill
Site Geophysicist: R. Blatt...
Survey Area ID: KAH 1G **Date:** 5/29/03
Field Team: BF, RB, RH
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒

N-S

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Stee
☒Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ___
☒None ☐Light ☐Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local
SW	_____, _____	A	0, 0
NW	_____, _____	B	0, 61
NE	_____, _____	C	61, 61
SE	_____, _____	D	61, 0

	Start	End	File Name
Battery Voltage:	12.4	12.3	
Static Background Value:			
Static Response Value:			

Instrument Clock Drift: N/A

Raw Data File Name: 052903 D 46970KB
Repeat Data ~~File~~ Line Name: .1 Repeat of 6
Geophysical Instrumentation: EMG1 MK2 w/ Pro-4000
Serial Number: 0.21907
~~Base~~ Station: _____
Serial Number: Top Coil : 0
Navigation Method: Wheel Mode @ .66 No Fids
Serial Number: Bottom Coil : 0
Additional Comments: Raw grid N-S, MK2 Grenade @ (0,10)

N	STA STA	IN	STA STA
54	60-61		
57	61-60		

6/6

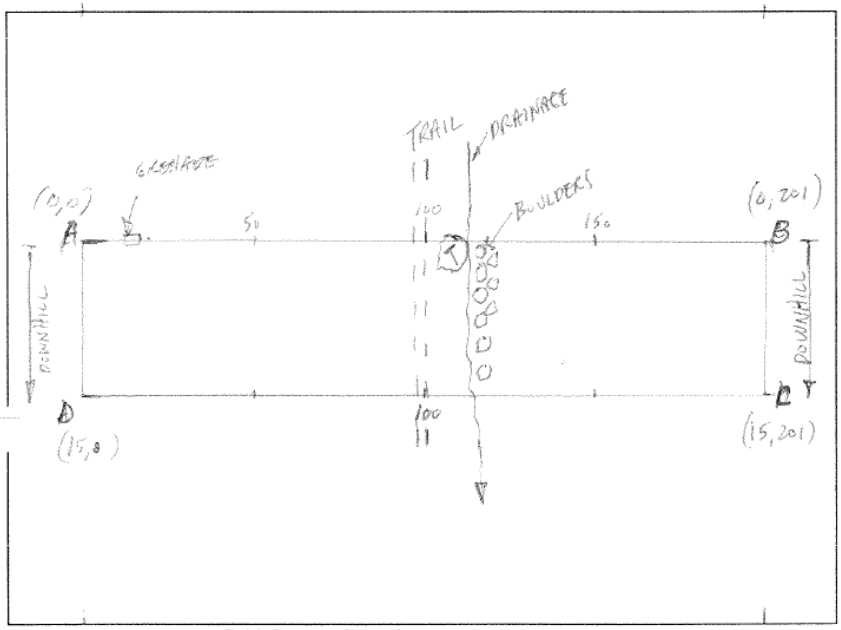
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: HEEIA KAHALU'U
Project Location: KAHALU'U
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 4T **Date:** 5/29/03
Field Team: R.B, BK, RH
Survey Type: ☐Grid ☐Meandering Path ☒Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☒Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30
☐None ☐Light ☒Medium ☐Thi

Brush:
☐None ☒Light ☐Medium ☐Thi

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		STAKE	Local
SW	_____, _____		A	Ø, Ø
NW	_____, _____		B	Ø, 201
NE	_____, _____		C	15, 201
SE	_____, _____		D	15, Ø

	Start	End	File Name
Battery Voltage:	12.3	12.0	
Static Background Value:	1	1	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 052903E 40232
Repeat Data ~~File~~ LINE Name: (.1) REPEAT OF LINE Ø
Geophysical Instrumentation: EM61 MK2 & PRO4000
Serial Number: 021927-3
~~Base Station~~: MK 2 GRENADE @ (0,10)
Serial Number: TOP COIL: 0130
Navigation Method: WHEEL MODE INC = 0.66 / FIDN @ 50, 100, 150
Serial Number: BOT COIL: 0231
Additional Comments: RUN LINES: NORTH - SOUTH / * CHECK STOP STATION

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
	25-34	3	119-102	9	201-197	15	190-180	0.1	199-185
Ø	68-78	3	13-8	9	174-170	15	140-136	0.1	122-103
Ø	104-122	6	*101-120	9	126-112	15	120-106	0.1	71-68
Ø	184-199	6	133-140	12	6-15	15	63-54	0.1	35-25
3	192-185	6	168-173	12	178-188	15	38-32		
3	170-161								

BLACKHAWK UXO Services a division of Blackhawk GeoServices MTADS

Project: 400.002

File: 700.015

Daily Checklist

Date: 05/30/03 System: EM61MK2

Processed Data and Spreadsheets

Dat61	Date	Initials		Date	Initials
Convert .R61 files	6/2/03		Raw XYZ on FTP	6/2/03	
Adjust lines and fiducials	6/2/03	"	Split Files In Excel	6/16/03	"
Create XYZ	6/2/03	"			

Maps and Targets

Oasis	Date	Initials	On FTP Site	Date	Initials
Review Test Files	6/16/03		Processed XYZ	6/16/03	
Determine Lag	6/16/03	"	Dig Sheets	6/16/03	"
Create Map	6/16/03	"	Local & SP Maps	6/16/03	"
Grid and Display Data	6/16/03	"	QC_tests.xls	6/9/03	
Auto Pick Targets	6/16/03	"	Processing Log	6/9/03	
Review/Add Targets	6/16/03	"	Zapata spreadsheets		
Targets to Digsheet	6/16/03	"			
Warp Data to SP	6/16/03	"			
Create SP & Local Maps	6/16/03	"			
Correct Format of Files	6/16/03	"			

Total Area Of Data: KAH 18 67 = 6529.6

Grids/Transects Collected: KAH 18 67

Total Targets: KAH 18 67 = 34

Comments:

Heeia/ Pali QC Tests

Date: ~~05~~ 053003 System: EM61MK2

AM Shake Test

File: 053003a XYZ: 053003_QCS_am_xyz.txt

mV Range	
Ch1:	.99 ± 2
ChT:	~~1.4 ± 2~~ -.34 ± 2.5

PM Shake Test

File: 053003c XYZ: 053003-QCS-pm_xyz.txt

mV Range	
Ch1:	.90 ± 2
ChT:	-.30 ± 3.5

AM Standard Test

File: 053003a XYZ: 053003_QCS_am_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	1.4 ± 2	169.3 ± 1.5	2.1 ± 2
ChT:	-.24 ± 2.5	233.9 ± 2.5	-.23 ± 2.5

PM Standard Test

File: 053003c XYZ: 053003_QCS-pm_xyz.txt

mV Range			
	Static 1	Standard	Static 2
Ch1:	.99 ± 2.5	166.10 ± 1.5	1.74 ± 2
ChT:	-.24 ± 3.5	230.0 ± 3	-.17 ± 3

KAH18a Repeat Line Test

File: 053003b XYZ: KAH18a_053003_QC10_xyz.txt

Locations		
	Local	State Plane
Line Start:	8, 0	168916.054 103929.01
Line End:	8, 81	168923.12 103960.53
Target:	0, ~~8~~ 10	

Attempted Lags: 0, 1, .5 Actual Lag: 1

Peak Reading		
	Pass One	Pass Two
Lag:	~~44.5~~ 127.35	104.72

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One	0	9.24	168911.69.24	103929.15
Pass Two	0	4.97	168911.69.39	103929.12

_____ Repeat Line Test

File: _____ XYZ: _____

Locations		
	Local	State Plane
Line Start:		
Line End:		
Target:		

Attempted Lags: _____ Actual Lag: _____

Peak Reading		
	Pass One	Pass Two
Lag:		

Ch1 - Peak Reading Locations (after corrections)				
	X	Y	State Plane	State Plane
Pass One				
Pass Two				

Daily Log and QC Testing

Date: 05/30/03 Page: 1 of 3

Blackhawk Field Personnel: R. BLOOM, B. KONSTAK

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
System: EM61 Model: MK2 SN: 021927-3
Controller: PB04000 Model: P4208-EJ SN: 1586
Top Coil: EM61 Model: 1x0.5T SN: 0130 Height to Coil: 30"
Bottom Coil: EM61 Model: 1x0.5B SN: 0231 Height to Coil: 17"

Pre-Survey Checklist
Equipment Warm-up (15 minutes) ✓ Start time: 07:20 End Time: 07:35
Check Battery Voltage ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Null Instrument After Warm-up ✓
Personnel Test (remove metal) ✓
Vibration Test (cable shake) ✓

QC8 Test (Six Line Test 1st Day of Project)

File Name: _____ Wheel Inc: _____ Time: _____

Line 1_____ Line 2_____ Line 3_____

Line 4_____ Line 5_____ Line 6_____

Length of lines: _____ft Standard test item is on line: _____

Notes: (Sketch site, etc)

AM Tests for Data Processing

Date: 05/30/03 Page: 2 of 3

QC5_AM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 053003A Battery Voltage: 12.9 Time: 08:08 Samples/Sec: 5

	Static(3)	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	2.0	169	2.0	167
Channel 2-Bottom:	0.0	96	0.0	96
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	0.5	234	0.5	233.5

Location: KAH GRID 18 (7,14) 40018 Kb

PM Tests for Data Processing

QC5_PM Test (Cable Shake/Static/Standard/Static Tests)

(1 minute cable shake + 3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 053003C Battery Voltage: 12.6 Time: 10:07 Samples/Sec: 5

	Static(3)	**Standard**	**Static**	**Residual** (standard minus static)
Channel 1-Bottom:	1.0	167	1.0	166
Channel 2-Bottom:	0.0	94	0.0	94
Channel 3-Bottom:	0.0	44	0.0	44
Channel 4-Top:	0.5	230	0.5	229.5

Location: KAH GRID 18 (7,14) 40876 Kb

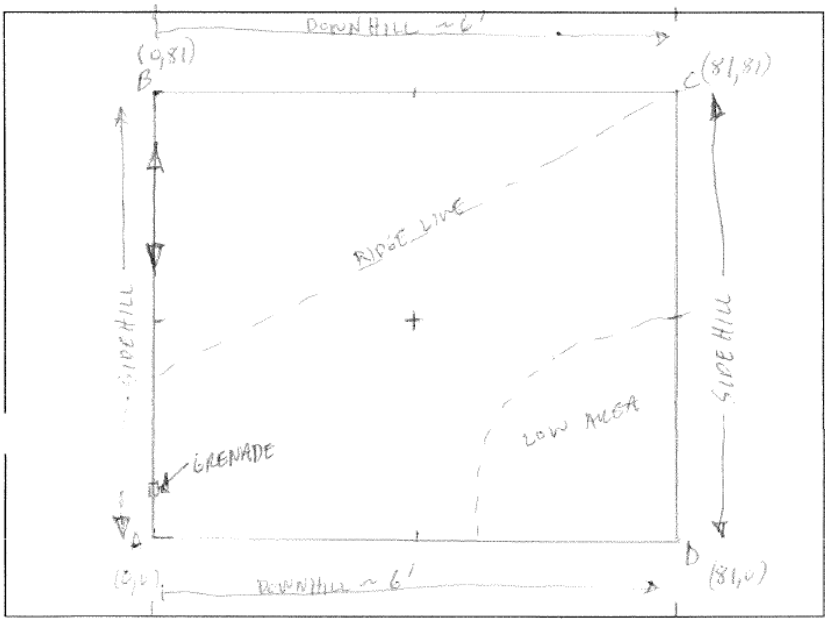
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by 3/3 Date: _____

Project Name: HEEIA KAHALU'U
Project Location: KAHALU'U TRAINING AREA
Geophysical Contractor: BLACKHAWK
Design Center POC: _____
Project Geophysicist: J. HILD
Site Geophysicist: R. BLOHM
Survey Area ID: KAH 18G **Date:** 05/30/03
Field Team: R.B., E.K., R.H.
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Stee
☒Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 3
☐None ☐Light ☒Medium ☐Th

Brush:
☐None ☒Light ☐Medium ☐Th

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	STAKE	Local
SW	_____, _____	A	∅, ∅
NW	_____, _____	B	∅, 81
NE	_____, _____	C	81, 81
SE	_____, _____	D	81, ∅

	Start	End	File Name
Battery Voltage:	12.9	12.6	
Static Background Value:	1.0	1.0	_____, _____
Static Response Value:			_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 053003 B 74910 kb
Repeat Data File Name: REPEAT OF LINE ∅ (.1)
Geophysical Instrumentation: EM61 MK2 + PRO4000 **Serial Number:** 021927-3
Base Station: MK2 GRENADE @ (0,10) **Serial Number:** TOP COIL: 0130
Navigation Method: WHEEL MODE ING = 0.66 / FID @ 40' **Serial Number:** BOT COIL: 0231
Additional Comments: RUN LINES NORTH ← SOUTH / DATA SKIPS LISTED BELOW

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
∅	22-25	6	4-10	12	40-43	24	21-30	33	2-0	51	50-44	63	56-46	72	86-81
∅	54-61	6	24-29	15	73-69	27	44-39	36	22-28	51	13-9	63	40-38	75	69-64
3	81-75	6	74-81	15	5-0	27	10-6	42	40-46	54	45-51	66	7-12	75	56-45
3	67-56	9	62-59	18	31-34	30	17-20	45	32-27	57	40-37	66	34-37	75	14-11
3	33-29	9	17-13	18	44-48	33	69-57	48	28-32	57	2-∅	66	44-48	81	34-30
		12	12-22									69	75-72	81	62-55

Pali Training Camp Geophysical Field Notes

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1/4

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 8/8/06
Blackhawk Field Personnel: R. Bloom,

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 13:30 End Time: 13:45
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 080806a
Line: 6
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

Tests for Processing: Date: 08-08-06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0808066 Battery Voltage: 12.6V Time: 1406 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	63	0	
Channel 2 Bottom	0	41	0	
Channel 3 Bottom	1	19	0	
Channel 4 Top	0	155	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: _____ Battery Voltage: _____ Time: _____ Samples/Sec: _____

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom				
Channel 2 Bottom				
Channel 3 Bottom				
Channel 4 Top				

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

3/

08/08/06

Six Line Test (First Day of Project only)

Acceptance Criteria: Repeatability of response amplitude +/- 20%, Positional Accuracy +/- 20cm

File Name: 080806c 08/08/06 Comments: • Line 50' Long • Wheel Mode • 2" Ball at 25' • Inc. = .65

Line 1 direction: N (No object on Line, Normal Pace)
Line 2 direction: S (No object on Line, Normal Pace)
Line 3 direction: N (Object on Line, Normal Pace)
Line 4 direction: S (Object on Line, Normal Pace)
Line 5 direction: N (Object on Line, Fast Pace)
Line 6 direction: S (Object on Line, Slow Pace)

Object location

Name	2" BALL
Latitude	@ 25'
Longitude	

File Name: _____ Comments: _____

Line 1 direction: _____ (No object on Line, Normal Pace)
Line 2 direction: _____ (No object on Line, Normal Pace)
Line 3 direction: _____ (Object on Line, Normal Pace)
Line 4 direction: _____ (Object on Line, Normal Pace)
Line 5 direction: _____ (Object on Line, Fast Pace)
Line 6 direction: _____ (Object on Line, Slow Pace)

Object location

Name	
Latitude	
Longitude	

File Name: _____ Comments: _____

Line 1 direction: _____ (No object on Line, Normal Pace)
Line 2 direction: _____ (No object on Line, Normal Pace)
Line 3 direction: _____ (Object on Line, Normal Pace)
Line 4 direction: _____ (Object on Line, Normal Pace)
Line 5 direction: _____ (Object on Line, Fast Pace)
Line 6 direction: _____ (Object on Line, Slow Pace)

Object location

Name	
Latitude	
Longitude	

DID MR-005-05
Attachment A

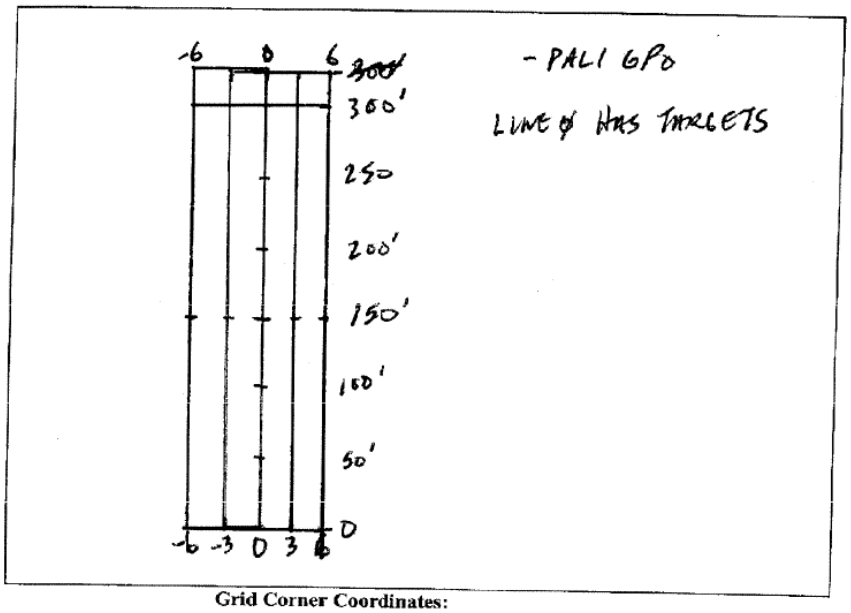
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm
Survey Area ID: Pali GPO **Date:** 08·08·06 **Field Team:** R. Blohm, S. ALU
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30'
☐None ☒Light ☐Medium ☐

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	-6, 0
NW	_____, _____	-6, 300
NE	_____, _____	6, 300
SE	_____, _____	6, 0

	Start	End	File Name
Battery Voltage:	12.6V	12.6V	
Static Background Value:	____	____	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: _____
Raw Data File Name: 0808006d **Repeat Data File Name:** 0808006e
Geophysical Instrumentation: Geonics EM61-MK2 **Serial Number:** _____
Base Station: RUN LINES 6, 3, 0, -3, -6 REPEAT -6, -3, 0, 3, 6 **Serial Number:** Top Coil
Navigation Method: Tapes + Flags **Serial Number:** Bottom Coil
Additional Comments: FIDs at 50' INTERVALS

1/3

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/09/06
Blackhawk Field Personnel: K. Blottr

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN
Top Coil(s):	Model EM61-MK2	SN

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 9:15 End Time: 9:30
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 080906a
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2/3

Tests for Processing: Date 08-09-06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0809061b Battery Voltage: 12.9V Time: 0941 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	45	0	
Channel 2 Bottom	0	43	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	155	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0809061h Battery Voltage: 12.6V Time: 1533 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	35	2	
Channel 2 Bottom	0	44	1	
Channel 3 Bottom	0	20	1	
Channel 4 Top	0	155	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

3/3

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

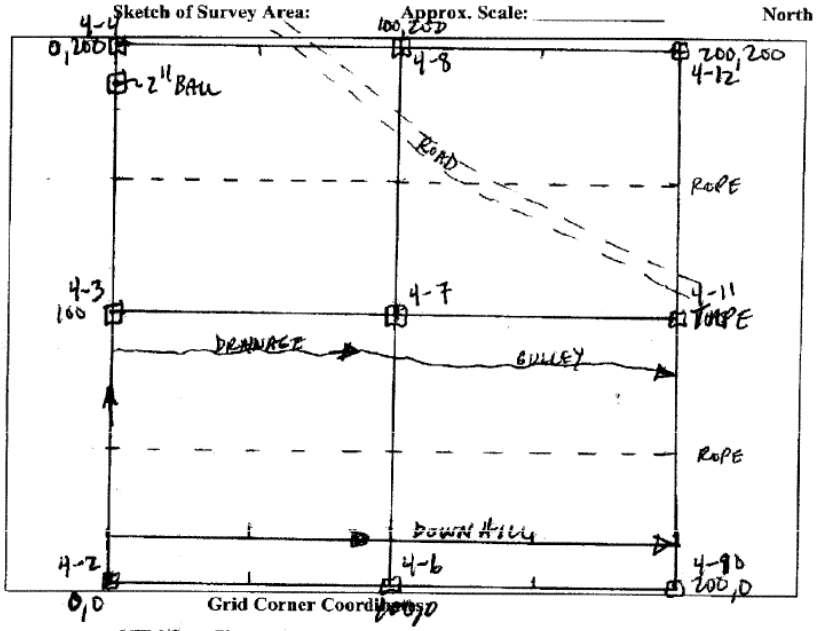
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: _____ **Date:** 08.09.06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☒Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	~~UTM/State Plane~~	Local
SW	STAKE 4-2	0, 0
NW	4-4	0, 200
NE	4-12	200, 200
SE	4-9	200, 0

Grid Corner Coordinates

	Start	End	File Name
Battery Voltage:	12.9V	12.1	0955 start
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

* NO DATA GAPS

Instrument Clock Drift: _____

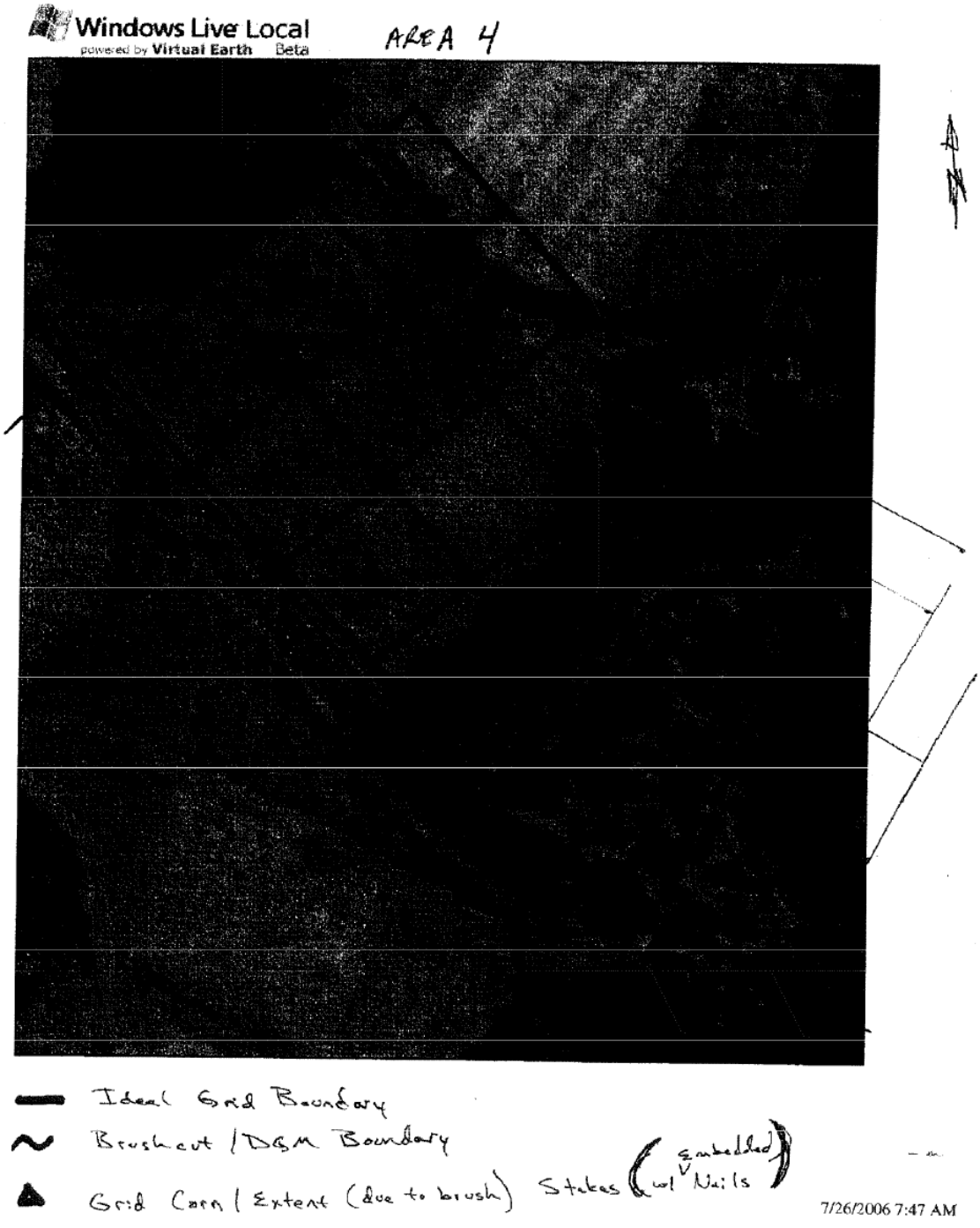
Raw Data File Name: 080906c, c=lines 0-48 **Repeat Data File Name:** 080906g

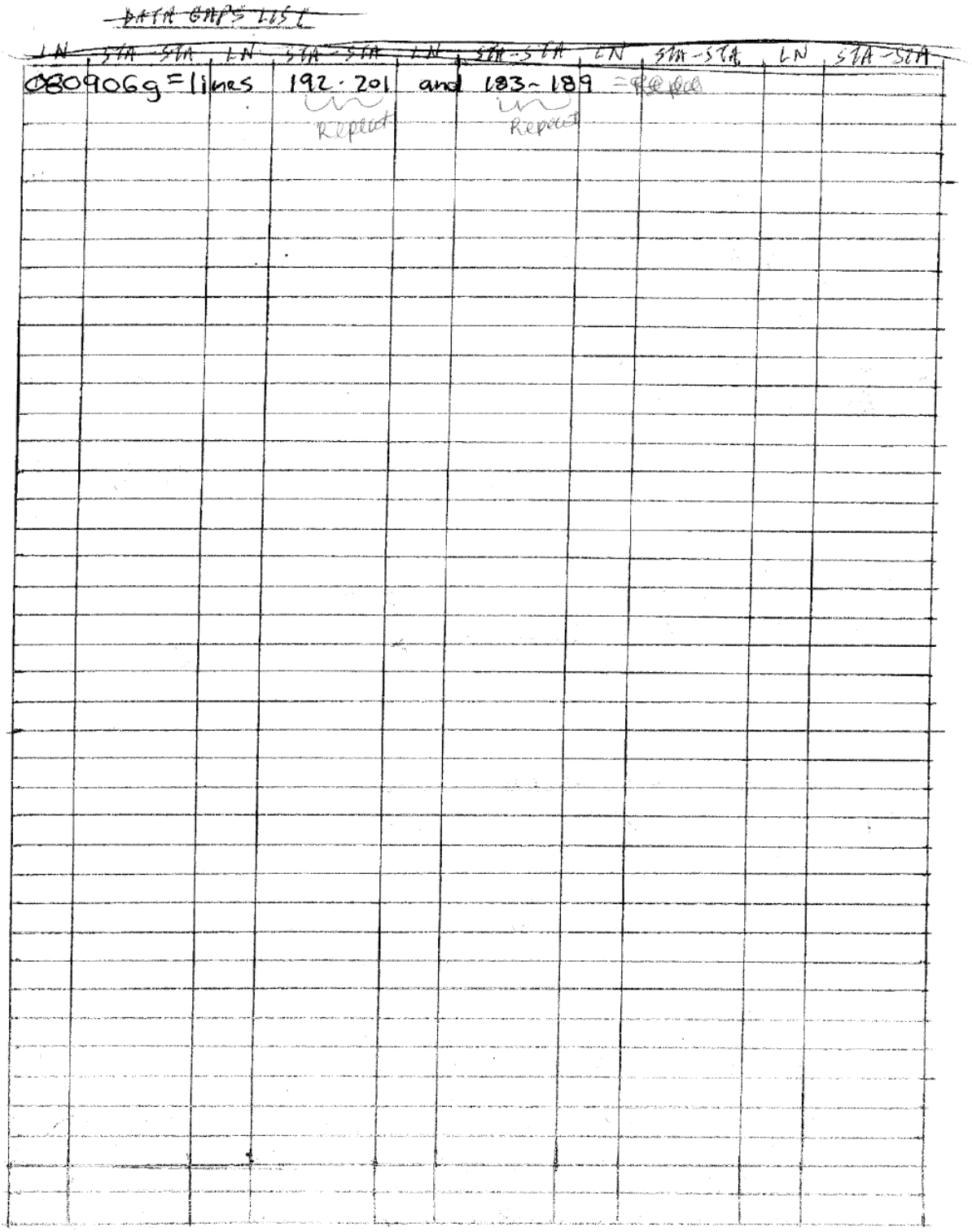
Geophysical Instrumentation: Geonics EM61-MK2 NAILS IN WOOD HUBS **Serial Number:** _____

~~**Base Station**~~ LINES RUN N-S 0-200' w/ FIDS @ 50', 100', 150' **Serial Number:** Top Coil

Navigation Method: MEASING TAPES, ROPES w/ FLAGS, TRAFFIC CONES **Serial Number:** Bottom Coil

Additional Comments: FIDs at 50' / 2" Ball Line 0, 185' / New file 080906d line 51 S / 080906d = lines 51-102 w/ .1 going S (.1 = line 0) / 080906e line 105 S / 12.3 V start / 080906e = lines 105-150 / 080906f line 153 S / 080906f = lines 153-195 / Battery died end 195 / Replaced Battery (V12.6) / Re-Nulled / 080906g line 192 N / (over)


Windows Live Local
powered by Virtual Earth Beta
AREA 4
Ideal Grid Boundary
Brushcut / DSM Boundary
Grid Corn / Extent (due to brush)
Stakes (w/ embedded V Nails)
of 1
7/26/2006 7:47 AM


DATA GAPS LIST
LN STA-STA LN STA-STA LN STA-STA LN STA-STA LN STA-STA
080906g = lines 192-201 and 183-189 = Repeat
Repeat

3/3

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

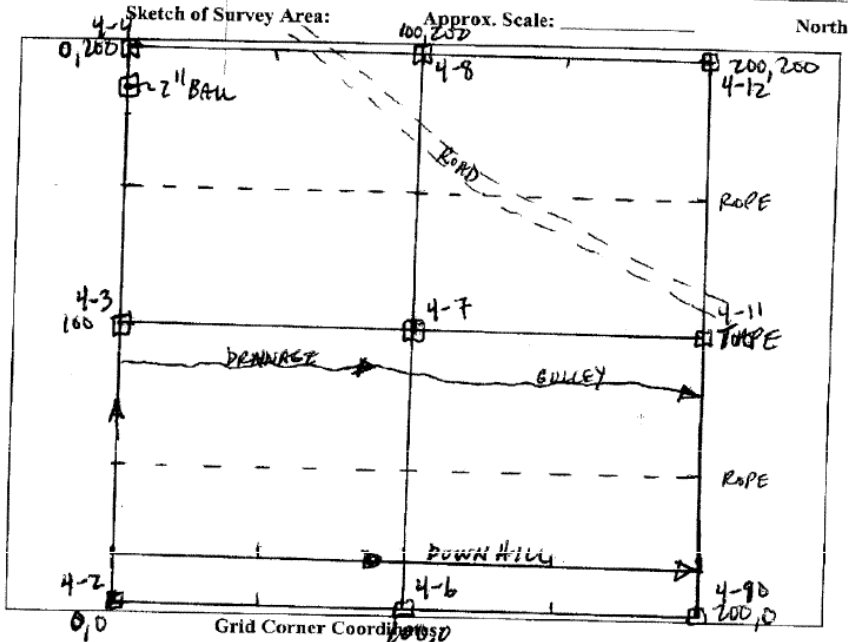
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: G-4-2 **Date:** 08-09-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☒Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	~~UTM/State Plane~~	Local	Start	End	File Name
Battery Voltage:			12.9V	12.1	0955 start
Static Background Value:					
Static Response Value:					
SW	STAKE 4-2	0, 0			
NW	4-4	0, 200			
NE	4-12	200, 200			
SE	4-9	200, 0			

* NO DATA GAPS

Instrument Clock Drift: _____

Raw Data File Name: 080906c, c=lines 0-48 **Repeat Data File Name:** 080906g

Geophysical Instrumentation: Geonics EM61-MK2 NAILS IN WOOD HUBS **Serial Number:** _____

~~**Base Station**~~ LINES RUN N-S 0-200' w/ FIDS @ 50', 100', 150' **Serial Number:** Top Coil

Navigation Method: MEASURING TAPES, ROPES w/ FLAGS, TRAFFIC CONES **Serial Number:** Bottom Coil

Additional Comments: FIDs at 50' / 2" Ball Line 0, 185' / new file 080906d line 51 / 080906d = lines 51-102 w/ .1 going S (o1 = line 0) / 080906e line 105 / 12.3 V start / 080906e = lines 105-150 / 080906f line 153 / 080906f = lines 153-195 / Battery died end 195 / Replaced Battery (V12.6) / Re-Nulled / 080906g line 192 / (over)

Repeated 4 lines ...

1/7

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode (YES) NO

Date: 08/14/06
Blackhawk Field Personnel: R. Bloom

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
Console(s): Model EM61-MK2 SN 022003 * NEW CONSOLE
System Controller: (Allegro\PRO4000) Model Allegro SN 11257
Bottom Coil(s): Model EM61-MK2 SN 10513
Top Coil(s): Model EM61-MK2 SN 10513

GPS Equipment:
GPS Base Station Antenna: Model Trimble 5700 SN
GPS Base Station Receiver: Model 5700 SN
GPS Base Station Transmitter: Model 5700 SN
GPS Rover Unit: Model 5700 SN
GPS Rover Antenna: Model L1-L2 SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0630 End Time: 0700
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 081406a
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2/7

Tests for Processing: Date: 08/14/06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081406b 081406c Battery Voltage: 12.5V Time: 0726 Samples/Sec: 5

	b/c Static	b/c Standard	b/c Single Coil Static	Residual
Channel 1 Bottom	-1/3	82/80	2/4	
Channel 2 Bottom	0/1	45/44	1/1	
Channel 3 Bottom	0/0	19/19	0/0	
Channel 4 Top	0/0	172/169	0/0	

File Name 081406 081408
Battery V: 12.3V
Time: 08

	g/h static	g/h standard	g/h static
ch1	0/0	74/77	-1/1
ch2	0/0	41/42	0/0
ch3	0/0	19/19	0/0
ch4	0/0	169/168	0/0

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081406n&o Battery Voltage: 12.4 Time: 1337 Samples/Sec: 5

	N/o Static	N/o Standard	N/o Single Coil Static	Residual
Channel 1 Bottom	0/1	78/77	3/2	
Channel 2 Bottom	0/0	44/43	2/1	
Channel 3 Bottom	0/0	20/19	0/0	
Channel 4 Top	0/0	170/169	0/0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: 081406m Line Length: 100' LINE @ 0.1 w/ 2" BALL @ 40'

Known Target: Northing: _____ Easting: _____ F10 @ 50'

2

3/.

08/08/06

Six Line Test (First Day of Project only)

Acceptance Criteria: Repeatability of response amplitude +/- 20%, Positional Accuracy +/- 20cm

File Name: 080806c 08/08/06 Comments: • Line 50' Long • Wheel Mode • 2" Ball at 25' • Inc. = .65

Line 1 direction: N (No object on Line, Normal Pace)
Line 2 direction: S (No object on Line, Normal Pace)
Line 3 direction: N (Object on Line, Normal Pace)
Line 4 direction: S (Object on Line, Normal Pace)
Line 5 direction: N (Object on Line, Fast Pace)
Line 6 direction: S (Object on Line, Slow Pace)

SUM #1

Object location

Name	2" BALL
Latitude	@ 25'
Longitude	

3/7

08/14/06

* File Name: 080806cd DATE: 08/14/06 Comments: • Line 50' Long • Wheel Mode • 2" Ball @ 25' • Inc = .65 *

NEW CONSOLE SERIAL NO: 022003

Line 1 direction: N (No object on Line, Normal Pace)
Line 2 direction: S (No object on Line, Normal Pace)
Line 3 direction: N (Object on Line, Normal Pace)
Line 4 direction: S (Object on Line, Normal Pace)
Line 5 direction: N (Object on Line, Fast Pace)
Line 6 direction: S (Object on Line, Slow Pace)

SUM #2

Object location

Name	2" Ball
Latitude	@ 25'
Longitude	

File Name: _____ Comments: _____

Line 1 direction: _____ (No object on Line, Normal Pace)
Line 2 direction: _____ (No object on Line, Normal Pace)
Line 3 direction: _____ (Object on Line, Normal Pace)
Line 4 direction: _____ (Object on Line, Normal Pace)
Line 5 direction: _____ (Object on Line, Fast Pace)
Line 6 direction: _____ (Object on Line, Slow Pace)

Object location

Name	
Latitude	
Longitude	

4/7

REVISED

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

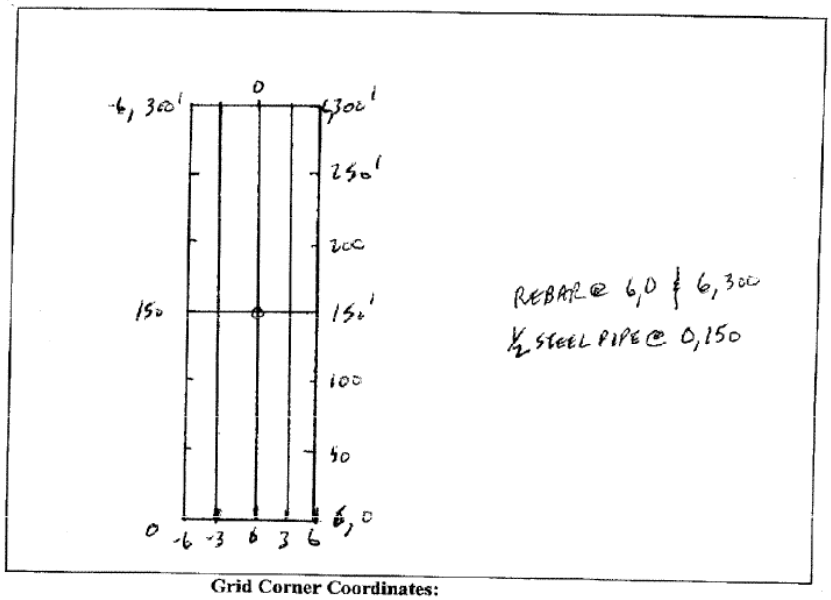
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Pali GPO **Date:** 08-14-06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30'
☐None ☒Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	_____, _____	-6, 0
NW	_____, _____	-6, 300
NE	_____, _____	6, 300
SE	_____, _____	6, 0

	Start	End	File Name
Battery Voltage:	12.4	12.3	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 081406e Inc = .65 **Repeat Data File Name:** 081406f Inc = .645

Geophysical Instrumentation: Geonics EM61-MK2 **Serial Number:** 022003

Base Station: Run Lines -6, -3, 0, 3, 6 Repeat -6, -3, 0, +3, +6 **Serial Number:** Top Coil 05/3

Navigation Method: Tapes + Flags **Serial Number:** Bottom Coil 05/3

Additional Comments: FIDs @ 50' Intervals

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DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

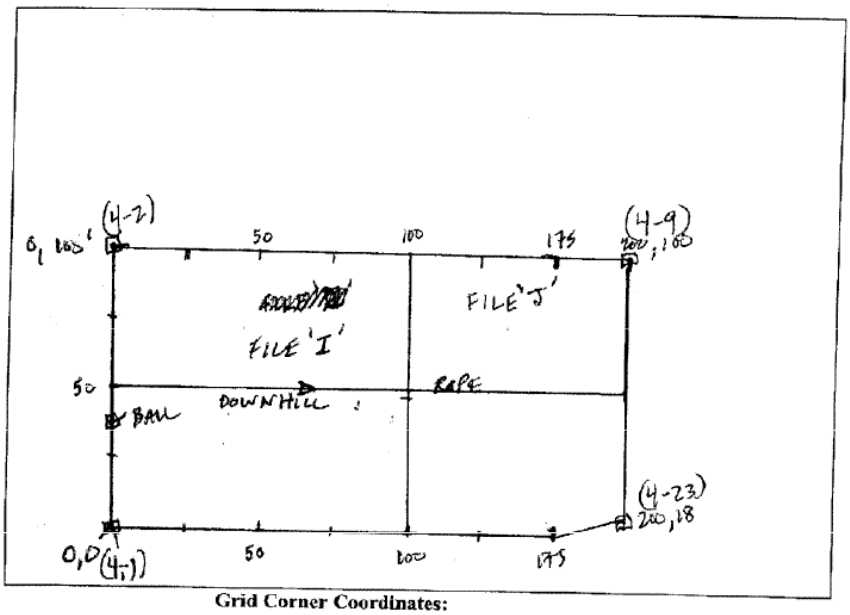
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: 4-1 GRID **Date:** 08/14/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: ☒None ☐Light ☐Medium ☐Thick **Tree Height:** ____

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	4-1, SAME	0, 0
NW	4-2, "	0, 100
NE	4-9, "	200, 100
SE	4-23, "	206, 18

	Start	End	File Name
Battery Voltage:	12.7	12.5	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 081406i = Lines 0-99 and 0 NOS; 081406j = Line 0 and 102-198

Repeat ~~Data File Name~~: LINE 0.1 IS LINE 0

Geophysical Instrumentation: Geonics EM61-MK2 INC = 0.645 **Serial Number:** 022003

~~Base Station~~: RUN LINES N-S FID'S @ 50', NAILS IN WOOD HUBS **Serial Number:** Top Coil 10513

Navigation Method: TAPES, REELS W/FLAGS ON 3' INTERVALS **Serial Number:** Bottom Coil 11

Additional Comments: 2" Ball @ 40' on 0 line/Wheel Inc. @ .645/FID @ 50'

~~FILE 081406s~~ * GAPS ON REVERSE FOR FILE "J".

DATA GAPS LIST

REVERSE OF 5/

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
171	1.96 - 0								
174	0 - 1								
177	5.8 - 0								
180	0 - 6								
183	11 - 0								
186	0 - 11								
189	13 - 0								
192	0 - 13								
195	16 - 0								
198	0 - 16								

6/7

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

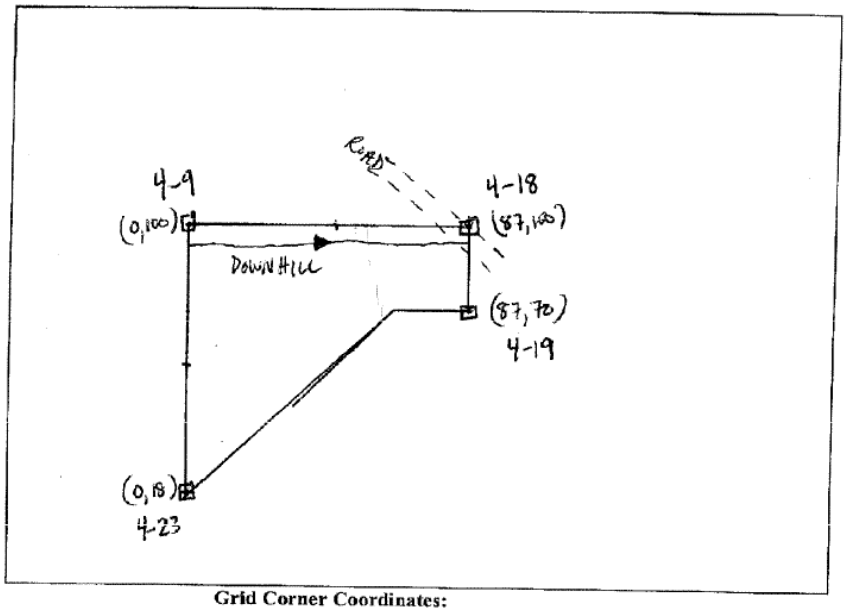
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 4-23 **Date:** 08-14-06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	4-23, STAKE	0, 18
NW	4-9, "	0, 100
NE	4-18, "	87, 100
SE	4-19, "	87, 70

	Start	End	File Name
Battery Voltage:	12.2V	11.8V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: NA

Raw Data File Name: 081406K : Lines 0-87 **Repeat Data File Name:** _____

Geophysical Instrumentation: Geonics EM61-MK2 Inc = .645 **Serial Number:** 622003

~~Base Station~~: Run lines N-S, FIDs @ 50', NAILS IN WOOD HUBS **Serial Number:** Top Coil 10513

Navigation Method: Tapes + Ropes **Serial Number:** Bottom Coil 4

Additional Comments: DATA GAPS/START-STOP STATIONS ON REVERSE

ACTUALLY FILE "L"

SOUTH END 100
START POINT PATH GAPS LIST

REVERSE OF 6/7

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	18 - 0								
3	0 - 22								
6	26 - 0								
9	0 - 26								
12	26 - 0								
15	0 - 26								
18	30 - 0								
21	0 - 30								
24	30 - 0								
27	0 - 32								
30	32 - 0								
33	0 - 34								
36	34 - 0								
39	0 - 36								
42	45 - 0								
45	0 - 48								
48	50 - 0								
51	0 - 50								
54	50 - 0								
57	0 - 54								
60	60 - 0								
63	0 - 62								
66	67 - 0								
69	0 - 70								
72	70 - 0								
75	0 - 70								
78	70 - 0								
81	0 - 70								
84	70 - 0								
87	0 - 70								

71

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

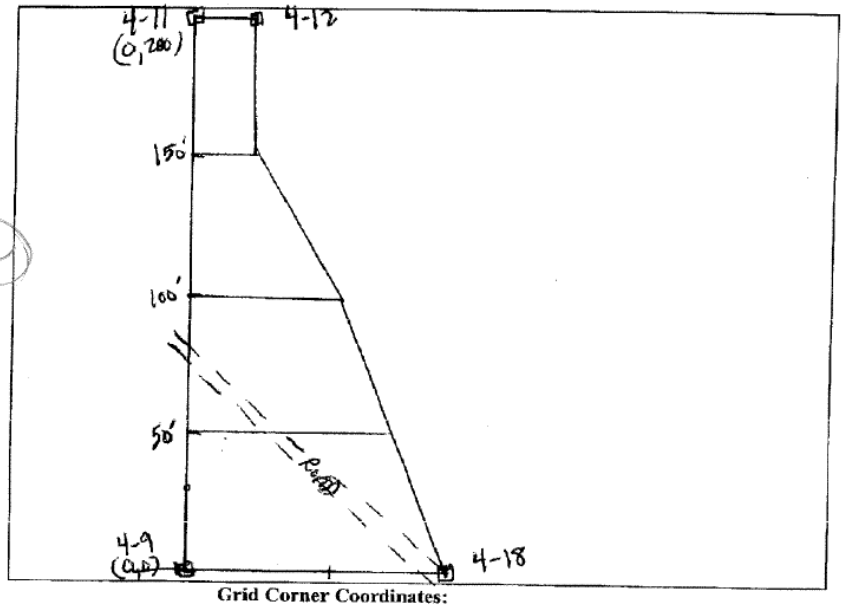
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 4-9 **Date:** 8.14.06 **Field Team:** R. Blohm, S. Ale

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous
☒ spongey grass
Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	4-9, STAKE	0, 0
NW	4-11, "	0, 200
NE	4-12, "	20, 200
SE	4-18, "	87, 0

	Start	End	File Name
Battery Voltage:	12.7V	12.5	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: _____

Raw Data File Name: 0814061 = Lines 0-84 **Repeat Data File Name:** _____

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = ~~.645~~ .65 **Serial Number:** 022003

Base Station: Run lines N-S, FIDs @ 50', NAILS IN WOOD HUBS **Serial Number:** Top Coil 105/3

Navigation Method: Tapes & Ropes **Serial Number:** Bottom Coil "

Additional Comments: Line 27 @ 159' Nail Hub + @ 129' Nail Hub

DATA GAPS / START-STOP STATIONS ON REVERSE

ACTUALLY FILE K

DATA GAPS LIST

REVERSE OF 7/7

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
21	200 - 193								
24	184 - 200								
27	200 - 181								
30	122 - 200								
33	200 - 113								
36	113 - 200								
39	200 - 100								
42	68 - 200								
45	200 - 62								
48	50 - 200								
51	200 - 50								
54	37 - 200								
57	200 - 34								
60	30 - 200								
63	200 - 30								
66	25 - 200								
69	200 - 18								
72	16 - 200								
75	200 - 11								
78	10 - 200								
81	200 - 5								
84	3 - 200								

1/5

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES NO
Wheel Mode: YES NO

Date: 08/15/06
Blackhawk Field Personnel: R. Bloom

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
Console(s): Model EM61-MK2 SN 027003
System Controller: (Allegro\PRO4000) Model Allegro SN 11257
Bottom Coil(s): Model EM61-MK2 SN 1053
Top Coil(s): Model EM61-MK2 SN 1053

GPS Equipment:
GPS Base Station Antenna: Model Trimble 5700 SN
GPS Base Station Receiver: Model 5700 SN
GPS Base Station Transmitter: Model 5700 SN
GPS Rover Unit: Model 5700 SN
GPS Rover Antenna: Model L1-L2 SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0700 End Time: 0730
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 081506a
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2/5

Tests for Processing: Date: 08·15·06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081506b Battery Voltage: 12.6V Time: 0743 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	77	0	
Channel 2 Bottom	0	44	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	170	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081506i Battery Voltage: 12.3V Time: 1532 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	77	0	
Channel 2 Bottom	0	43	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	170	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

3/

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

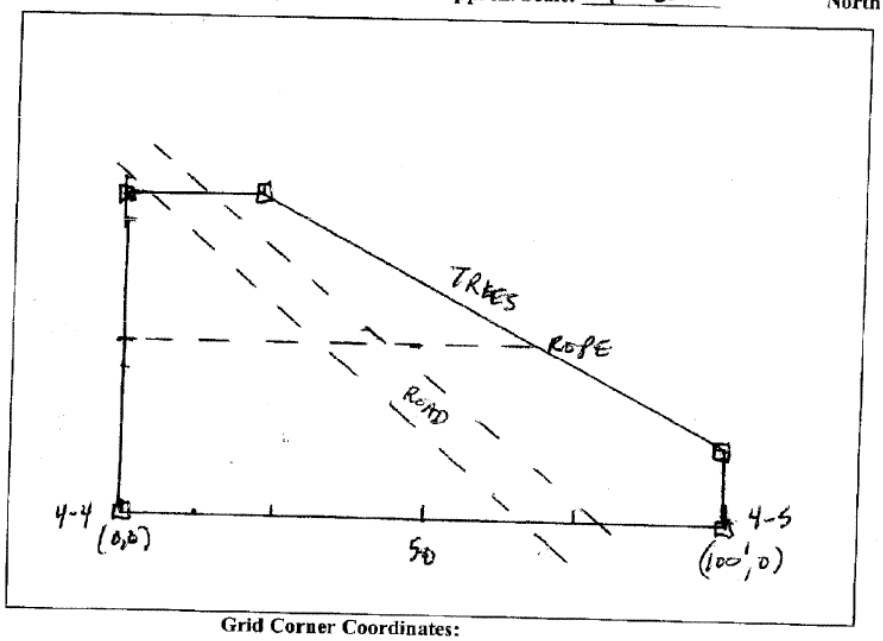
Survey Area ID: GRID 4-4 **Date:** 08-15-06 **Field Team:** R. Blohm, S. Aly

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** 1" = 25'

North Arrow:



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☒Light ☐Medium ☐T.
ON NORTHSIDE

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	4-4, Stake	0, 0
NW	4-25, "	0, 60
NE	_____, _____	100, 7
SE	4-5, "	100, 0

	Start	End	File Name
Battery Voltage:	12.7	12.6	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: _____

Raw Data File Name: 081506c = Lines 0-44

Repeat Data File Name: SEE BELOW

Geophysical Instrumentation: Geonics EM61-MK2 Inc.=.65 **Serial Number:** 022003

~~**Base Station:**~~ Run Lines N-S, FIDs @ 30', NAILS IN HUBS **Serial Number:** Top Coil 10513

Navigation Method: Tapes & Ropes, cones **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 25' / 081506d = Line 0 S->N & N->S

* START & END STATIONS ON REVERSE SIDE *

DATA GAPS LIST

REVERSE OF [3]

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
24	ends 53								
27	start 52								
30	ends 51								
33	starts 46								
36	ends 43								
39	starts 39								
42	ends 35								
45	starts 33								
48	ends 31								
51	starts 30								
54	ends 29								
57	starts 28								
60	ends 23								
63	starts 23								
66	ends 23								
69	starts 23								
72	ends 18								
75	starts 18								
78	ends 14								
81	starts 13								
84	ends 11								
87	starts 10								
90	ends 8								
93	starts 8								
96	ends 7								
99	starts 7								
~~102~~	~~ends~~								

4/5

DID MR-005-05
Attachment A

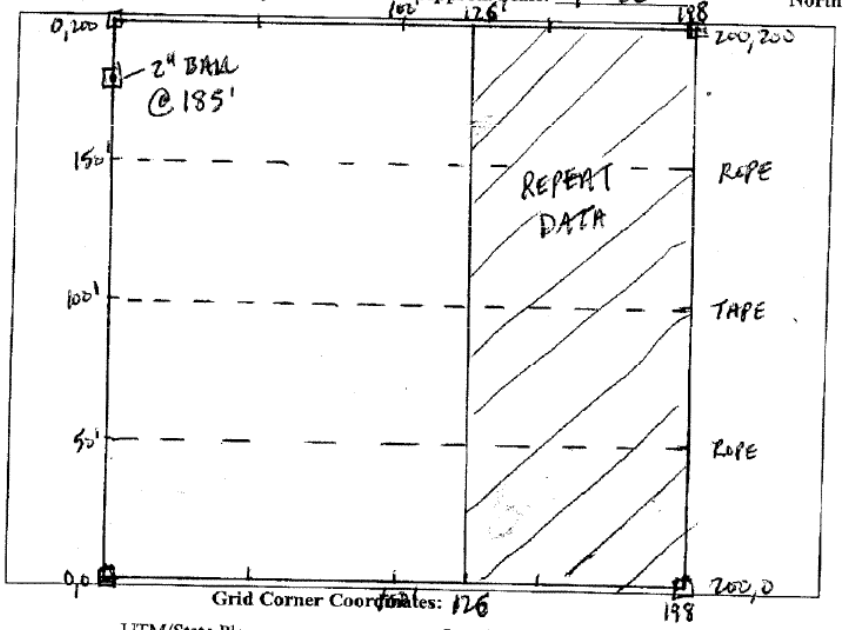
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI
Project Location: Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering
Design Center POC: _____
Project Geophysicist: J. Hild
Site Geophysicist: R. Blohm
Survey Area ID: GRID 4-2 **Date:** 08-15-06
Field Team: R. Blohm, S. Alu
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** 1" = 50'



North Arrow:

Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☒None ☐Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☒Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	4-2	Stake	0	0
NW	4-4	"	0	200
NE	4-11	"	200	200
SE	4-9	"	200	0

	Start	End	File Name
Battery Voltage:	12.7V	12.6V	
Static Background Value:			
Static Response Value:			

Instrument Clock Drift: _____ (w/ 2" Ball)

Raw Data File Name: 081506e
Repeat Data File Name: 081506f = Line 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645
Serial Number: 022003
~~**Base Station**~~: Run Lines N-S, FIDs @ 50', NO GAPS
Serial Number: Top Coil 10513
Navigation Method: Tapes + ~~Lines~~ SA Ropes, CONES, NAILS IN WOOD HUBS
Serial Number: Bottom Coil "
Additional Comments: *Edit out 1st Line 159 - use 2nd Line 159/*
* REPEAT DATA ON LINES 126 - 198 * NO DATA GAPS

5/1

DID MR-005-05
Attachment A

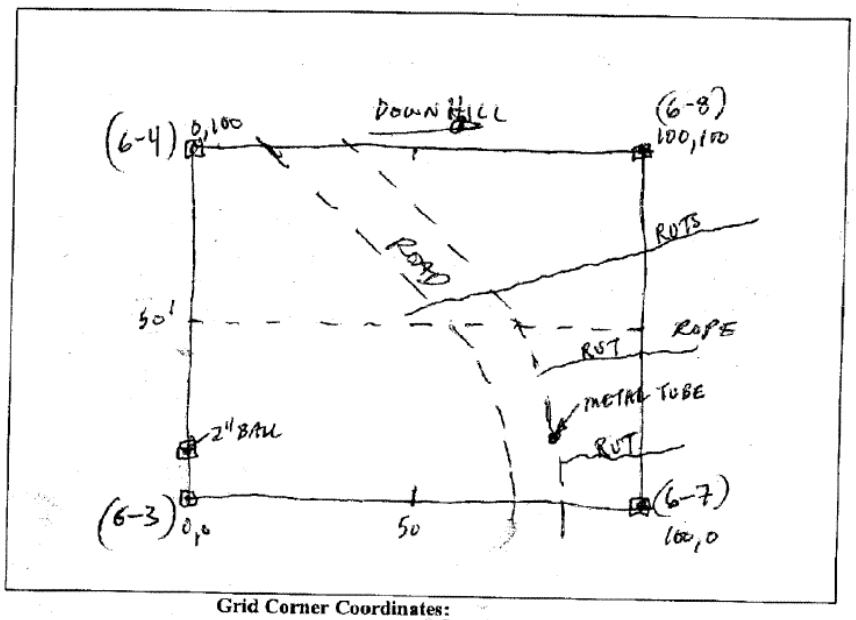
Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm
Survey Area ID: 6-3 **Date:** 08.15.06 **Field Team:** R. Blohm, S Aly
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fe

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30'
☐None ☐Light ☒Medium ☐Ti

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☒Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local (Orig)	
SW	6-3	Stake	0	0
NW	6-4	"	0	100
NE	6-8	"	100	100
SE	6-7	"	100	0

	Start	End	File Name
Battery Voltage:	12.4V	12.3	
Static Background Value:			
Static Response Value:			
Instrument Clock Drift:			

Raw Data File Name: 081506g **Repeat Data File Name:** _____
Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .625 **Serial Number:** 022003
~~**Base Station:**~~ Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil 10513
Navigation Method: Tapes + Ropes + cones, NAILS IN CORNER HUBS **Serial Number:** Bottom Coil "
Additional Comments: 2" Ball on Line Ø @ 10' / Line 81 @ 13' Metal 3/4" dia tube /
081506h = Line 0 back + forth w/ 2" Ball / ~~081506i~~ ~ 200 mV Response
* GAPS ON REVERSE SIDE *

DATA GAPS LIST

REVERSE OF 5

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
9	72.9 - 70								
30	19.3 - 25								
33	25.8 - 19								
36	50 - 52								
36	66.8 - 71								
39	70.3 - 88								
51	28.4 - 27								
63	81.9 - 77								

1/5

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/16/06
Blackhawk Field Personnel: R. Blotham

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 07:30 End Time: 0815
Check Batteries ✓
Check Gasoline Levels ✓
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 081606a
Line: _____
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2/5

Tests for Processing: Date: 08/16/06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0816066 Battery Voltage: 12.6 Time: 0846 Samples/Sec: 5

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	76	1	
Channel 2 Bottom	0	43	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	171	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0816066 Battery Voltage: 12.3 Time: 1533 Samples/Sec: 5

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	74	2	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	169	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

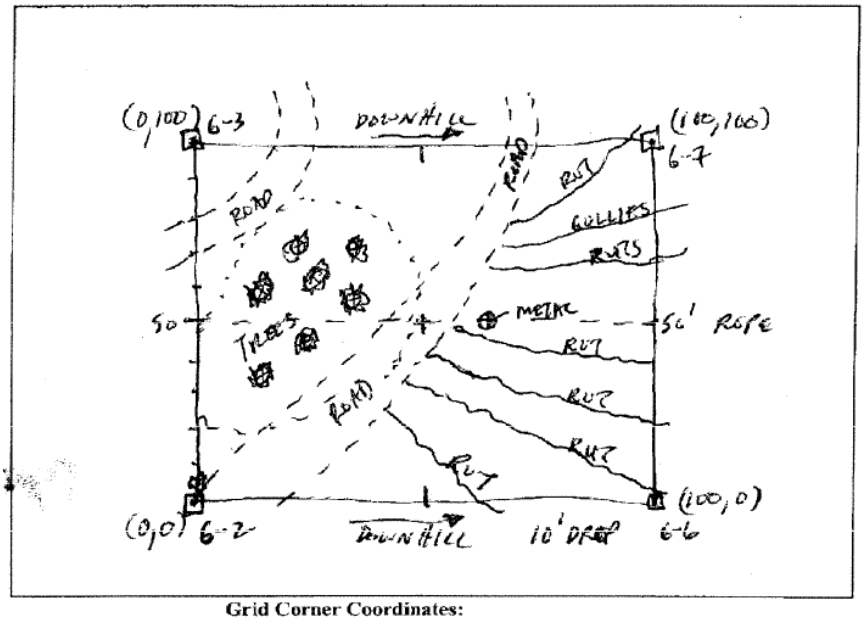
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: G-2 **Date:** 08-10-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☒Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☒Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	G-2, Stake	0, 0
NW	G-3, "	0, 100
NE	G-7, "	100, 100
SE	G-6, "	100, 0

	Start	End	File Name
Battery Voltage:	12.6V	12.1V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 08160606c = Lines 0-99 + 0 **Repeat Data ~~File Name~~ Line** 0.1 w/ 2" BALL

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 022003

~~Base Station~~ Run Lines N-S, 2" Ball Line 0 @ 22' **Serial Number:** Top Coil 10513

Navigation Method: Tapes + Ropes + CONES, NAILS IN HUBS **Serial Number:** Bottom Coil 11

Additional Comments: Line 60 @ 50' piece of thin metal
* LINE 0 STARTS @ 3' OVE TO TREE.

DATA GAPS LIST GRID 6-2

LN	STA - STA	[illegible]	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
[illegible]	0 - 3	TREE							
6	19.3 - 22	"							
6	34 - 39	"							
6	[illegible] - 92	"							
9	59 - 56	"							
12	19 - 23	"							
15	72 - 69	"							
15	54 - 51	"							
15	43 - 40	"							
18	59 - 62	"							
18	69 - 75	"							
21	80 - 69	"							
27	41 - 39	"							
30	33.5 - 41	"							
30	70 - 74	"							
33	78 - 69	"							
33	65.5 - 62	"							
33	55.5 - 47	"							
33	40 - 35	"							
36	36 - 41	"							
36	47 - 50	"							
39	60 - 56	"							
42	19 - 23	"							
45	63 - 61	"							
45	47 - 37	"							
51	66 - 62	"							
54	40 - 44	"							
57	9.5 - 8	"							
78	24.5 - 29	"							
99	91 - 86	"							

4/5

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

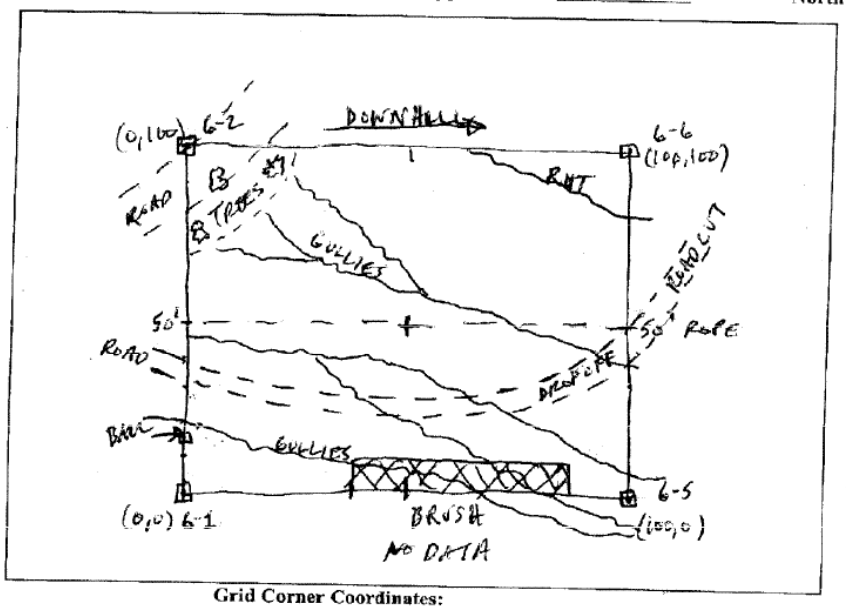
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: 6-1 **Date:** 08.16.06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-1	Stake	0	0
NW	6-2	"	0	100
NE	6-6	"	100	100
SE	6-5	"	100	0

	Start	End	File Name
Battery Voltage:	12.7V	12.5	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 081606d = Lines 0.99+0 **Repeat Data ~~File Name~~ Line:** 0.1 w/ 2" Ball

Geophysical Instrumentation: Geonics EM61-MK2 Inc = .645 **Serial Number:** 0220003

~~Base Station~~: Run Lines N-S, 2" Ball on Ø Line @ 15' **Serial Number:** Top Coil 10573

Navigation Method: Tapes, Ropes, & Cones, NAILS IN HUBS **Serial Number:** Bottom Coil 11

Additional Comments: Drop-off on Lines 84, 87, 90, 93, 96, 99

DATA GAPS LIST GRID 6-1

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	80 - 83	TREE							
9	81 - 75	"							
* 18	92 - 94	"							
21	100 - 96	"							
30	93 - 95	"							
33	16 - 14	"							
36	9.5 - 13	"							
39	100 - 97	"							
42	0 - 10	"							
45	91 - 88	"							
45	10 - 0	"							
48	0 - 14	"							
48	36 - 39	"							
51	10 - 0	"							
54	0 - 10	"							
54	20 - 23	"							
54	47 - 52	"							
57	19 - 17	"							
57	10 - 0	"							
60	0 - 10	"							
63	10 - 0	"							
66	0 - 10	"							
66	19 - 22	"							
69	10 - 0	"							
72	0 - 10	"							
75	10 - 0	"							
78	0 - 10	"							
81	10 - 0	"							
84	0 - 10	"							
90	75 - 79	"							
93	89 - 85	"							
93	21 - 18	"							
96	87 - 89	"							

175

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

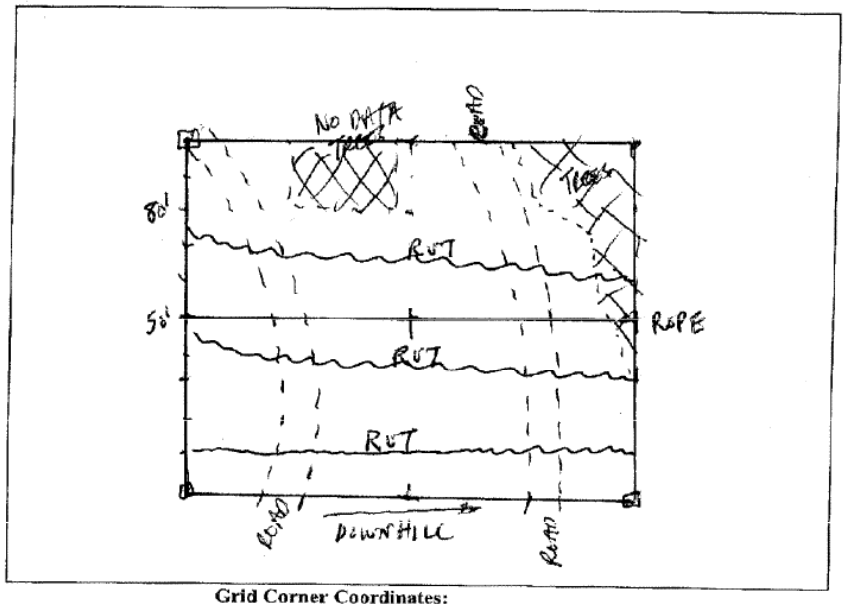
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: 6-7 **Date:** 08-16-06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☐Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** ____
☐None ☐Light ☐Medium ☐Thic

Brush:
☐None ☐Light ☐Medium ☐Thick

Weather:
☐Sunny ☐Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☐Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	6-7, Stake	0, 0
NW	6-8, "	0, 160
NE	_____, _____	_____, _____
SE	6-9, STAKE	100, 0

	Start	End	File Name
Battery Voltage:	12.6V	12.3	
Static Background Value:	____	____	_____, _____
Static Response Value:	____	____	_____, _____

Instrument Clock Drift: N/A

Raw Data File Name: 0816066

Repeat Data ~~File Name~~ Line: 0.1 From 100 To 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .0645 **Serial Number:** 022033

Base Station: Run Lines N-S, 2" Ball O Line @ 10' **Serial Number:** Top Coil 10513

Navigation Method: Tapes, Ropes, Cones, NAILS IN HUBS **Serial Number:** Bottom Coil "

Additional Comments: Edit out 1st Line 21+ Line 18 - Use ~~2nd~~ 3rd 18 and 2nd 21/Edit 24

* EDIT LINE 24 *

- Hiccup in Allegro

Line 18 or 21 Large Gradient

DATA GAPS LIST

GRID 6-7

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
6	ends 99'	93	starts 50						
9	starts 96'	96	ends 37						
12	ends 94'	99	starts 27						
15	starts 93'								
~~18~~ 1st	ends 91'								
~~21~~ 1st	~~starts 90'~~								
3rd ~~18~~	ends 90'								
2nd 21	starts 90'								
24	51 - 54								
24	ends 84								
27	starts 80								
27	17 - 15								
30	ends 76								
33	starts 80								
36	ends 75								
39	~~starts ends~~ 80								
42	~~ends starts~~ 80								
45	~~starts ends~~ 80								
48	~~ends starts~~ 80								
51	~~starts ends~~ 80								
54	~~ends starts~~ 80								
57	~~starts ends~~ 80								
~~[illegible]~~									
60	23 - 28								
60	ends 80								
63	starts 80								
63	~~29~~ - 25								
66	ends 80								
~~69~~	starts 80								
72	ends 73								
75	starts 67								
75	16 - 11								
78	9.5 - 14								
78	ends 62								
81	starts 50								
84	ends 50								
87	starts 50								
90	25 - ~~29~~								
90	38 - ~~42~~								
90	ends ~~50~~								

15

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/17/06
Blackhawk Field Personnel: R. Blohm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0645 End Time: 0715
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 081706a
Line: _____
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2/5

Tests for Processing: Date: 08/17/06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081706b Battery Voltage: 12.6V Time: 0726 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	79	3	
Channel 2 Bottom	0	44	2	
Channel 3 Bottom	0	20	1	
Channel 4 Top	0	174	1	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081706f Battery Voltage: 12.0 Time: 1554 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	76	1	
Channel 2 Bottom	0	41	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	170	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

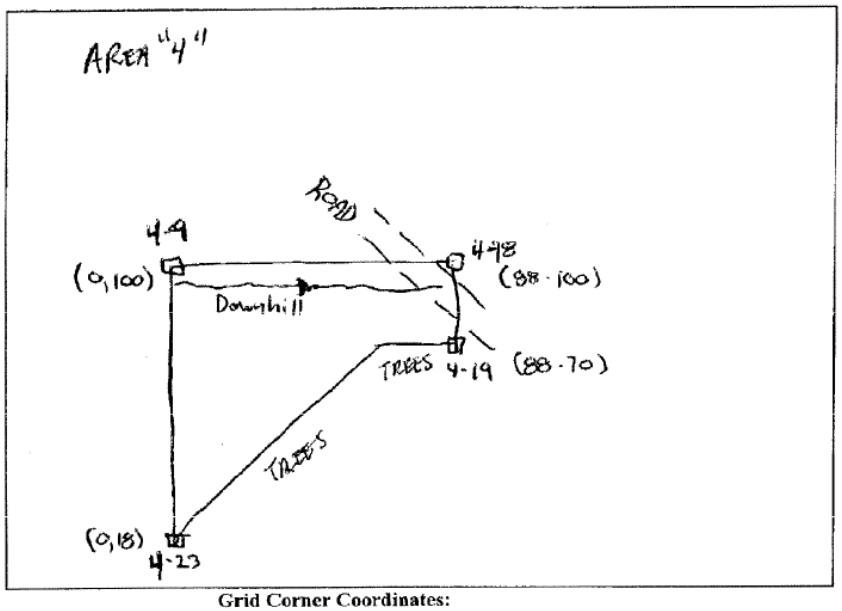
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 4-23 **Date:** 08/17/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☒Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☒None ☒Light ☐Medium ☐Thick
ON SOUTH EDGE OF GRID

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	STAKE, 4-23	0, 18
NW	11, 4-9	0, 100
NE	11, 4-18	~~100~~ 88, 100
SE	11, 4-19	88, 70

	Start	End	File Name
Battery Voltage:	12.6V	12.4V	
Static Background Value:			
Static Response Value:			
Instrument Clock Drift:	N/A		

Raw Data File Name: 081706c = Lines 0-87 **Repeat ~~Data File~~ Line Name:** 01

Geophysical Instrumentation: Geonics EM61-MK2 Inc.= .645 **Serial Number:** 022003

~~Base Station~~: Run lines N-S, FIDs @50', 2" Ball @ Line @45' **Serial Number:** Top Coil 10513

Navigation Method: Tapes, Ropes, Cones, Nails in Hubs **Serial Number:** Bottom Coil 10513

Additional Comments: Editout 1st Line 54' - Use 2nd ✓ * 65K FILE SIZE
* START / END STATIONS ON BACK *

START/END FOR PAGE 3/5 GRID 4-23

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
3	ends 25'								
6	starts 25'								
9	ends 26'								
12	starts 26'								
15	ends 27'								
18	starts 27'								
21	ends 30'								
24	starts 30'								
27	ends 33'								
30	starts 33'								
33	ends 36'								
36	starts 37'								
39	ends 42'								
42	starts 44'								
45	ends 50'								
48	starts 50'								
51	ends 50'								
54	starts 52'								
57	ends 57'								
60	starts 59'								
63	ends 65'								
66	starts 65'								
69	ends 70'								
72	starts 70'								
75	ends 70'								
78	starts 70'								
81	ends 70'								
84	starts 70'								
87	ends 70'								

DID MR-005-05
Attachment A

4/5

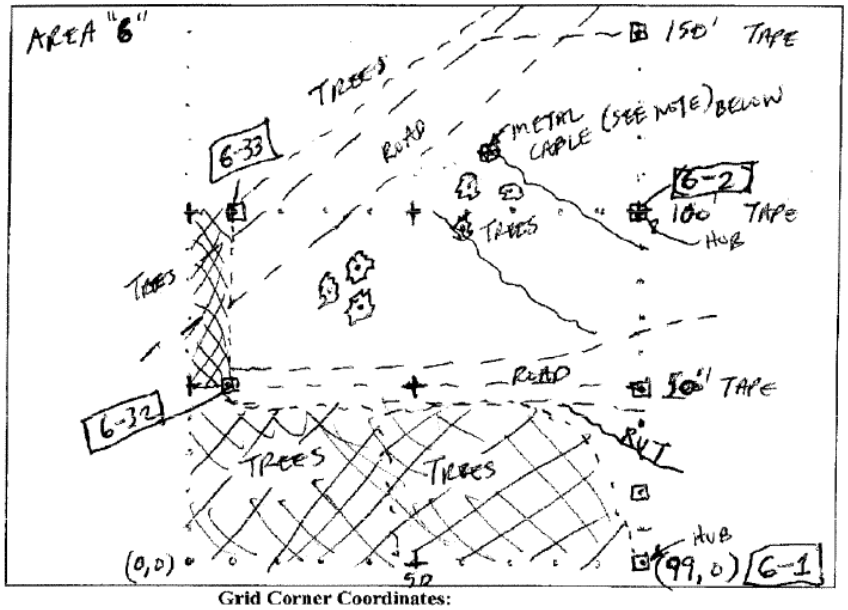
☐ QC checked by _____ Date: _____

Field Data Sheet

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm
Survey Area ID: 6-32 **Date:** 08-17-06 **Field Team:** R. Blohm, S. Alg
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-32	Stake	10	50
NW	6-33	"	12	100
NE	6-3	"	99	200
SE	6-1	"	99	0

Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 30'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	Start	End	File Name
Battery Voltage:	12.7V	12.5V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A
Raw Data File Name: 081706d = 12-99
Repeat ~~Data File~~ Line Name: Line 12.1
Geophysical Instrumentation: Geonics EM61-MK2 Inc = .645 **Serial Number:** 022003
~~Base Station~~: Run Lines N-S, FIDs @ 50', 50, 100, 152 **Serial Number:** Top Coil 10513
Navigation Method: Lines (Tapes), Cones, Hubs w/Nails **Serial Number:** Bottom Coil 10513
Additional Comments: 2" Ball Line 13 @ 61' / Lines 12-21 are 50'-100' / Metal Cable * w/ hooks - surface and sub @ Lines 69 + 72 @ 118'-121' / 1" cable
* DATA GAPS ON BACK *

GRID 6-32
PAGE 4/5

Data PATH LIST

LN	STA - STA	LN	STA - STA
24	50 - 106		
27	110 - 50		
30	50 - 110		
33	113 - 50		
36	50 - 110		
39	117 - 50		
42	50 - 118		
* 45	122 - 50		
48	50 - 123		
51	125 - 50		
54	50 - 127		
57	127 - 50		
60	50 - 130		
* 63	135 - 56		
66	50 - 135		
69	141 - 50		
72	50 - 143		
* 75	145 - 50		
78	50-148		
81	150 - 30		
84	30 - 150		
87	158 - 22		
* 90	19 - 158		
* 93	165 - 10		
96	7 - 170		
* 99	177 - 2		

Data Gaps

LN	STA - STA	LN	STA - STA	LN	STA - STA
45	84 - 73				
63	70 - 65				
75	110 - 105				
90	68 - 69				
90	74 - 78				
90	98 - 102				
93	79 - 75				
99	144 - 139				
99	104 - 100				
99	84 - 79				

File Size 120K 5/5

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

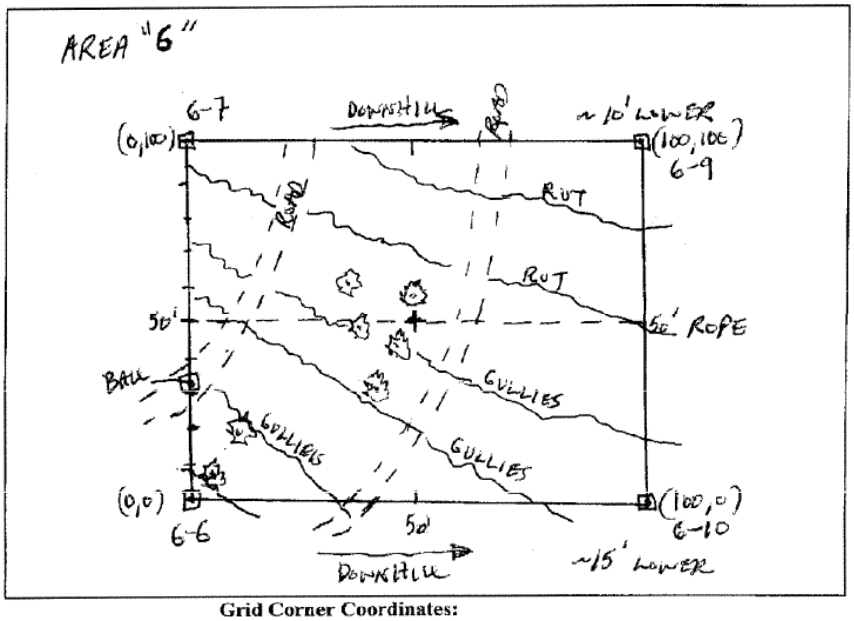
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 6-6 **Date:** 08-17-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ f

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☒Dangerous
☒ SIDEHILL

Tree Cover: **Tree Height:** 25
☐None ☐Light ☒Medium ☐

Brush:
☐None ☐Light ☒Medium ☐Thic

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-6	Stake	0	0
NW	6-7	Stake	0	100
NE	6-9	"	100	100
SE	6-10	"	100	0

	Start	End	File Name
Battery Voltage:	12.4V	12V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 081706e = Lines 0-99

Repeat ~~Data File~~ Line Name: e1 from 100 To 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil 0051

Navigation Method: Tapes, Ropes, Cones, Hubs w/ Nails **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 33'

* DATA GAPS ON BACK *

DATA GAPS LIST PAGE 5/5 GRID 6-6

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	89 - 92	TREE							
3	11 - 5	"							
6	7 - 11	"							
9	13 - 10	"							
12	10 - 18								
18	3 - 6								
24	27 - 28								
33	42 - 31								
33	18 - 14								
36	35 - 39								
42	0 . 3								
45	15 - 9								
48	8.5 - 13								
54	27 - 37								
54	50 - 55								
57	56 - 42								
57	35 - 31								
60	16 - 19								
63	19 - 8								
78	15 - 19								
78	53 - 58								
81	61 - 54								
84	56 - 61								
93	47 - 43								
93	20 - 9								
96	18 - 21								
96	43 - 47								
99	83 - 78								
99	28 - 24								
~~102~~									
.1	91 - 85	REPEAT LINE Ø 100 To Ø							

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/18/06 FRIDAY
Blackhawk Field Personnel: R. Bloom

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
Console(s): Model EM61-MK2 SN 022003
System Controller: Model Allegro SN 11257
(Allegro\PRO4000)
Bottom Coil(s): Model EM61-MK2 SN 10513
Top Coil(s): Model EM61-MK2 SN 10513

GPS Equipment:
GPS Base Station Antenna: Model Trimble 5700 SN
GPS Base Station Receiver: Model 5700 SN
GPS Base Station Transmitter: Model 5700 SN
GPS Rover Unit: Model 5700 SN
GPS Rover Antenna: Model L1-L2 SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0815 End Time: 0845
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: NA
Frequency: ____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 081806a
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

3/

Tests for Processing: Date: 08-18-06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081806b Battery Voltage: 12.6V Time: 0900 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	76	0	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	170	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 081806e Battery Voltage: 12.6V Time: 1355 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	76	1	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	169	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

3/4

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

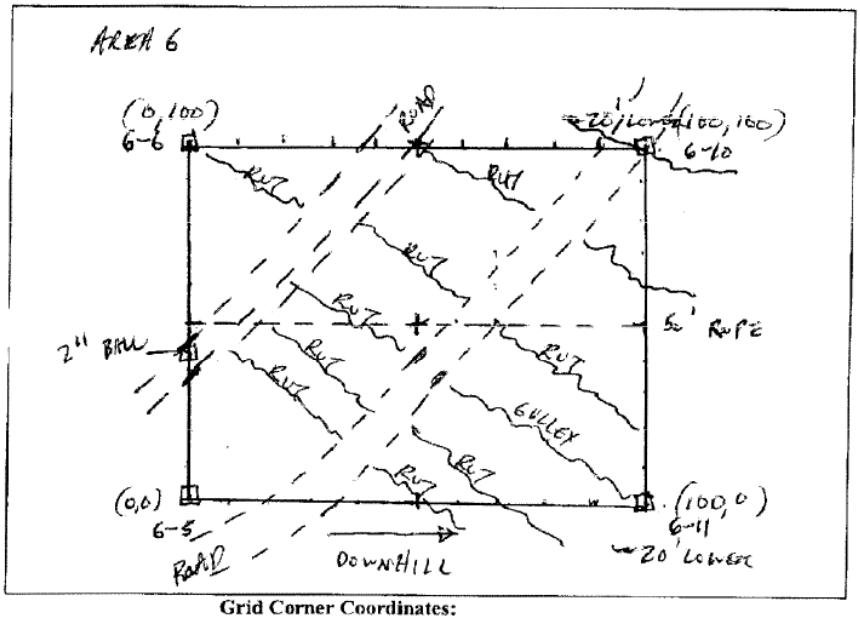
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 6-5 **Date:** 08-18-06 **Field Team:** R. Blohm, S Alg

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD ___ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☒Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-5	Stake	0	0
NW	6-6	11	0	100
NE	6-10	11	100	100
SE	6-11	11	100	0

	Start	End	File Name
Battery Voltage:	12GV	12.0	
Static Background Value:	___	___	___
Static Response Value:	___	___	___

Instrument Clock Drift: NA

Raw Data File Name: 060806c **Repeat Data Line File Name:** 0.1 FROM STA 100 TO 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil

Navigation Method: Tapes, Ropes, Cones / NAILS IN CORNER HUBS **Serial Number:** Bottom Coil

Additional Comments: 2" Ball Line 0 @ 40' / Edit out 1st Line 90 - Use 2nd /

DATA GAPS LIST GRID 6-5

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
6	83 - 87	TREE							
18	94 - 98	"							
27	52 - 43	"							
30	51 - 54								
33	97 - 92								
36	93 - 100								
39	57.5 - 55								
42	21 - 24								
42	55 - 58								
45	33 - 29								
45	4 - 0								
48	0 - 3								
48	19 - 23								
48	29 - 33								
51	80 - 76								
51	57 - 54								
57	90 - 86								
57	76 - 72								
57	22 - 18								
60	37 - 47								
60	74 - 77								
63	54 - 50								
63	37 - 34								
63	8 - 4								
66	4 - 8								
69	92 - 89								
69	50 - 34								
69	12 - 9								
84	46 - 51								
87	96 - 94								
87	63 - 60								
90	92 - 96								

File Size 92K 4/4

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

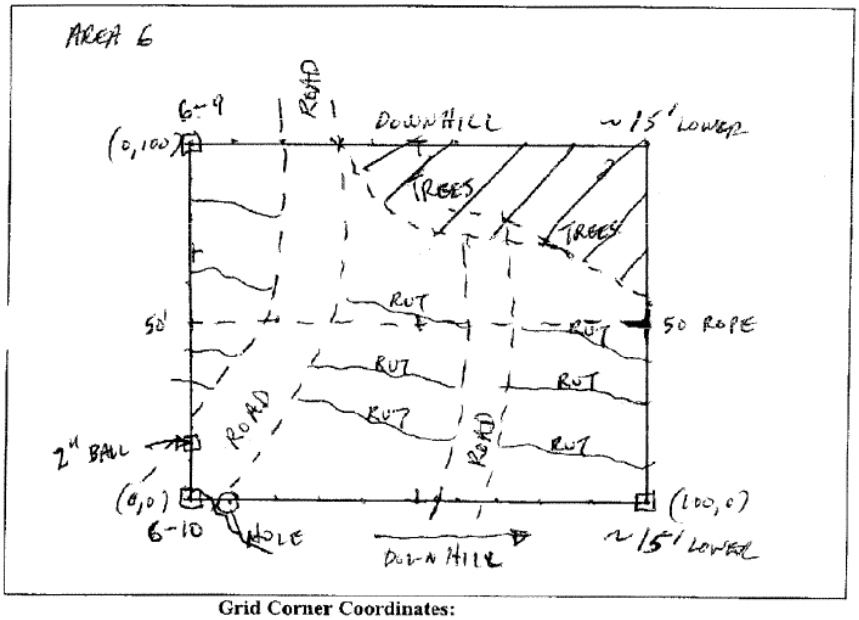
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: 6-10 **Date:** 08-18-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒ Grid ☐ Meandering Path ☐ Transect ☐ Other _____

Coordinate System: ☐ UTM ☐ State Plane NAD _____ ☒ Local ☐ Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:** N



Terrain:
☐ Level ☐ Moderate Slope ☐ Steep
☐ Rolling ☐ Ruts ☐ Gullies
☐ Rocky ☐ Swampy ☐ Dangerous

Tree Cover: **Tree Height:** ____
☐ None ☐ Light ☐ Medium ☐ Thick

Brush:
☐ None ☐ Light ☐ Medium ☐ Thick

Weather:
☐ Sunny ☐ Cloudy ☐ Drizzle
☐ Rain ☐ Thunderstorms ☐ Hail
☐ Fog ☐ Humid ☐ Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	6-10, Stake	0, 0
NW	6-9, 11	0, 100
NE	TREES, 11	100, 50
SE	6-13, 11	100, [illegible]

	Start	End	File Name
Battery Voltage:	12.7V	12.6V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 081806a1 = Lines 0-99 **Repeat Line Data File Name:** 0.1 from sta 100-0

Geophysical Instrumentation: Geonics EM61-MK2 Inc.= .645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil

Navigation Method: Tapes, Ropes, Cones **Serial Number:** Bottom Coil

Additional Comments: 2" Ball Line 0 @ 15' / Line 24 from 70'-100' drop-off / Line 75 starts @ 50' cause of drop-off / ALONG ROAD CUT / DATA GAPS ON BACK

DATA GAPS LIST GRID 6-10

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	4.5 - 8	TREE							
15	92 - 86								
18	21 - 25								
24	ends 70								
27	15 - 12								
30	20 - 23								
30	ends 79								
33	starts 79								
36	66 - 70								
36	ends 74								
39	starts 70								
39	66 - 63								
42	63 - 66								
42	ends 70								
45	starts 70								
48	ends 70								
51	starts 70								
54	42 - 47								
54	ends 70								
57	starts 70								
57	49 - 44								
60	ends 68								
63	starts 69								
66	39 - 41								
66	ends 65								
69	starts 65								
72	ends 65								
75	starts 50								
78	ends 60								
81	starts 60								
84	ends 59								
87	starts 58								
90	ends 55								
93	starts 55								
96	ends 50								
99	starts 50								
0.1	10 - 4	TREE							

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/21/06 MONDAY
Blackhawk Field Personnel: R. Blo Htm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

re-Survey Checklist

Warm-up (15 minutes)	✓	Start Time: 0700 End Time: 0745
Check Batteries	✓	
Check Gasoline Levels		
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Visual Inspection of GPS Antenna		

Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: [redacted] 082106a
Line: _____
Check Cable Connections: ✓
Shake Cables while monitoring for change:

75

Tests for Processing: Date: 08-21-06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082106b Battery Voltage: 12.5V Time: 0804 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	75	1	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	171	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082106f Battery Voltage: 12.1V Time: 1515 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	75	1	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	168	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

File Size = 119 K 3/5

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

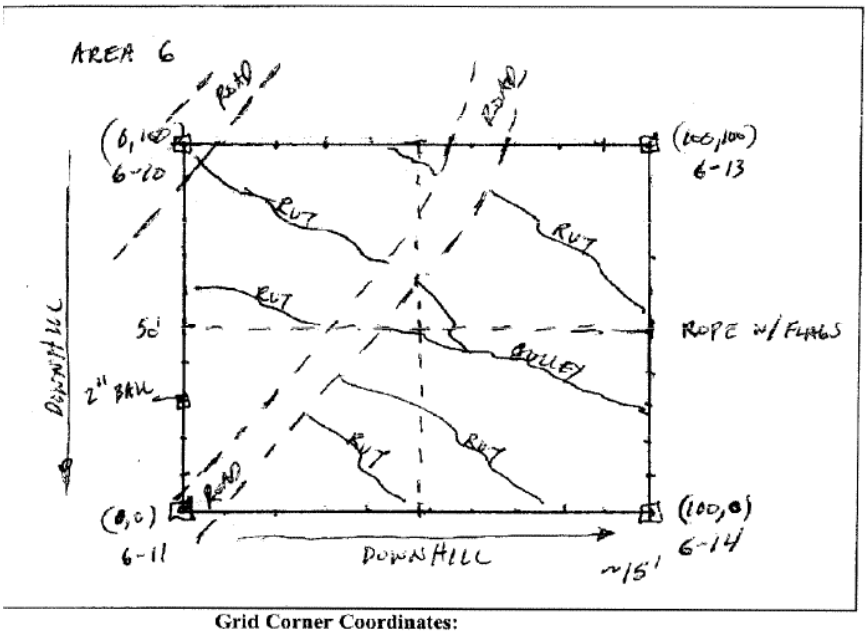
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 6-11 **Date:** 08-21-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** 1"=50' **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☒Light ☒Medium ☐Thick

Brush:
☐None ☐Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-11	Stake	0	0
NW	6-10	"	0	100
NE	6-13	"	100	100
SE	6-14	"	100	0

	Start	End	File Name
Battery Voltage:	12.5V	12.0	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082106c = Lines 0-99 **Repeat ~~Data File~~ Line Name:** 0.1 FROM 100 TO 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50', NAILS IN CORNER AMS **Serial Number:** Top Coil 10513

Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 30' / Line 93 - Nose Fuze @ 98'
* DATA GAPS ON BACK *

PATH GAPS LIST GRID G-11

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	18 - 26	93	2 - 0						
3	26 - 12	96	10 - 14						
6	56 - 60								
6	68 - 75								
6	98 - 100								
9	50 - 46								
12	20 - 25								
12	31 - 36								
12	46 - 50								
15	3 - 8								
18	12 - 15								
18	81 - 84								
21	1.5 - 0								
24	0 - 2								
24	21 - 25								
27	80 - 76								
27	11 - 8								
30	73 - 77								
33	77 - 73								
36	22 - 26								
36	79 - 82								
39	50 - 46								
39	26 - 22								
48	15 - 12								
48	10 - 14								
51	77 - 74								
51	46 - 42								
51	15 - 10								
54	23 - 27								
54	61 - 71								
57	77 - 74								
60	73 - 78								
63	97 - 93								
63	76 - 71								
66	92 - 96								
72	22 - 27								
78	33 - 37								
87	24 - 18								
90	0 - 4								
90	96 - 100								

File Size = 108K

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

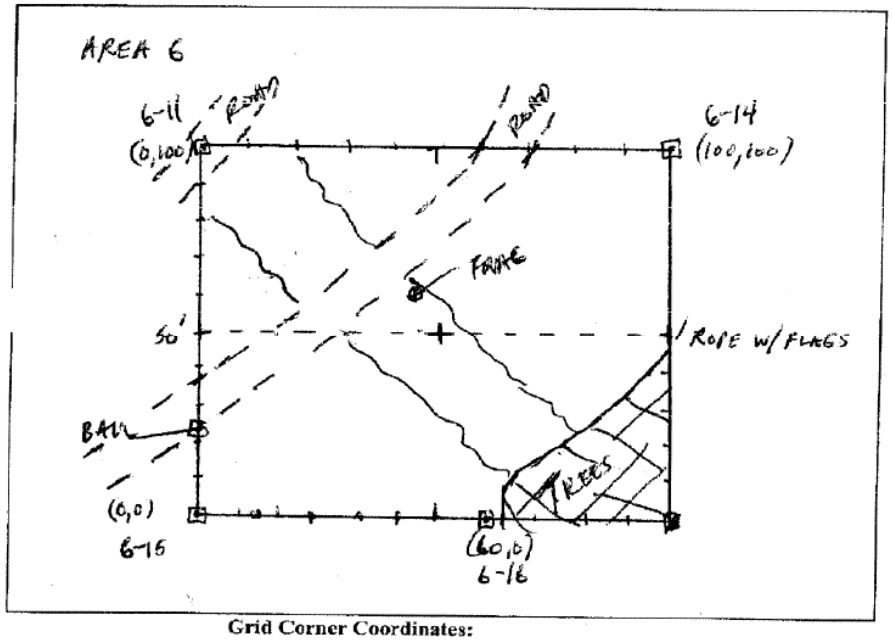
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid G-15 **Date:** 8 21-06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ ft

Sketch of Survey Area: **Approx. Scale:** 1" = 50' **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☒Light ☒Medium ☐Thic

Brush:
☐None ☒Light ☐Medium ☐Thic

Weather:
☐Sunny ☒Cloudy ☒Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	6-15, Stake	0, 0
NW	6-11, 11	0, 100
NE	6-14, 11	100, 100
SE	6-16, ~~11~~	60, 0

	Start	End	File Name
Battery Voltage:	12.7V	12.6V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Repeat Data File Name: LINE 0, 1

Raw Data File Name: 082106d LINE 0 TO 79

Geophysical Instrumentation: Geonics EM61-MK2 Inc = .0645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil 10513

Navigation Method: Tape, Rope, Cones, NAILS IN CORNER HUBS **Serial Number:** Bottom Coil 41

Additional Comments: 2" Ball Line 0 @ 23' / Line 45 - Frag @ 65.8' /

* DATA GAPS ON BACK *

DATA GAPS LIST GRID 6-15

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	35 - 46	TREE							
3	1,5 - 0								
9	97 - 94								
12	95 - 97								
15	85 - 79								
15	18 - 15								
18	81 - 85								
21	24 - 20								
24	82 - 87								
33	91 - 88								
36	87 - 91								
48	95 - 98								
57	77 - 73								
63	88 - 85								
63	ends 16								
66	starts 18								
66	85 - 89								
67	ends 21								
12	starts 22								
75	ends 24								
78	starts 25								
81	ends 28								
84	start 33								
87	95 - 93								
87	ends 35								
90	begins 37								
90	~~ends~~ 98 - 100								
93	100 - 97								
93	ends 40								
96	starts 43								
99	ends 50								
0.1	45 - 36								

File Size = 83K

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

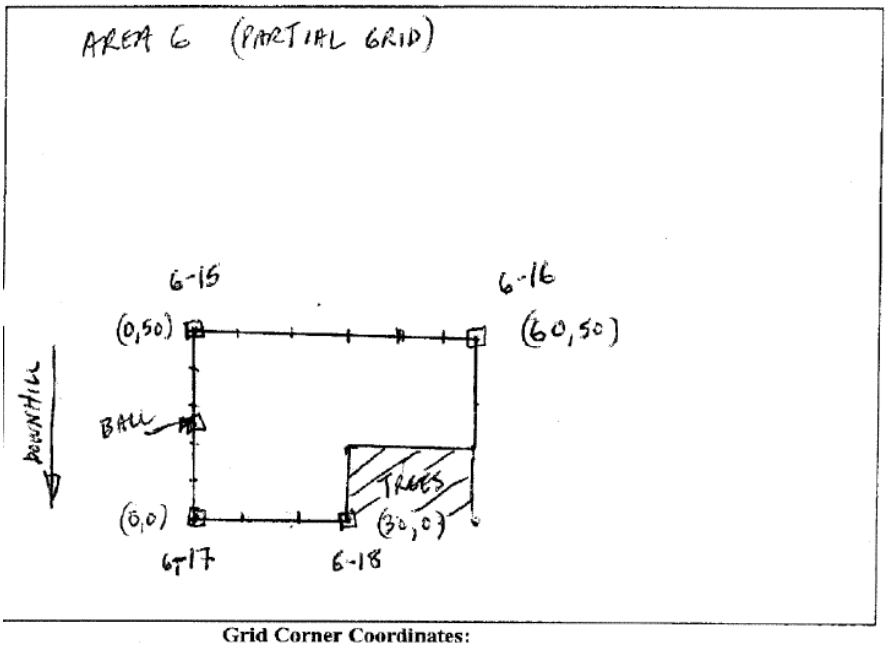
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 6-17 **Date:** 08-21-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fe

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 15'
☐None ☒Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☒Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	6-17, Stake	0, 0
NW	6-15, Stake	0, 50
NE	6-16, "	60, 50
SE	6-18, "	30, 0

	Start	End	File Name
Battery Voltage:	12.3V	12.1V	
Static Background Value:			
Static Response Value:			

Instrument Clock Drift: N/A

Raw Data File Name: 082106a = Line 0-60 **Repeat Line Name:** 0.1

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 02203

~~Base Station~~: Run Lines N-S, No FIDS, NAILS IN CORNER HUBS **Serial Number:** Top Coil 10513

Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 25'

* DATA GAPS ON BACK *

DATA GAPS LIST GRID 6-17

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	12 - 16	TREE							
3	21 - 18	"							
18	40 - 44	"							
33	ends 12								
36	starts 12								
36	24 - 28								
39	35 - 32								
39	ends 14								
42	start 15								
42	32 - 35								
45	ends 17								
48	begins 16								
51	ends 21								
54	start 23								
57	ends 28								
60	start 31								
0.1	16 - 12								

%

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/22/06
Blackhawk Field Personnel: R. BLOHM

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 0220D3
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist

Warm-up (15 minutes)	✓	Start Time: 0705 End Time: 0730
Check Batteries	✓	
Check Gasoline Levels		
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Visual Inspection of GPS Antenna		

Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches

Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference:

✓

QC4 (Cable Shake Test)

File name: 082206a

Line: _____

Check Cable Connections: ✓

Shake Cables while monitoring for change:

1

Tests for Processing: Date: 08/22/06

QC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082206b Battery Voltage: 12.7V Time: 0745 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	80	5	
Channel 2 Bottom	6	44	1	
Channel 3 Bottom	0	19	6	
Channel 4 Top	6	171	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082206g Battery Voltage: 12.3V Time: 1415 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	76	1	
Channel 2 Bottom	6	43	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	168	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

File Size = 58K 3/6

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

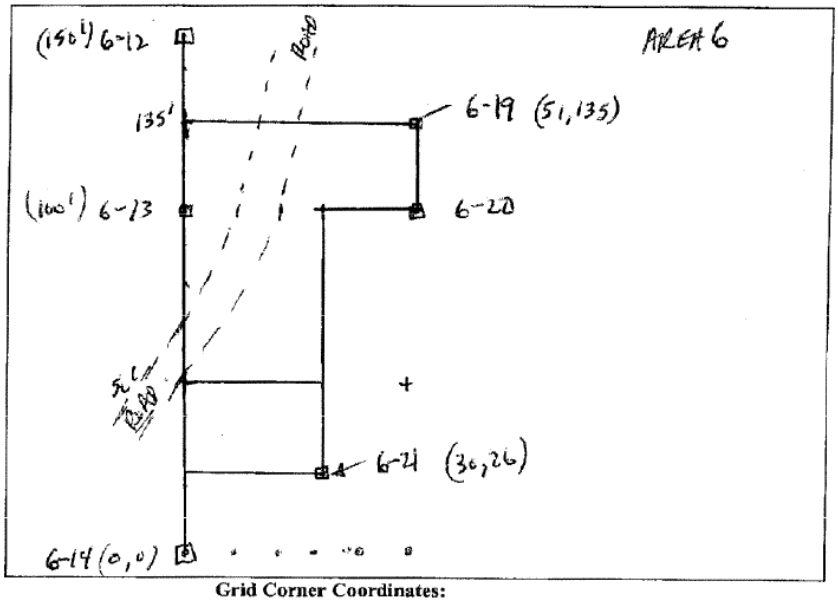
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 6-14 **Date:** 08/22/06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 25'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	6-14	Stake	0	0
NW	6-12	"	0	150
NE	6-19	"	51	135
SE	6-21	"	30	26

	Start	End	File Name
Battery Voltage:	12.7V	12.6	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082706c = LINES 0-51 **Repeat ~~Data File~~ Line Name:** 0.1 From 150' - 18'

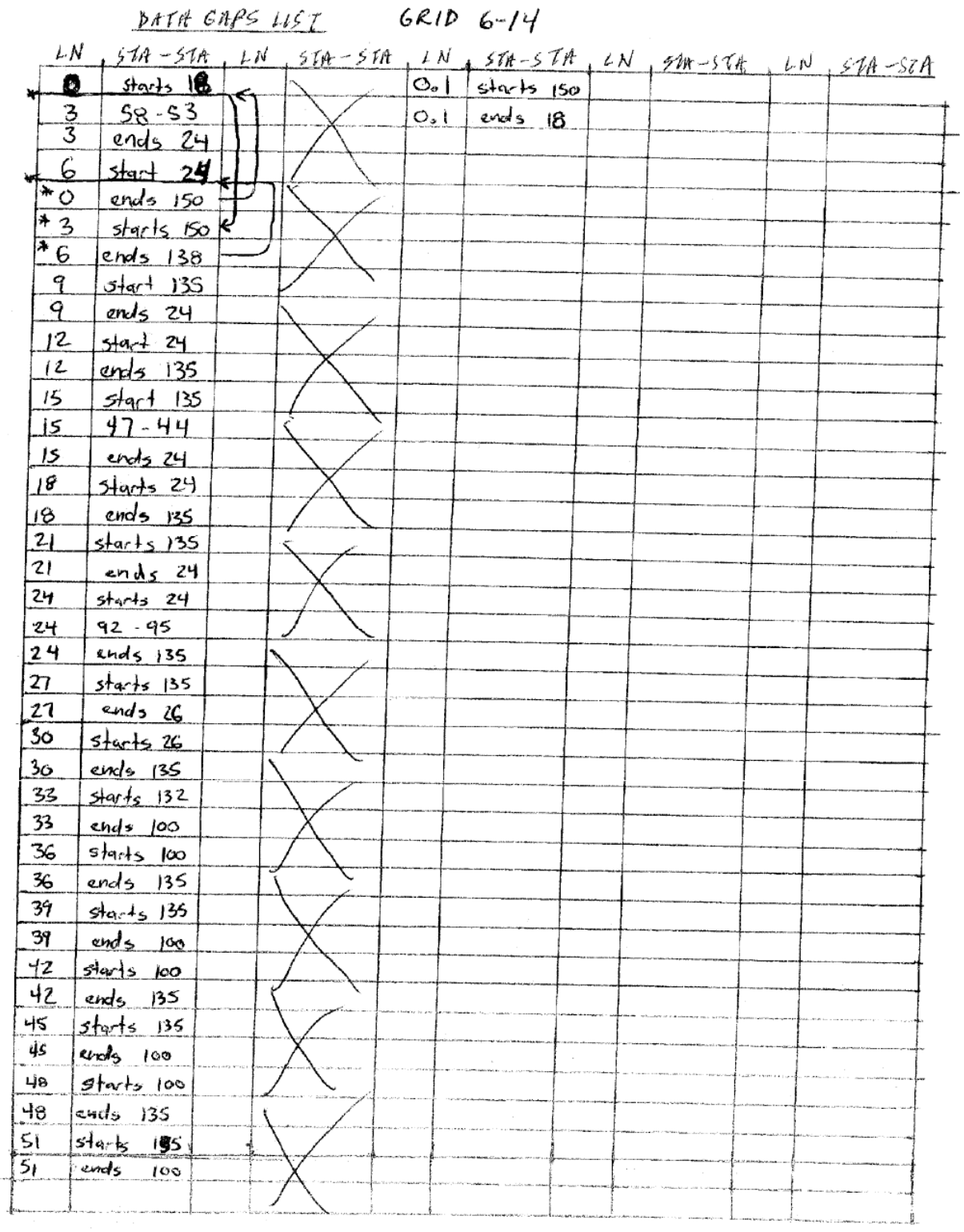
Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .645 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil 10513

Navigation Method: Tapes, Rope, Cones **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 68'

* DATA GAPS ON BACK X



DATA GAPS LIST GRID 6-14

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	starts 18			0.1	starts 150				
3	58 - 53			0.1	ends 18				
3	ends 24								
6	start 24								
*0	ends 150								
*3	starts 150								
*6	ends 138								
9	start 135								
9	ends 24								
12	start 24								
12	ends 135								
15	start 135								
15	47 - 44								
15	ends 24								
18	starts 24								
18	ends 135								
21	starts 135								
21	ends 24								
24	starts 24								
24	92 - 95								
24	ends 135								
27	starts 135								
27	ends 26								
30	starts 26								
30	ends 135								
33	starts 132								
33	ends 100								
36	starts 100								
36	ends 135								
39	starts 135								
39	ends 100								
42	starts 100								
42	ends 135								
45	starts 135								
45	ends 100								
48	starts 100								
48	ends 135								
51	starts 135								
51	ends 100								

File Size = 140K 4/5

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

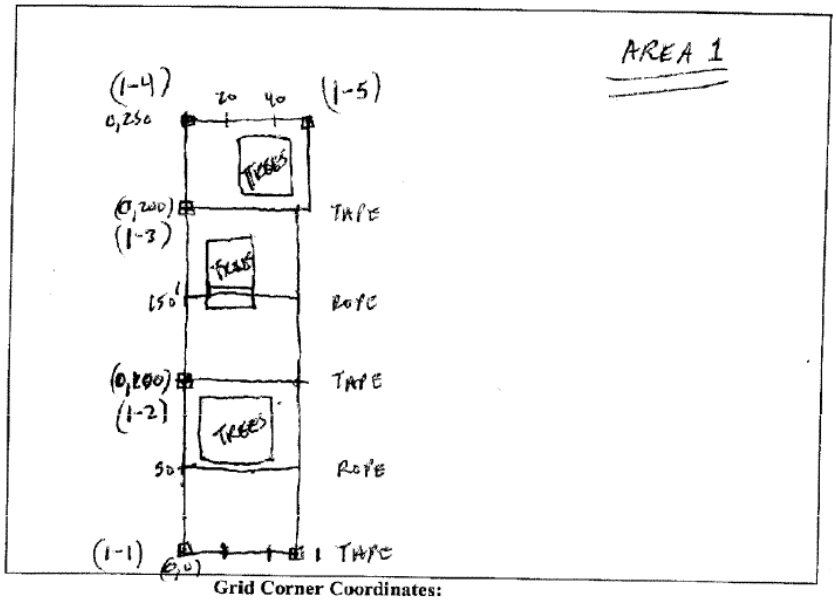
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid 1-1 **Date:** 08/22/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fee

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☐Light ☒Medium ☐Th

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	1-1	Stake	0	0
NW	1-4	"	0	250
NE	1-5	"	45	250
SE	1-6	"	33	0

	Start	End	File Name
Battery Voltage:	12.9V	12.6V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082206cd LINES 0-48 **Repeat Line Name:** 0.1 250-0

Geophysical Instrumentation: Geonics EM61-MK2 Inc = .66 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FID's @ 50', NAILS IN HUBS **Serial Number:** Top Coil 10513

Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil 4

Additional Comments: 2" Bail Line 0 @ 54'

* DATA GAPS ON BACK *

DATA GAPS LIST GRID 1-1

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
3	170 · 167	27	84 · 82						
3	164 · 161	27	78 · 75						
3	157 · 154	27	70 · 68						
3	150 · 148	27	65 · 62						
3	144 · 141	30	218 · 221						
6	61 · 65	30	225 · 228						
6	74 · 78	30	230 · 234						
6	81 · 85	30	238 · 241						
6	87 · 91	33	248 · 245						
6	141 · 144	33	241 · 238						
6	148 · 150	33	234 · 232						
9	169 · 167	33	228 · 225						
9	163 · 160	33	90 · 88						
9	156 · 154	33	85 · 81						
9	150 · 147	33	78 · 75						
12	81 · 84	33	71 · 68						
12	87 · 91	33	65 · 62						
12	139 · 143	36	starts 17						
12	147 · 150	36	50 · 54						
12	153 · 157	36	218 · 221						
12	160 · 163	36	225 · 228						
15	78 · 75	36	231 · 235						
15	71 · 68	36	238 · 241						
15	65 · 62	36	244 · 247						
18	74 · 77	39	248 · 244						
18	81 · 84	39	241 · 238						
18	87 · 90	39	235 · 232						
21	284 · 244	39	228 · 225						
21	242 · 238	39	ends 26						
21	235 · 232	42	starts 50						
21	228 · 225	45	224 · 228						
21	221 · 219	45	231 · 234						
21	72 · 69	45	237 · 240						
21	65 · 62	45	243 · 247						
24	87 · 90	45	ends 50						
27	248 · 244	48	start 100						
27	241 · 238	48	ends 200						
27	234 · 231								
27	228 · 225								
27	221 · 218								

File Size = 14K 5/6

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

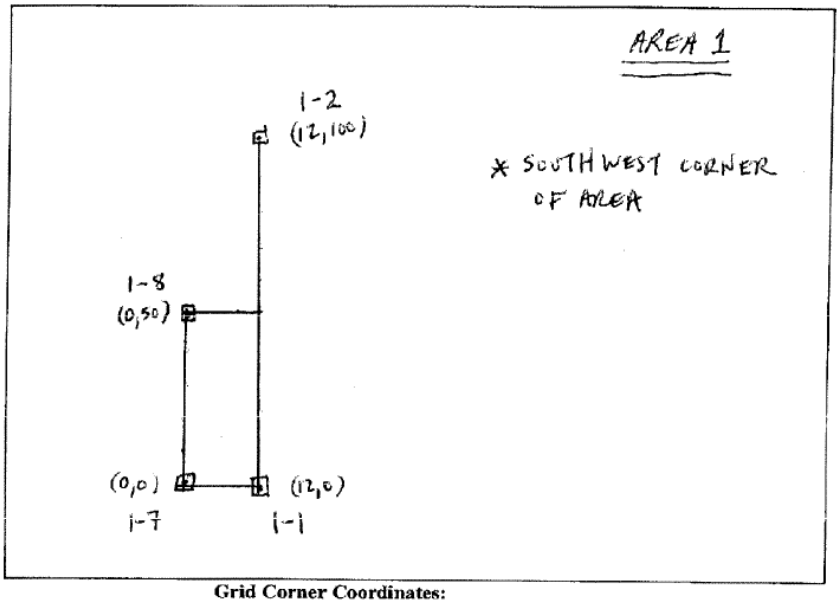
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid 1-7 **Date:** 08-22-06 **Field Team:** R. Blohm, S. Aly

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☒Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	1-7, Stake	0, 0
NW	1-8, "	0, 50
NE	1-2, "	12, 100
SE	1-1, "	12, 0

	Start	End	File Name
Battery Voltage:	12.6V	12.6V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082206e = Line 0-12 **Repeat ~~Data File~~ Line Name:** 0, 1

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .065 **Serial Number:** 022603

Base Station: Run Lines N-S, FIDs @ 50' **Serial Number:** Top Coil 10513

Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil "

Additional Comments: 2" Ball Line 0 @ 6' / Line 12 repeat of Line 0 on Survey Area ID: Grid 1-1 / * START AND END STATIONS ON BACK *

DATA GAPS LIST GRID 1-7

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	ends 50								
3	starts 50								
6	ends 62								
9	starts 87								
12	ends 100								
0.1	starts 50								

6/6

DID MR-005-05
Attachment A

File Size = 9 K

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Tng Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

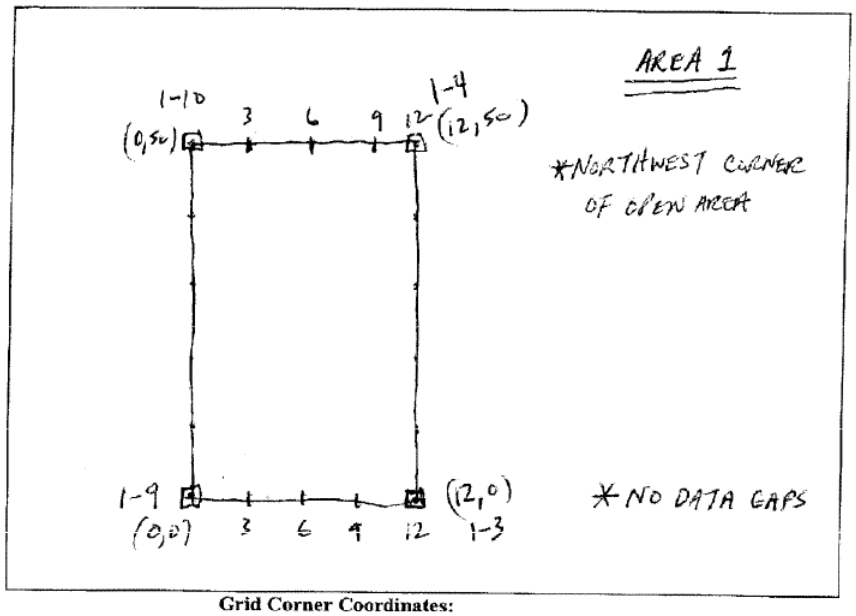
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid 1-9 **Date:** 08-22-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☐Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☒Light ☐Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	1-9, Stake	0, 0
NW	1-10, "	0, 50
NE	1-4, "	12, 50
SE	1-3, "	12, 0

	Start	End	File Name
Battery Voltage:	12.5V	12.4V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

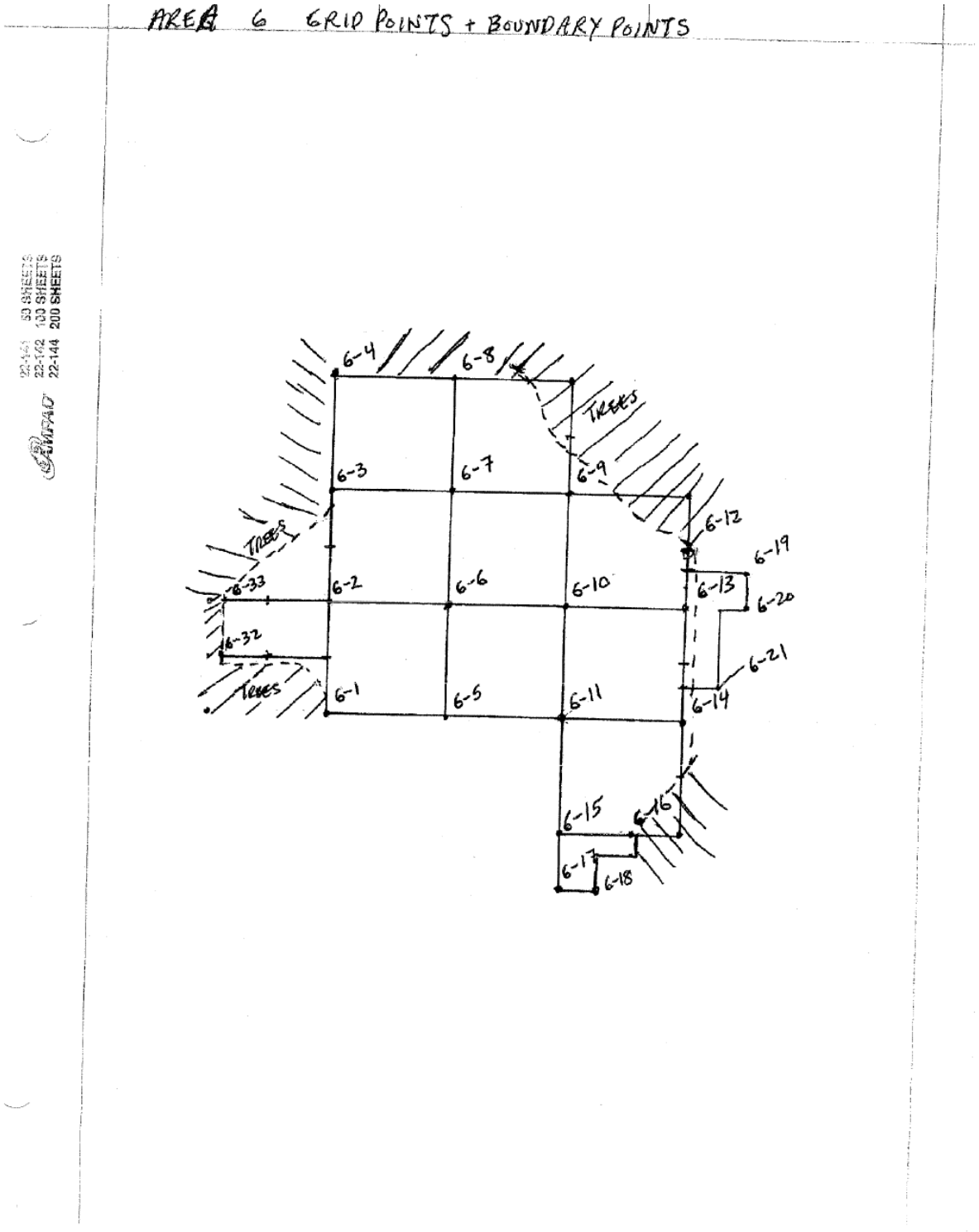
Raw Data File Name: 082206f + Lines 0-9 **Repeat ~~Data File~~ Line Name:** 0,1 So To ø

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65 **Serial Number:** 022003

Base Station: Run Lines N-S, No FIDS **Serial Number:** Top coil 105/3

Navigation Method: Tape, Cones **Serial Number:** Bot coil 105/3

Additional Comments: 2nd Ball Line 0 @ 12' / Line 9 repeat of part Line 0 on Survey Area ID: Grid 1-11


AREA 6 GRID POINTS + BOUNDARY POINTS
6-4
6-8
TREES
6-3
6-7
6-9
6-12
6-19
TREES
6-33
6-2
6-6
6-10
6-13
6-20
6-32
6-21
TREES
6-1
6-5
6-11
6-14
6-15
6-16
6-17
6-18

1/3

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/23/06
Blackhawk Field Personnel: R. BLOHM

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist

Warm-up (15 minutes)	✓	Start Time: 1030 End Time: 1100
Check Batteries	✓	
Check Gasoline Levels		
Check Cable Connections	✓	
Visual Inspection of EM Coils	✓	
Visual Inspection of GPS Antenna		

Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference:

✓

QC4 (Cable Shake Test)

File name: 082306a
Line: _____
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

2
1

Tests for Processing: Date: 08/23/06

QC5_AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0823306b Battery Voltage: 12.9V Time: 1110 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	77	2	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	171	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 0823306e Battery Voltage: 12.1V Time: 1425 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	75	2	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	169	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

082306c File Size = 50K 3/3

DID MR-005-05
Attachment A 082306d File Size = 52K

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heela Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

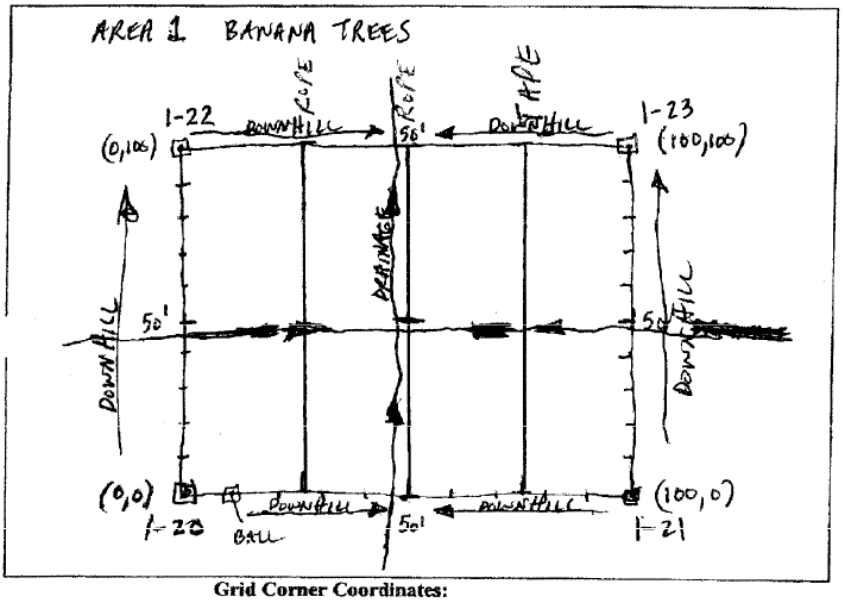
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid 1-20 **Date:** 08-23-06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☒Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 25'
☐None ☐Light ☐Medium ☒Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	1-20	stake	0	0
NW	1-22	"	0	100
NE	1-23	"	100	100
SE	1-21	"	100	0

	Start	End	File Name
Battery Voltage:	12.9V	12.1V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Repeat ~~Data~~ File Name: 0.1

Raw Data File Name: 082306c = Lines 0-48

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65 **Serial Number:** _____

Base Station: Run Lines E-W, FIDs @ 50' **Serial Number:** Top Coil

Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil

Additional Comments: 2" Ball Line 0 @ 10'/Edit Line 1 to Line 0/Lines 0-12 has a metal roof on/at the surface @ 100' area/Edit out Line 36 1st 69 on - use 2nd 69 on/started 082306d on Line 51/082306d = Lines 51-99 and 0.1/* DATA GAPS ON BACK *

DATA GAPS LIST GRID 1-20

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	57-60	54	66-74	93	81-76				
3	32-27	54	98-100	93	63-56				
6	24.5-31	57	72-66	93	51-37				
9	39-25	57	49-37	96	25-51				
12	18-39	60	24-27	96	75-82				
12	88-92	60	42-46	99	83-67				
15	92-89	60	82-94	99	54-25				
15	35-19	63	74-64						
18	41-45	63	45-40	0.1	60-54				
18	58-67	63	27-24						
21	69-50	66	25-30						
21	45-41	66	41-47						
24	27-37	66	72-75						
24	60-77	66	95-100						
27	78-63	69	100-96						
27	57-54	69	50-25						
27	42-36	72	25-37						
30	37-42	72	41-45						
30	54-60	72	69-81						
30	66-70	72	98-100						
33	97-90	75	100-99						
33	69-55	75	84-68						
36	25-32	75	58-50						
36	59-69	75	36-30						
36	83-96	78	21-26						
39	96-88	78	31-35						
39	78-74	78	50-55						
39	46-18	78	69-86						
42	18-50	81	87-74						
42	73-77	81	54-49						
45	75-64	81	29-20						
45	46-19	84	21-27						
48	19-28	84	49-63						
48	33-43	84	72-76						
48	65-73	87	76-67						
51	100-98	87	62-55						
51	74-66	90	47-50						
51	64-61	90	57-62						
51	52-41	90	77-82						
54	39-52	90	91-97						

1/3

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 8-24-06
Blackhawk Field Personnel: R. Blohm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10613
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN ~~X~~
GPS Base Station Receiver:	Model 5700	SN ~~X~~
GPS Base Station Transmitter:	Model 5700	SN ~~X~~
GPS Rover Unit:	Model 5700	SN ~~X~~
GPS Rover Antenna:	Model L1-L2	SN ~~X~~

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0830 End Time: 0900
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 0824069
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

Tests for Processing:

Date: 08-24-06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082406b Battery Voltage: 12.9V Time: 0931 Samples/Sec: 5X

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	80	3	
Channel 2 Bottom	0	44	1	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	169	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082406e Battery Voltage: 12.2V Time: 1230 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	73	-1	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	166	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

2

082406c File Size = 54k 3/3
082406d File size = 51k

DID MR-005-05
Attachment A

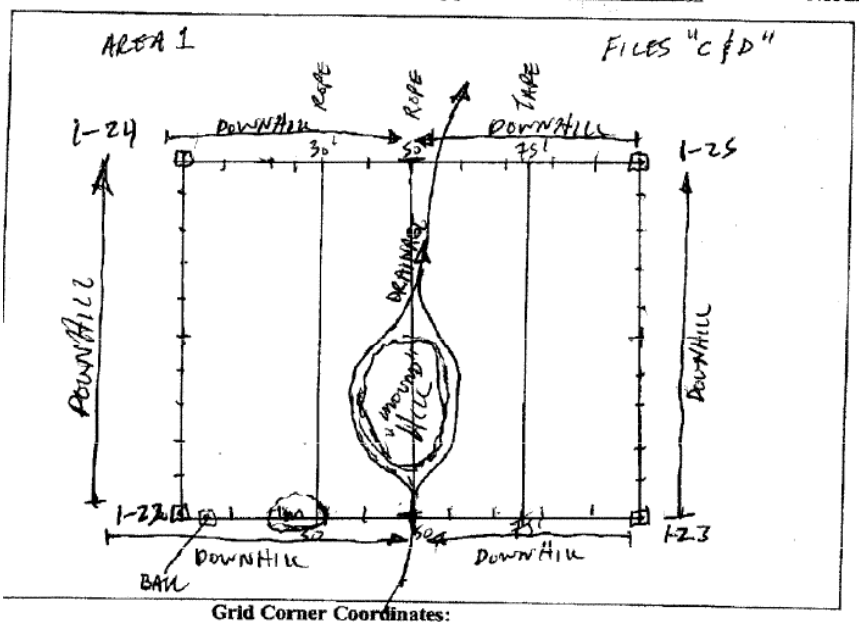
Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI
Project Location: Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering
Design Center POC: _____
Project Geophysicist: J. Hild
Site Geophysicist: R. Blohm
Survey Area ID: Grid 1-22 **Date:** 08-24-06
Field Team: R. Blohm, S. Ala
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____
Unit of Measure: ☐ meters ☒ ~~feet~~

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 25'
☐None ☐Light ☒Medium ☒Thick

Brush:
☐None ☐Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	1-22	stake	0	0
NW	1-24	"	0	100
NE	1-25	"	100	100
SE	1-23	"	100	0

	Start	End	File Name
Battery Voltage:	12.75V	12.2V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A
Repeat ~~Data File~~ Line Name: 0.1
Raw Data File Name: 082406c = Line 0-48 Inc. = .65
Geophysical Instrumentation: Geonics EM61-MK2 **Serial Number:** 022003
~~Base Station~~: Run Lines E-W, FIDs @ 50' **Serial Number:** Top Coil 1065
Navigation Method: Tape, Rope, Cones **Serial Number:** Bottom Coil 1073
Additional Comments: 2" Ball Line 0 @ 6'/Editout Line 0 98'-100'
Editout 1st Line 21 - use 2nd/started 082406d on Line 51/082406d = Lines 51-99 and 0.1/* DATA GAPS ON BACK *

082406c File Size = 54k

DID MR-005-05
Attachment A 082406d File size = 51k

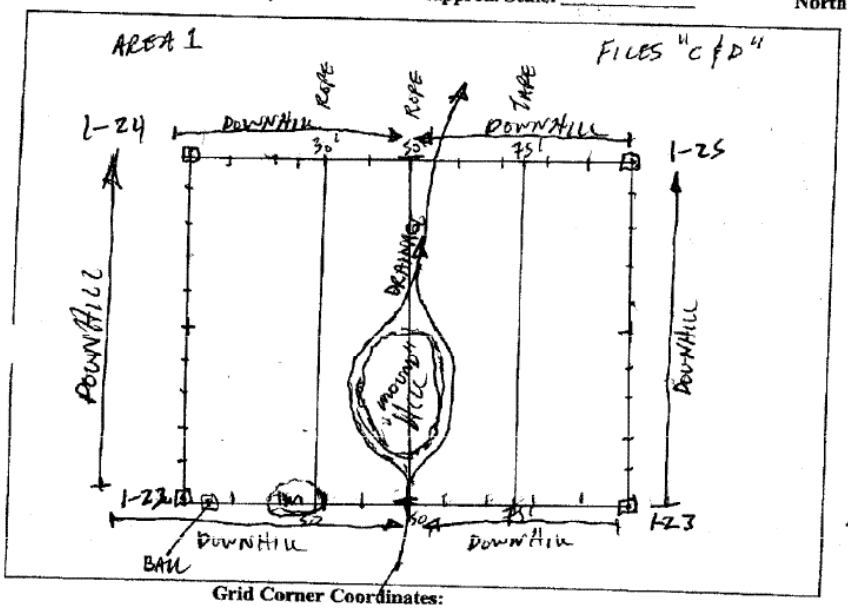
Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI
Project Location: Pali Site
Geophysical Contractor: Blackhawk/Zapata Engineering
Design Center POC: _____
Project Geophysicist: J. Hild
Site Geophysicist: R. Blohm
Survey Area ID: Grid 1-22 **Date:** 08-24-06
Field Team: R. Blohm, S. Ala
Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____
Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** _____ **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 25'
☐None ☐Light ☒Medium ☒Thick

Brush:
☐None ☐Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	1-22	stake	0	0
NW	1-24	"	0	100
NE	1-25	"	100	100
SE	1-23	"	100	0

	Start	End	File Name
Battery Voltage:	12.7V	12.2V	
Static Background Value:	___	___	___, ___
Static Response Value:	___	___	___, ___

Instrument Clock Drift: N/A
Repeat Line Name: 0.1
Raw Data File Name: 082406c = Line 0-48
Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65
Serial Number: 022003
~~Base Station~~: Run Lines E-W, FIDs @ 50'
Serial Number: Top Coil 10513
Navigation Method: Tape, Rope, Cones
Serial Number: Bottom Coil 10513
Additional Comments: 2" Ball Line 0 @ 6'/Editout Line 0 98'-200'
Editout 1st Line 21 - use 2nd/ started 082406d on Line 51/082406d = Lines 51-99 and 0.1/* DATA GAPS ON BACK *

PAIN GRID > LN 1

GRID 1-22

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	24 - 55	42	68 - 75	84	48 - 55				
0	68 - 82	42	88 - 92	87	100 - 96				
0	95 - 100	45	81 - 67	87	61 - 47				
3	79 - 67	45	57 - 50	87	30 - 24				
3	52 - 46	45	42 - 37	90	30 - 36				
6	45 - 51	48	50 - 63	90	51 - 72				
6	86 - 90	48	79 - 92	90	96 - 100				
9	100 - 95	51	100 - 95	93	84 - 65				
9	89 - 86	51	90 - 73	93	62 - 54				
9	73 - 67	51	63 - 58	96	65 - 85				
12	68 - 75	51	42 - 37	99	86 - 81				
12	92 - 100	54	33 - 45	99	75 - 69				
15	76 - 67	54	73 - 77						
15	52 - 46	54	94 - 100	0.1	97 - 95				
18	67 - 74	57	78 - 75	0.1	82 - 67				
18	86 - 91	57	72 - 67	0.1	55 - 24				
[illegible]		57	46 - 35						
21	91 - 85	60	38 - 42						
24	31 - 35	60	76 - 88						
24	44 - 50	63	97 - 81						
24	84 - 88	66	45 - 50						
24	96 - 100	66	73 - 76						
27	100 - 95	66	90 - 100						
27	87 - 81	69	92 - 84						
27	51 - 30	69	74 - 71						
30	30 - 42	69	66 - 61						
30	57 - 64	69	30 - 25						
30	78 - 82	72	23 - 44						
30	88 - 91	72	55 - 61						
30	95 - 100	72	63 - 74						
33	90 - 88	72	85 - 90						
33	82 - 79	75	89 - 84						
33	64 - 52	75	75 - 52						
33	42 - 34	75	45 - 38						
36	41 - 44	75	31 - 22						
36	51 - 59	78	22 - 33						
36	71 - 76	78	53 - 63						
36	87 - 89	78	93 - 100						
39	90 - 68	81	30 - 22						
42	37 - 41	84	21 - 30						

13

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/25/06
Blackhawk Field Personnel: R. Bloom

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
Console(s): Model EM61-MK2 SN 022003
System Controller: Model Allegro SN 11257
(Allegro\PRO4000)
Bottom Coil(s): Model EM61-MK2 SN 10513
Top Coil(s): Model EM61-MK2 SN 10513

GPS Equipment:
GPS Base Station Antenna: Model Trimble 5700 SN
GPS Base Station Receiver: Model 5700 SN
GPS Base Station Transmitter: Model 5700 SN
GPS Rover Unit: Model 5700 SN
GPS Rover Antenna: Model L1-L2 SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 1230 End Time: 1300
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) beea nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 082506a
Line:
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

Channel 2 Bottom	0	44	1	
Channel 3 Bottom	0	19	0	
Channel 4 Top	0	170	0	

Target Position: Lat: Long:
Known Position: Lat: Long:

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: Line Length:
Known Target: Northing: Easting:

2

3/3

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

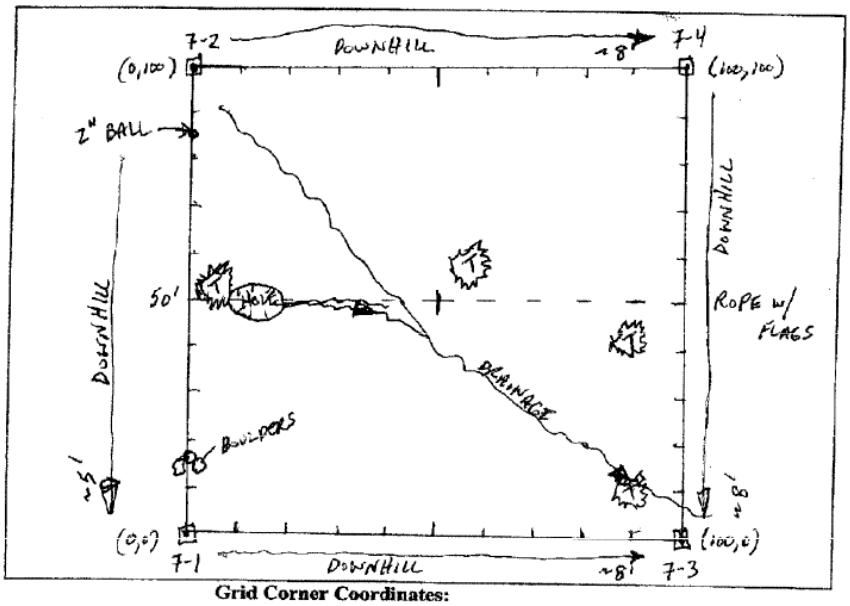
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 7-1 **Date:** 08/25/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐meters ☒feet

Sketch of Survey Area: **Approx. Scale:** 1"=30' **North Arrow:**



Grid Corner Coordinates:

	UTM/State Plane	Local
SW	STAKE, 7-1	0, 0
NW	" , 7-2	0, 100
NE	" , 7-4	100, 100
SE	" , 7-3	100, 0

Terrain:
☐Level ☒Moderate Slope ☐Steep
☒Rolling ☐Ruts ☒Gullies
☒Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 70'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☐Light ☒Medium ☐Thick

Weather:
☐Sunny ☒Cloudy ☐Drizzle
☒Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	Start	End	File Name
Battery Voltage:	12.9	12.6	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

FILE SIZE = 113K

Instrument Clock Drift: N/A

Repeat Data ~~File~~ LINE Name: 0.1 STA 100 TO 0

Raw Data File Name: 082506c = LINES 0-99

Geophysical Instrumentation: Geonics EM61-MK2 WHEEL INC. = 0.65'

~~Base Station~~: RUN LINES N-S

Navigation Method: TAPES, ROPE w/ FLAGS @ 3' INC, CONES

Additional Comments: 2" BALL ON LINE 0 @ 86'

* DATA GPS ON BACK *

Serial Number: 022003

Serial Number: Top Coil 10513

Serial Number: Bottom Coil 10513

PATH GAPS LIST GRID 7-1

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	13-21								
0	62-67								
3	70-53								
3	21-14								
6	13-18								
6	50-70								
9	70-43								
9	18-13								
12	21-28								
12	44-63								
15	28-18								
36	30-34								
48	11-16								
54	38-42								
54	85-89								
57	89-85								
57	62-49								
57	24-13								
60	16-38								
60	45-65								
63	63-46								
63	26-17								
66	19-28								
66	48-60								
72	31-36								
75	16-9								
78	10-17								
81	13-10								
84	10-18								
87	20-11								
90	6.5-18								
90	25-43								
93	45-29								
93	10-6								
96	6-10								
96	28-44								
0.1	68-61								
0.1	20-13								

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/28/06
Blackhawk Field Personnel: R. Bloom

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers

Console(s):	Model EM61-MK2	SN 022003
System Controller: (Allegro\PRO4000)	Model Allegro	SN 11257
Bottom Coil(s):	Model EM61-MK2	SN 10513
Top Coil(s):	Model EM61-MK2	SN 10513

GPS Equipment:

GPS Base Station Antenna:	Model Trimble 5700	SN
GPS Base Station Receiver:	Model 5700	SN
GPS Base Station Transmitter:	Model 5700	SN
GPS Rover Unit:	Model 5700	SN
GPS Rover Antenna:	Model L1-L2	SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0800 End Time: 10:02
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches
Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location: _____
Frequency: _____ MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 082806a
Line: _____
Check Cable Connections: ✓
Shake Cables while monitoring for change:

1

Tests for Processing: Date: 08/28/06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082806b Battery Voltage: 12.9 Time: 10:17 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	74	-2	
Channel 2 Bottom	0	41	-1	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	168	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: [illegible] Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082806d Battery Voltage: 12.7V Time: 1122 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	0	74	0	
Channel 2 Bottom	0	41	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	167	0	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

File Size = 120K 3/3

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

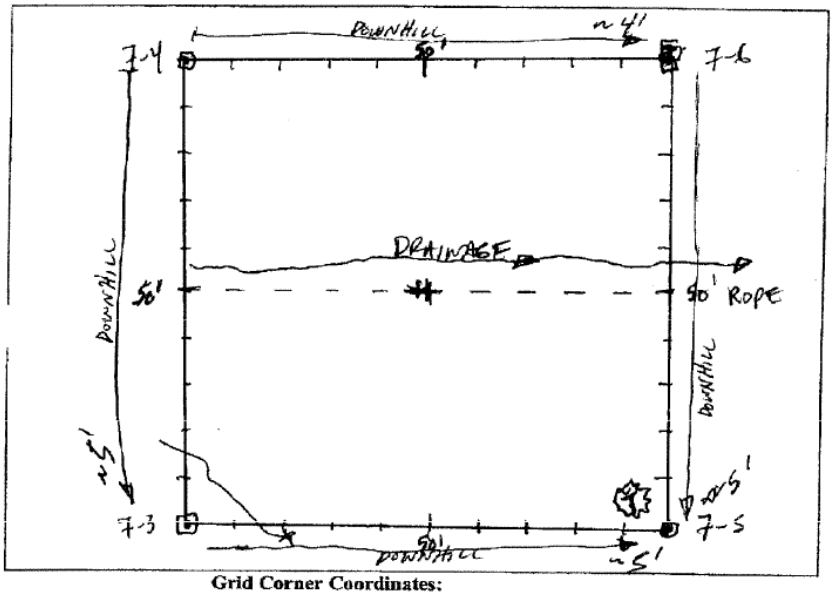
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: Grid 7-3 **Date:** 08/28/06 **Field Team:** R. Blohm, S. Ala

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** 1" = 30' **North Arrow:** N



Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 70'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☐Light ☒Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	7-3	Stake	0	0
NW	7-4	"	0	100
NE	7-6	"	100	100
SE	7-5	"	100	0

	Start	End	File Name
Battery Voltage:	12.9V	12.7V	
Static Background Value:			
Static Response Value:			

Instrument Clock Drift: N/A

Raw Data File Name: 082806c = Lines 0.99 + 0.1 **Repeat Line Data File Name:** 0.1 From STA 100 To 0

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65 **Serial Number:** 022003

~~Base Station:~~ **Serial Number:** Top Coil 05/13

Navigation Method: Run Lines N-S (Tape, Rope, Cones) **Serial Number:** Bottom Coil 05/13

Additional Comments: 2" Ball Line @ 15"

* DATA GAPS ON BACK *

DATA GAPS LIST GRID 7-3

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
6	17 - 21								
9	21 - 17								
45	81 - 76								
63	75 - 70								
75	28 - 24								
78	0 - 6								
81	25 - 22								
81	4 - 0								
84	22 - 24								
84	78 - 86								
87	82 - 72								
87	38 - 34								
90	73 - 77								
93	14 - 6								
96	4 - 11								
96	28 - 33								
99	9 - 5								

Heeia Combat Training Area (Pali Site), HI

(Daily Log and QC Testing)

System: EM61-MK2 System
GPS Mode: YES (NO)
Wheel Mode: (YES) NO

Date: 08/29/06
Blackhawk Field Personnel: R. Blehm

QC1 Test (Equipment/Electronics)

Equipment Serial Numbers
Console(s): Model EM61-MK2 SN 022003
System Controller: Model Allegro SN 11257
(Allegro\PRO4000)
Bottom Coil(s): Model EM61-MK2 SN 10513
Top Coil(s): Model EM61-MK2 SN 10513

GPS Equipment:
GPS Base Station Antenna: Model Trimble 5700 SN
GPS Base Station Receiver: Model 5700 SN
GPS Base Station Transmitter: Model 5700 SN
GPS Rover Unit: Model 5700 SN
GPS Rover Antenna: Model L1-L2 SN

Pre-Survey Checklist
Warm-up (15 minutes) ✓ Start Time: 0700 End Time: 0800
Check Batteries ✓
Check Gasoline Levels
Check Cable Connections ✓
Visual Inspection of EM Coils ✓
Visual Inspection of GPS Antenna
Has the instrument (EM only) been nulled: (YES) NO

QC2 Test (Sensor Positions)

Height to Bottom Coil: 16 inches

Height to Top Coil: 28 inches

GPS Base Station Setup
Base Location:
Frequency: MHz

QC3 Test (Personal Test)

Operator has removed personal effects that may cause instrument interference: ✓

QC4 (Cable Shake Test)

File name: 082906a

Line:

Check Cable Connections: ✓

Shake Cables while monitoring for change:

Tests for Processing:

Date: 08/29/06

OC5 AM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082906b Battery Voltage: 12.4V Time: 0815 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	79	2	
Channel 2 Bottom	0	45	1	
Channel 3 Bottom	0	20	0	
Channel 4 Top	0	170	0	

Target Position: Lat: _____ Long: _____
Known Position: Lat: _____ Long: _____

QC10_AM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

QC5_PM Test (Static/Standard Test and Positional Accuracy) Board with 6-inch pipe on Top Coil

(3 minutes static test + 1 minute standard test + 1 minute static test)

File Name: 082906e Battery Voltage: 12.3V Time: 1425 Samples/Sec: 5x

	Single Coil			
	Static	Standard	Static	Residual
Channel 1 Bottom	1	75	0	
Channel 2 Bottom	0	42	0	
Channel 3 Bottom	0	18	0	
Channel 4 Top	0	165	-1	

Target Position: Lat: _____ Long: _____

Known Position: Lat: _____ Long: _____

QC10_PM Test (Latency Test with Position check or Repeat Line Test)

File Name: _____ Line Length: _____

Known Target: Northing: _____ Easting: _____

File = 88K
Size

DID MR-005-05
Attachment A

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

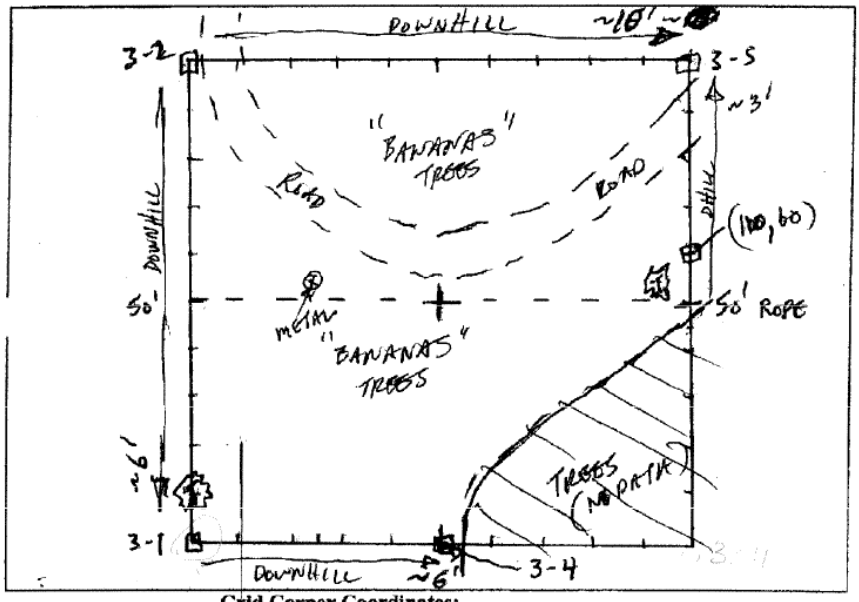
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 3-1 **Date:** 08/29/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ fe

Sketch of Survey Area: **Approx. Scale:** 1" = 30' **North Arrow:**



Terrain:
☐Level ☒Moderate Slope ☒Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: ☒BANANAS **Tree Height:** 20'
☐None ☐Light ☒Medium ☐Thick

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

Grid Corner Coordinates:

	UTM/State Plane	Local
SW	STAKE, 3-1	0, 0
NW	" , 3-2	0, 100
NE	" , 3-5	100, 100
SE	" , 3-4	50, 100

	Start	End	File Name
Battery Voltage:	12.4V	12.3V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082906c = Lines 0-99 + 0.1 **Repeat ~~Data File~~ Line Name:** @0.1

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65 **Serial Number:** 022003

~~Base Station~~: Run Lines N-S, FIDs @ 50', WHEEL MODE **Serial Number:** Top Coil 10513

Navigation Method: Tapes, Ropes, Cones, NAILS IN CORNER HUBS **Serial Number:** Bottom Coil 10513

Additional Comments: 2" Ball Line 0 @ 86' / Line 24 Metal Drum protruding from ground @ 53'-56' / *DATA GAPS ON BACK*

DITH GAL'S LIST GRID 3-1

LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA	LN	STA - STA
0	5-20	75	100 - 91						
0	26 - 38	75	ends 43						
0	55 - 70	78	starts 43						
3	72 - 56	78	89 - 100						
3	38 - 28	81	100 - 89						
3	20 - 5	81	ends 46						
6	8 - 18	84	starts 50						
6	62 - 70	84	89 - 97						
12	11 - 19	87	62 - 59						
15	100 - 94	87	ends 50						
15	86 - 77	90	starts 50						
15	19 - 12	90	59 - 62						
18	74 - 91	93	100 - 92						
18	94 - 100	93	ends 56						
21	92 - 77	96	starts 58						
21	35 - 29	96	92 - 97						
24	85 - 92	99	77 - 74						
30	70 - 76	99	ends 59						
33	77 - 70								
33	45 - 37	0.1	71 - 56						
36	20 - 27	0.1	39 - 27						
36	34 - 46	0.1	20 - 5						
36	70 - 78								
39	79 - 67								
39	27 - 18								
42	65 - 77								
45	77 - 66								
48	65 - 76								
54	starts 8								
57	ends 15								
60	starts 15								
60	78 - 93								
63	93 - 79								
63	ends 19								
66	starts 27								
66	86 - 90								
69	100 - 94								
69	ends 33								
72	starts 42								
72	90 - 100								

DID MR-005-05
Attachment A

File Size = 100K 4/4

Field Data Sheet

☐ QC checked by _____ Date: _____

☐ QA checked by _____ Date: _____

Project Name: Heeia Combat Traning Area, Oahu, HI **Project Location:** Pali Site

Geophysical Contractor: Blackhawk/Zapata Engineering **Design Center POC:** _____

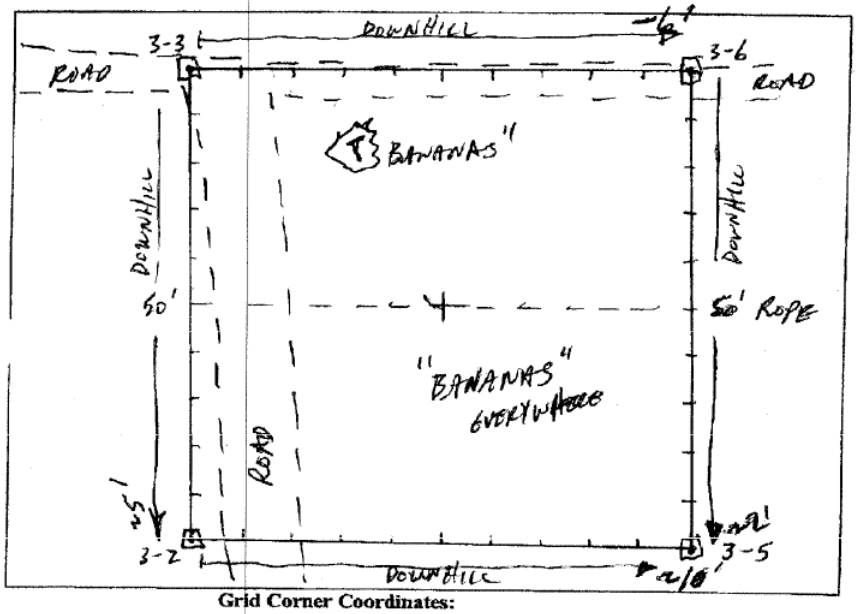
Project Geophysicist: J. Hild **Site Geophysicist:** R. Blohm

Survey Area ID: GRID 3-2 **Date:** 08/29/06 **Field Team:** R. Blohm, S. Alu

Survey Type: ☒Grid ☐Meandering Path ☐Transect ☐Other _____

Coordinate System: ☐UTM ☐State Plane NAD _____ ☒Local ☐Other _____ **Unit of Measure:** ☐ meters ☒ feet

Sketch of Survey Area: **Approx. Scale:** 1"=30' **North Arrow:**



Grid Corner Coordinates:

	UTM/State Plane		Local	
SW	3-2	Stake	0	0
NW	3-3	"	0	100
NE	3-6	"	100	100
SE	3-5	"	100	0

Terrain:
☐Level ☒Moderate Slope ☐Steep
☐Rolling ☒Ruts ☐Gullies
☐Rocky ☐Swampy ☐Dangerous

Tree Cover: **Tree Height:** 20'
☐None ☐Light ☒Medium ☐Thick
☒ BANANAS

Brush:
☐None ☒Light ☐Medium ☐Thick

Weather:
☒Sunny ☒Cloudy ☐Drizzle
☐Rain ☐Thunderstorms ☐Hail
☐Fog ☒Humid ☐Snow

	Start	End	File Name
Battery Voltage:	12.9V	12.7V	
Static Background Value:	____	____	____, ____
Static Response Value:	____	____	____, ____

Instrument Clock Drift: N/A

Raw Data File Name: 082906d = Lines 0.99 + 0.1 **Repeat Line Name:** 0.1

Geophysical Instrumentation: Geonics EM61-MK2 Inc. = .65 **Serial Number:** 022003

Base Station: Run Lines N-S, FIDs @ 50', Wheel mode **Serial Number:** Top Coil 1013

Navigation Method: Tapes, Ropes Cones, Hubs in corners **Serial Number:** Bottom Coil 1013

Additional Comments: 2" Ball Line 0 @ 43'

* DATA GAPS ON BACK *

DATA GAPS LIST GRID 3-2

LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA	LN	STA-STA
0	0-20	63	53-43						
12	73-79	66	0-4						
12	91-97	66	12-17						
15	98-73	66	43-50						
15	38-31	69	68-65						
15	1-0	69	18-12						
18	0-1	69	3-0						
18	33-38	72	0-2						
18	71-97	72	11-17						
21	97-70	72	65-79						
21	25-17	75	90-80						
24	14-28	75	71-66						
24	71-87	78	19-30						
27	94-88	78	39-48						
27	28-15	78	75-93						
30	0-5	81	92-77						
30	80-94	81	49-39						
33	89-82	81	32-8						
33	6-0	84	9-31						
38	0-10	84	40-47						
36	46-51	84	77-93						
39	54-43	87	93-77						
39	12-0	87	20-14						
42	4-10	90	15-19						
42	40-52	93	77-65						
45	91-84	93	61-50						
45	73-66	96	50-58						
48	67-73	96	67-76						
48	82-93	99	62-53						
51	90-83								
51	53-45	0.1	19-0						
51	40-33								
54	31-54								
54	80-93								
57	93-82								
57	54-24								
60	24-36								
60	42-52								
60	68-75								
63	75-69								

APPENDIX K

GPO Documentation

(Included Electronically Only)

Summary Report: Geophysical Prove-Out Results
Heeia Combat Training Area and Pali Training Camp, Oahu, Hawaii

1.0 INTRODUCTION

During the period 19 to 22 March 2002, a Geophysical Prove-out (GPO) was conducted at the Luana Hills Country Club property within the location of the former Pali Training Camp, Oahu, Hawaii. The GPO was conducted in preparation for a forthcoming Engineering Evaluation/Cost Analysis (EE/CA) to be conducted by ZAPATAENGINEERING at the former Heeia Combat Training Area and the former Pali Training Camp sites.

Data acquisition and processing steps carried out during the GPO are described in the enclosed report titled, "Geophysical Prove-Out for Pali Parcel, Heeia Combat Training Area, Oahu, Hawaii," Blackhawk UXO Services Project Number 2706BX1, May 9, 2002.

2.0 SITE DESCRIPTION

A test plot 300 feet in length was constructed in a flat, grass-covered area that is maintained by mowing. The test plot line and all survey lines were constructed in an approximately north-south direction.

3.0 QUALITY CONTROL

EM data collection quality control steps specified in the Geophysical Prove-out Work Plan were carried out by Blackhawk and monitored by the ZAPATAENGINEERING Senior Geophysicist and by the USACE Project Geophysicist, Jon Durham. Blackhawk complied with all QC procedures.

Data acquisition/processing quality was monitored on site, and each evening and/or next morning following fieldwork. The subcontractor's normal field and data processing methods were followed and satisfied or exceeded requirements of the Work Plan.

4.0 CONCLUSION

The Pali Seeded Item Test results are shown in Table 1.

Background noise level in the test area is 1mV to 3 mV, discounting probable metallic debris beneath the grids.

Items 5, 11 and 15 were selected by the Blackhawk processor in the Oasis program. Item # 7 was not detected; Item # 15 was missed as well at the three-foot line spacing (even though the item was seeded on the test centerline). In contrast, regarding an item on the centerline, Item 11 produced a 2.4 mV anomaly on the 2.5 foot grid but produced a 3.3 mV anomaly on the 3.0 foot grid. Item 11, a Mark 2 grenade at 20 inches depth, was picked as a target, a pick that is verified by the presence of a reasonably clear anomaly in the profile view of the line. The anomaly is as discernable in the Blackhawk color images as in the profiles.

The difference in detection between the 2.5-foot line spacing and the 3.0-foot spacing is most probably caused by coincidence, or lack thereof, between the data positions relative to actual target locations, a normal result of wheel counter acquisition mode. Because there is no significant difference between results of the 2. 5-foot and the 3.0 foot line spacing grids in this test, we recommend that the EE/CA geophysical survey be carried out at the proposed 3.0 foot line spacing.

The target selection threshold level for geophysical surveys will necessarily be lower than the initial DAS level of 5 mV if smaller OE items are to be detected at depths close to their detection limits, terrain noise levels permitting.

The GPO shows that the EM equipment and work procedures selected for OE detection at Heeia/Pali will be satisfactory to detect expected ordnance at those sites. Threshold levels will have to be set according to the terrain noise levels found at each grid and transect.

David A. Smith
Senior Geophysicist,
Zapata Engineering

TABLE 1

ITEM ID	DESCRIPTION	DEPTH INCHES	ORIENTATION WRT LINE	BLIND ?	2.5 FOOT LINE SPACING DETECTED ?	Known Item mV	Unknown Item mV	3.0 FEET LINE SPACING DETECTED ?	mV	mV
1	81 mm	18	across	Y	Y		90	Y		96
2	81 mm	27	across	Y	Y		30*	Y		36*
3	Mk II	6	NA	Y	Y		24	Y		23
4	2.36 rocket	20	along	N	Y (1)	6.2		Y (1)	5.9*	
5	Mk II	12	NA	N	Y (2)	2.4		Y (2)	1.5	
6	Mk II	6	NA	N	Y	31		Y	33	
7	MK II	20	NA	Y	N		NA	N	NA	
8	MK II	6	NA	Y	Y		41	Y		43
9	2.36 rocket	20	across	N	Y (1)	7.5*		Y (1)	3.9*	
10	MK II	12	NA	Y	Y		7.8	Y		5.3
11	MK II	20	NA	N	Y (2)	2.4		Y (2)	3.3	
12	MK II	12	NA	Y	Y		7.2	Y		7.4
13	2.36 rocket	12	across	Y	Y		41	Y		42
14	2.36 rocket	12	along	N	Y (1)	33		Y	28	
15	MK II	23	NA	N	Y (2)	1.9		N	NA	

(1) Double peak response

(2) Lowered threshold

* approximate or average

GEOPHYSICAL PROVE-OUT
PALI PARCEL
HEEIA COMBAT TRAINING AREA
OAHU, HAWAII

Blackhawk UXO Services Project Number 2706BX1

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October 31, 2002

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1.0 INTRODUCTION

An Engineering Evaluation/Cost Analysis (EE/CA) will be done by Zapata on the Pali Parcel of the Heeia Combat Training Area in Oahu, Hawaii. In support of this EE/CA, a geophysical prove-out survey was conducted to establish the methods, equipment, and procedures best suited to the site. A test plot was constructed by Zapata and seeded with inert ordnance. Blackhawk UXO Services was tasked to collect geophysical data over the plot both before and after the emplacement of seeded items. The EM61-MK2 system was used for geophysical data collection. Positional data were acquired with a wheel counter and were transformed into Hawaii State Plane coordinates following the geophysical survey.

2.0 SURVEY LOGISTICS

2.1 Site Description

A test plot measuring 300 feet was constructed at Luana Hills in flat and open terrain. The plot is comprised of a central line with four parallel flanking lines (2 on each side) at either 2.5 or 3ft line spacing. Geophysical data were collected three times over the prove-out line. A summary of the data collection is as follows:

1. Before emplacement of seeded items with 2.5ft line spacing
2. After emplacement of seeded items with 2.5ft line spacing
3. After emplacement of seeded items with 3ft line spacing

2.2 Geophysical Equipment

2.2.1 EM61-MK2

The Geonics EM61-MK2 metal detection system consists of a pair of one meter by one-half meter coils. A coincident transmitter and receiver coil are positioned 40 centimeters (cm) above the ground when mounted in the wheel assembly. The second receiver coil is located 28 cm above the main coil. The electronics are stored in a backpack that is worn by the equipment operator. The coils are oriented with the axis of the one-meter side perpendicular to the direction of travel, such that a one-meter swath is covered with each pass. To evaluate the effect of line spacing at the site, data were collected over the test line with both 2.5 and 3 foot line spacing. Geophysical data were collected in wheel counter mode, resulting in a data sampling point about every 0.64 feet. Data were stored in the PRO4000 field computer for downloading at the end of the field day.

The TDEM method generates an electromagnetic (EM) pulse in the transmitter coil, causing eddy currents to flow both within the ground and within metal objects. When the EM pulse is terminated, the eddy currents decay and induce a secondary magnetic field. In the MK2 system, four separate time channels of secondary response are measured by the receiver coils and recorded in millivolts (mV). The equipment operator has the option of collecting four channels of bottom coil response, or three channels of bottom coil and one channel of top coil response. For this survey, three channels of bottom coil response were recorded (Channel 1 – 216 usec, Channel 2 – 366 usec, Channel 3 – 660 usec) along with one channel of top coil response (Channel 4 – 660 usec). However, only Channels 1 and 4 are included in the processed data files and only the first (earliest) time gate of bottom coil response (Channel 1 – 216 usec) was utilized for data interpretation. The data from this time gate has the highest signal to noise ratio and is the best at identifying metal targets.

This system is designed so that a low level and/or constant signal is received when no metal is present. When metal is present, an increased signal is received. This signal is generally highest, for larger objects, when the coils are located directly over the object. This typically results in "bulls-eye" type anomalies for isolated metal objects and simplifies data analysis.

2.2.2 Sensor Positioning

Positional data for the EM61-MK2 system were acquired in wheel mode resulting in data sampling spacing of about .64 feet along survey lines. With this mode of operation, target anomalies are expected to have location precision between six and 18 inches due to the geophysical sensor width and line spacing. Positional data are recorded in local coordinates and are fully integrated with the geophysical data in the PRO4000 computer.

After the completion of data collection, Zapata personnel provided geographic coordinates for three reference points along the prove-out line. These coordinates were used to transform the local coordinates of the test plot into Hawaii State Plane coordinates. Table 2-1 details the coordinate reference and transformation information.

Table 2-1
Coordinate Reference Points
(*NAD83 Hawaii Zone 3 State Plane, US Survey Feet)

Local Coordinates		Geographic Coordinates		*State Plane Coordinates	
X	Y	Longitude	Latitude	Easting	Northing
0	0	157° 45' 39.82677" W	21° 22' 27.74501" N	1721714.76	75511.76
0	150	157° 45' 39.89600" W	21° 22' 29.23110" N	1721707.99	75661.71
0	300	157° 45' 39.96520" W	21° 22' 30.71643" N	1721701.23	75811.58

2.3 Quality Control

To ensure high-quality geophysical data, the data collection and processing steps were monitored. During data collection, the following steps were performed for quality control:

- A 15-minute warm-up was allotted for the geophysical sensors prior to data collection.
- After the warm-up period, data were recorded in a stationary mode for two to three minutes to aid in identifying equipment problems and determining instrument drift.
- Daily standard tests were performed to verify sensor operation in static mode.
- A test line survey was performed to verify sensor operation in dynamic mode.

During data processing the following quality control steps were performed:

- Static and standard tests were reviewed for proper sensor operation.
- Test line data were processed to verify proper positioning and sensor operation.
- Raw and processed geophysical data were posted on the Blackhawk FTP site for downloading by appropriate parties.

2.4 Static Tests

Prior to geophysical data collection, sensor data were recorded in a stationary mode for two to three minutes. The deviation of the instrument readings was monitored by the field crew.

2.5 Standard Tests

At the beginning of each field day the geophysical sensors were zeroed. A metal standard was placed in exactly the same position on the geophysical sensors and data were recorded with the instrument in static mode. The magnitudes of these standard readings are listed in Table 2-2.

Table 2-2
Standard Test Readings

	Sensor Reading (mV)	
	Bottom Coil (Channel 1)	**Top Coil (Channel 4)**
03/20/02	128.69	157.49
03/20/02 - Repeat	127.57	159.94
03/21/02	121.81	159.79

2.6 Test Lines

During the first day of the prove-out survey, test line data were acquired in order to assess the effect of walking speed on data quality and positioning. First, background data were collected over a 100-foot line (up and down the line). Next, one-half of a grenade was placed on the ground surface at station 50 and data were collected at normal operating speed (up and down the line). Finally, data were collected traveling up the line at a speed faster than normal, and going down the line at a speed slower than normal. Profile plots of the geophysical data collected over the test line are located in Appendix B. Test line data yielded the following results:

1. Test line background shows a noise level of +/- 1 to 3 mV.
2. The anomaly from the grenade has an average signal (at normal walking speed) of 33.8 mV. This results in a signal to noise ratio of about 10 to 30.
3. The amplitude of the target (1/2 grenade) at normal walking speed is within 10% of the anomaly amplitude detected in the repeat runs at different speeds.
4. The position of the target is within 0.5 feet for all data runs over the test line, including those at different speeds.

3.0 DATA PROCESSING

3.1 Geophysical Data

The geophysical data were processed using Oasis Montaj. The MTADS data analysis system (DAS) was used to pick and model anomalies.

The processing stream consisted of the following steps:

- Raw geophysical data were downloaded from the field computer and loaded in Oasis Databases.
- The QC standard tests were evaluated and sensor readings tabulated (Table 2-2).
- The test line profiles were evaluated and the necessary lag corrections were applied to the sensor data. Test line profile maps are located in Appendix B.
- Individual geophysical data streams were evaluated for spikes, gaps, and sensor failure.
- The field notes were evaluated for recorded cultural features and equipment problems. A copy of the field notes is located in Appendix A.
- A drift correction was applied in order to level the data to a zero baseline.
- The data were warped from local coordinates to state plane coordinates using the reference points listed in Table 2-1.
- The sensor data were gridded and displayed on the screen for review by the geophysical processor.
- Processed data were output in XYZ ASCII format. Positioning data were reported in NAD83 State Plane Coordinates, Hawaii Zone 3, US Survey Feet. Preliminary data sets were posted on Blackhawk's FTP site.
- The processed data were input into the MTADS DAS program for interpretation.
- Target anomalies were selected from the gridded geophysical data. A peak-picking algorithm was used as the initial step in target identification. An initial value of 5 mV was used by the MTADS DAS peak picker to select targets. Then, following normal procedures, an analyst plotted the data in Oasis and selected additional targets based on judgment/experience. These selections were based on plan map aspects, discrete/defined anomalies, and absence of background response. Additionally, targets attributed to single point data spikes, system noise, and gridding effects were removed.
- Final target lists were generated. Positioning data were reported in NAD83 State Plane Coordinates, Hawaii Zone 3, US Survey Feet. Hard copies of the target reports are located in Appendix C and electronic files are included on the attached CD.

4.0 SURVEY RESULTS

4.1 Test Plot

Figure 4-1 shows the color grid map of the background data collected over the test plot with a line spacing of 2.5 feet. The figure displays the gridded bottom coil (channel 1) data collected with the EM61-MK2 system. Anomalies present in the background data suggest the presence of buried metal located in the prove-out line before the emplacement of seeded items. The location of the anomalies is shown on this figure.

Figures 4-2 and 4-3 show color maps of the geophysical data collected over the test plot after the emplacement of seeded items. The descriptions and locations of half of the seeded items were withheld from Blackhawk. The descriptions of the known seeded items are listed in Table 4-1.

Table 4-1
Test Plot Known Seeded Item List
(NAD 83 Hawaii Zone 3 State Plane, US Survey Feet)

Item ID	Item	Easting	Northing	Depth (in)	Orientation
4	2.36 Rocket	1721710.25	75611.73	20	Parallel to Line
5	MK2	1721709.38	75631.72	12	Parallel to Line
6	MK2	1721708.75	75645.72	6	Parallel to Line
9	2.36 Rocket	1721706.63	75692.70	20	Perpend. to Line
11	MK2	1721705.50	75716.70	20	Vertical
14	2.36 Rocket	1721703.50	75761.68	12	Parallel to Line
15	MK2	1721701.63	75801.66	23	Parallel to Line

Figure 4-2 displays the geophysical data collected with a line spacing of 2.5 feet. The MTADS DAS picks have been superimposed on the figure along with the positions of the known seeded items. The system was effective at detecting all of the known seeded items in the test plot. A total of 44 anomalies were picked with the DAS. Seventeen of the DAS picks match positions of anomalies that are present in the background data.

Figure 4-3 displays the geophysical data collected with a line spacing of 3 feet. All but one of the known seeded items were detected with the system. The system did not detect the MK2 buried parallel to the line at a depth of 23 inches (Item 15). A total of 40 anomalies were picked with the DAS and 13 of the picked anomalies are present in the background data.

Table 4-2 compares the known positions of the seeded items with the positions picked by the DAS. For data collected at 2.5-foot line spacing, the offset between the picked positions and the known positions ranges from .31 feet to 2.44 feet with an average offset of 1.20 feet. For data collected with 3-foot line spacing, the offset ranges from .19 feet to 2.75 feet with an average offset of 1.07 feet. The positional offsets are normal for data collected with the wheel counter since it lacks the precision of GPS methods. Other factors that may influence positional offsets are the size of the coils and the size of the anomalies. The 2.36 rocket has a length of over 20 inches. Due to the linear

extent of the rocket and its coupling with the coils, signal highs tend to occur near the ends of the rocket when it is in a horizontal orientation. This results in target picks occurring at either end of the rocket rather than in the center. Complete target lists for both data sets are contained in Appendix C with electronic versions on the data CD.

Table 4-2
Test Plot Positional Results
(NAD 83 Hawaii Zone 3 State Plane, US Survey Feet)

	MTADS DAS Positions 2.5ft Line Spacing		Difference (ft)			MTADS DAS Positions 3ft Line Spacing		Difference (ft)			
Item ID	Easting	Northing	Delta E	Delta N	Offset	Easting	Northing	Delta E	Delta N	Offset	Response
4	1721710.50	75613.20	-0.25	-1.47	1.49	1721710.20	75613.20	0.05	-1.47	1.47	6.00
5	1721709.30	75632.70	0.08	-0.98	0.98	1721709.50	75631.90	-0.12	-0.18	0.22	1.50
6	1721709.00	75645.90	-0.25	-0.18	0.31	1721708.70	75645.90	0.05	-0.18	0.19	32.50
9	1721709.00	75692.10	-2.37	0.60	2.44	1721703.90	75693.00	2.73	-0.30	2.75	4.40
11	1721705.70	75716.40	-0.20	0.30	0.36	1721705.70	75715.80	-0.20	0.90	0.92	3.30
14	1721703.30	75763.20	0.20	-1.52	1.53	1721703.60	75760.80	-0.10	0.88	0.89	27.90
15	1721701.80	75800.40	-0.17	1.26	1.27	Not Detected		N/A	N/A	N/A	N/A

5.0 CONCLUSIONS AND RECOMMENDATIONS

The EM61-MK2 system was used to collect geophysical data over a test plot at Luana Hills. Data were collected over the prove-out with 2.5-foot line spacing before emplacement of seeded items, and both 2.5 and 3-foot line spacing after emplacement of seeded items. The data sets were evaluated and target anomalies were selected with the MTADS DAS software. The DAS picked positions were compared with the known positions of the seeded items. A summary of the test plot results is shown in Table 5-1.

Table 5-1
Test Plot Results

Line Spacing	Number of MTADS DAS Picks	DAS Picks That Match Background Anomalies	% of Known Seeded Items Detected	Offset of Picked Position From Known Postion		
				Minimum	Maximum	Average
2.5 ft	44	17	100%	0.31 ft	2.44 ft	1.20 ft
3 ft	40	13	86%	0.19 ft	2.75 ft	1.07 ft

The locations of one half of the seeded items were not revealed to Blackhawk. Because of this, it is not possible for us to fully evaluate the prove-out results. However, based on the known seeded items the following conclusions can be made:

- The data collected with 3-foot line spacing did not detect item 15 (MK2 buried at a depth of 23 inches). The item was detected in the data collected with 2.5-foot line spacing, but the peak value was so low (1.9 mV) that it would likely be indistinguishable from background noise during a normal survey. Further, the detection of this item is unrelated to line spacing since this target was buried on the center line.
- Data collected with 3-foot line spacing had a slightly smaller average positional offset than data collected with 2.5-foot line spacing.

Before beginning the geophysical mapping at the site, it is recommended that a minimum picking threshold be determined based on the complete ground truth data. For the geophysical prove-out an initial picking threshold of 5mV was used during data analysis. However, based on the EM response from the known seeded items, a picking threshold of about 2mV would have been necessary to identify all of the known items buried in the test plot.

3/20/02
Heeia + Pali
2P062AP

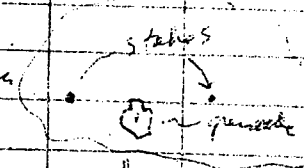
1/3

10:34 A.M. Start 15 min
warm up.

- using field South of Pali
Hwy. Mauna Wili
Luana Hills golf course
- REPLACE BATT @ 10:50 12.75 VDC

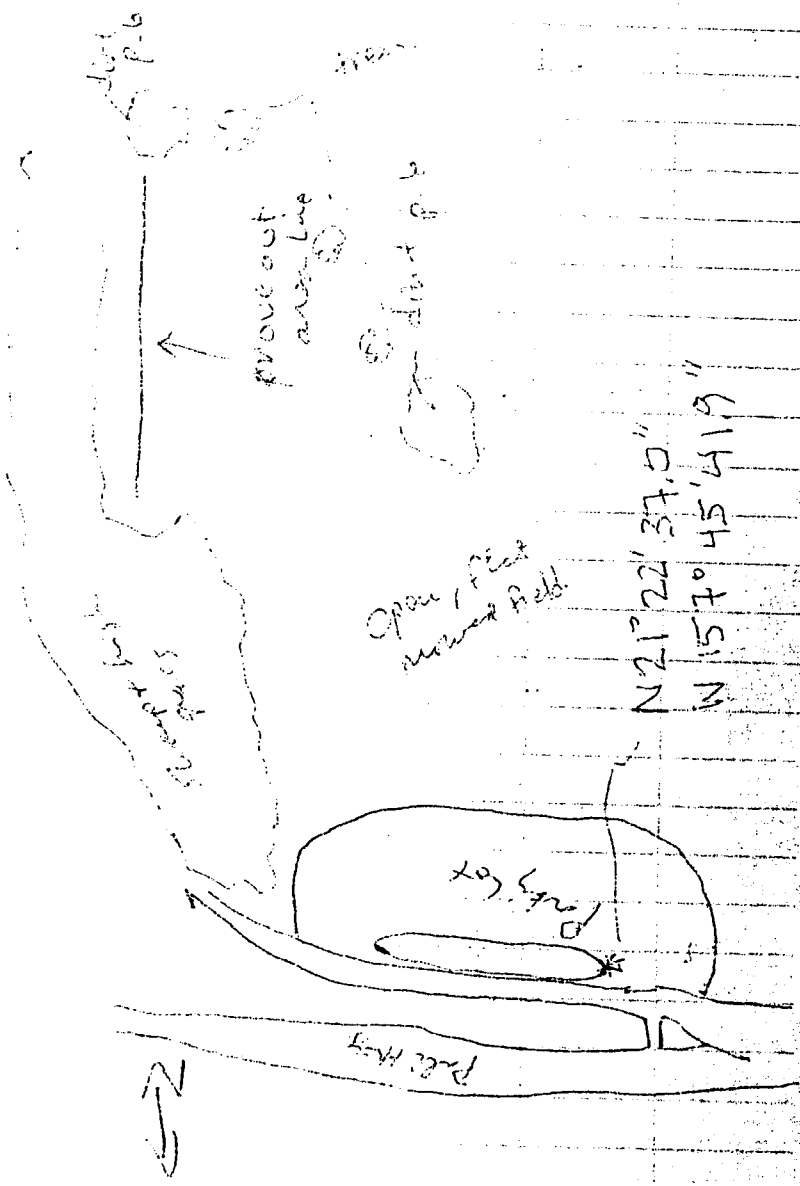
- 12:00 Start warm up again.
Batt 12.75V
warm for Amt 5 min.

File ~~320A~~ 0320B
static test
(no target) 1 sample/sec
3 min



0320C
test with 1/2 grenade on
surface (N-S approx.)
1 sample/sec
3 min

0320D
Same as ~~about~~ 0320C
1 sample/sec.
3 min



3/20/02
Pali

2/3

0320E with target (ground)
4 sample/sec rate.
3 min

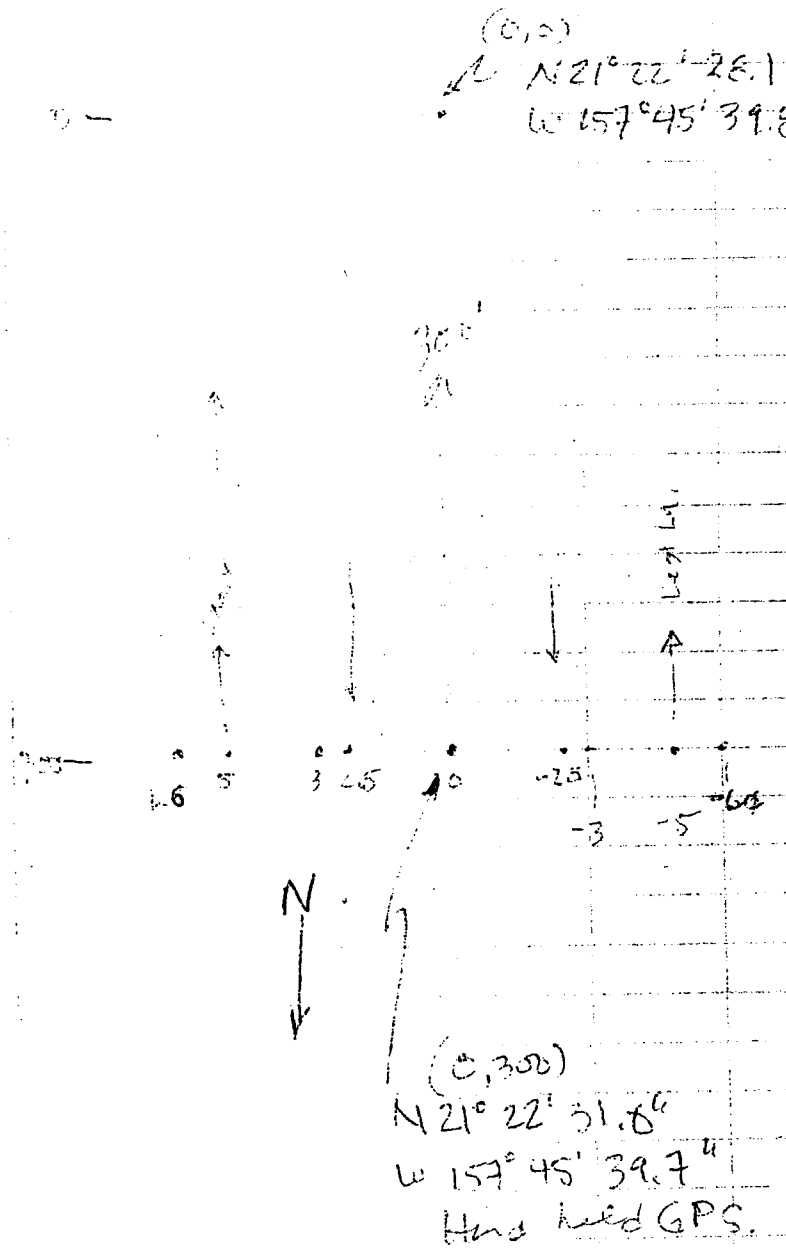
0320F without target
4 samples sec
3 min

0320G - standard 4 samples/sec
2 min. 45
standard on top end
Batt = 12.6V

0320H - Remove and Replace
Standard 2 min 4 samples/sec

0320 ~~I~~ J K -
L1 - heading S on 100'
line - no targets
L2 - running N - no targets
L3 - heading S with ground
@ 50 normal walking speed

L4 - running N with ground
L5 - running S fast
L6 running N slow



3/20/02

3/3

0320 L

Line 1 – Run South [illegible] Normal Speed

Line 2 – Run North [illegible] Normal Speed

Line 3 – Run South [illegible] Sta. 50 Normal Speed

Line 4 – Run N. [illegible] Sta. 50 Normal Speed.

Line 5 – Run S [illegible] Sta. 50 Fast Speed.

Line 6 – Run N. [illegible] Sta. 50 Slow Speed

0320 M Running the lines line 5, 2.5, 0, -2.5 and 5 no planted targets. Backward using wheel (inc. 0.63). Batt 12.45 V. ≈ 1:27 PM

3/21/02 PALI pinear 1/2

0321A - at static site
recording during warmup. no target
start 12:30 stop about 1:00 P.M.
after nulling 1HZ collapse
o Dry, slight breeze, partly sunny - nice day!

0321B - static test no
target, 4HZ recording ≈ 3min.

0321C - static with grenade
4HZ recording ≈ 3min.

0321D - static with standard
4HZ rec. ≈ 3min.

0321E - run lines (RJ.)
start sta Ø Line -5
wheel mode run 2.5' spacing.
start 1:20 P.M. finish 1:33
13min

0321F - run lines (RJ)
start sta. 300, LN 5
wheel mode run 2.5' spacing.
start. 1:35 P.M. finish. 1:46
11min

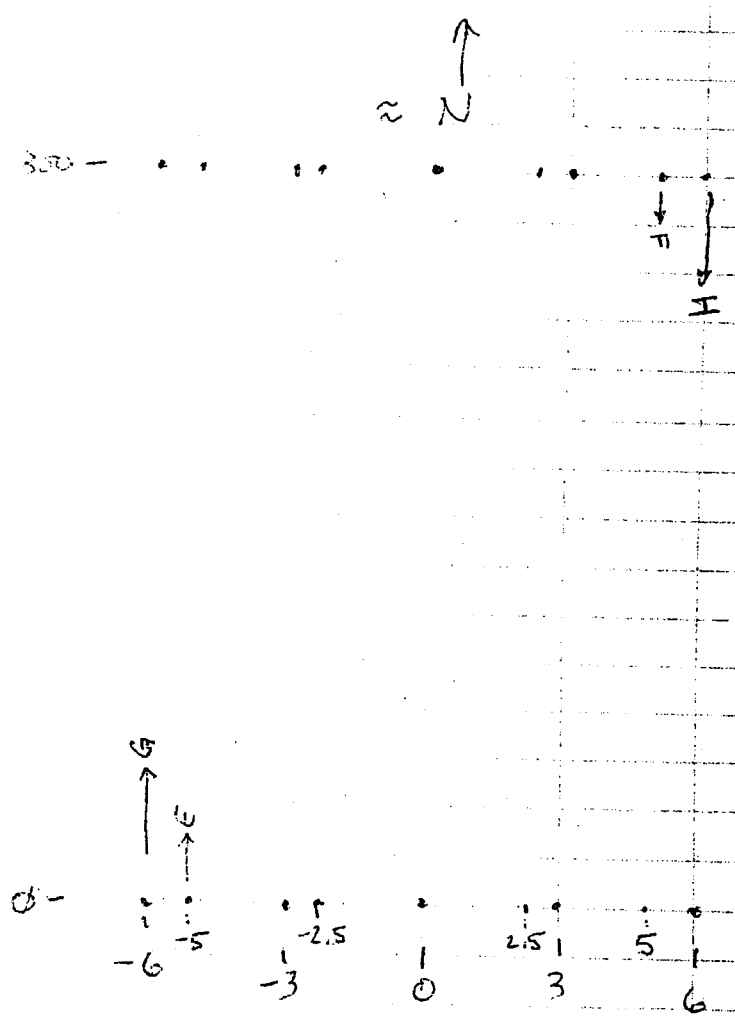
wheel inc. 0.63

grenade

0

N

Level on pinear



3/21/02 Pali P.O. 2/2

0321G - Run lines (R.J.)
start sta Ø, Line -6
run 3 ft lines
start 1:49 finish 2:01
calibrated before start

0321 H - Run lines (MW)
start sta 300 line 6
3' lines 12.45 V BATT
start: 2:15 (finish: 2:30)

RENULL - BEFORE STARTING DATA
PULL EM61 ALONG LINES, BEHIND OPERATOR

0321I - RUN LINE Ø (MW)

LINE	SPEED	DIRECTION	TIME
1	NORMAL	S→N	
2	"	N→S	* NEED TO EDIT END-OF
3	"	S-N	
4	"	N→S	
5	FAST	S→N	
6	"	N→S	
7	SUPER FAST	S→N	2:45

0.63 IND

* DOWNLOAD DATA @ MINIVAN, PROCESS

Pali Icon

- short trail
  NAALA HEE trail
  on hairpin on Pali Hhwy.
  poss. access

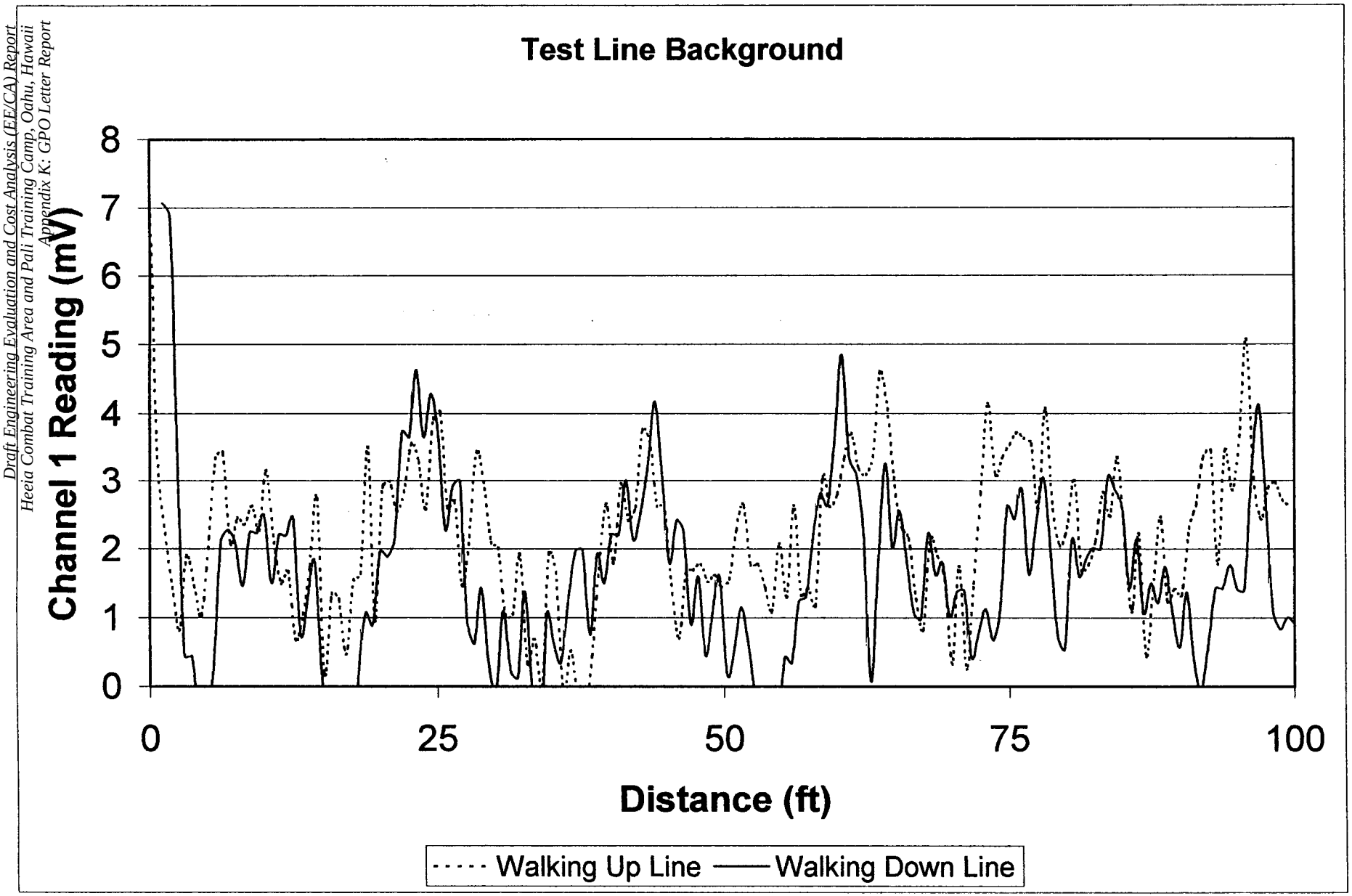
Marylyn Mick office 808-792-1850
808-479 7764

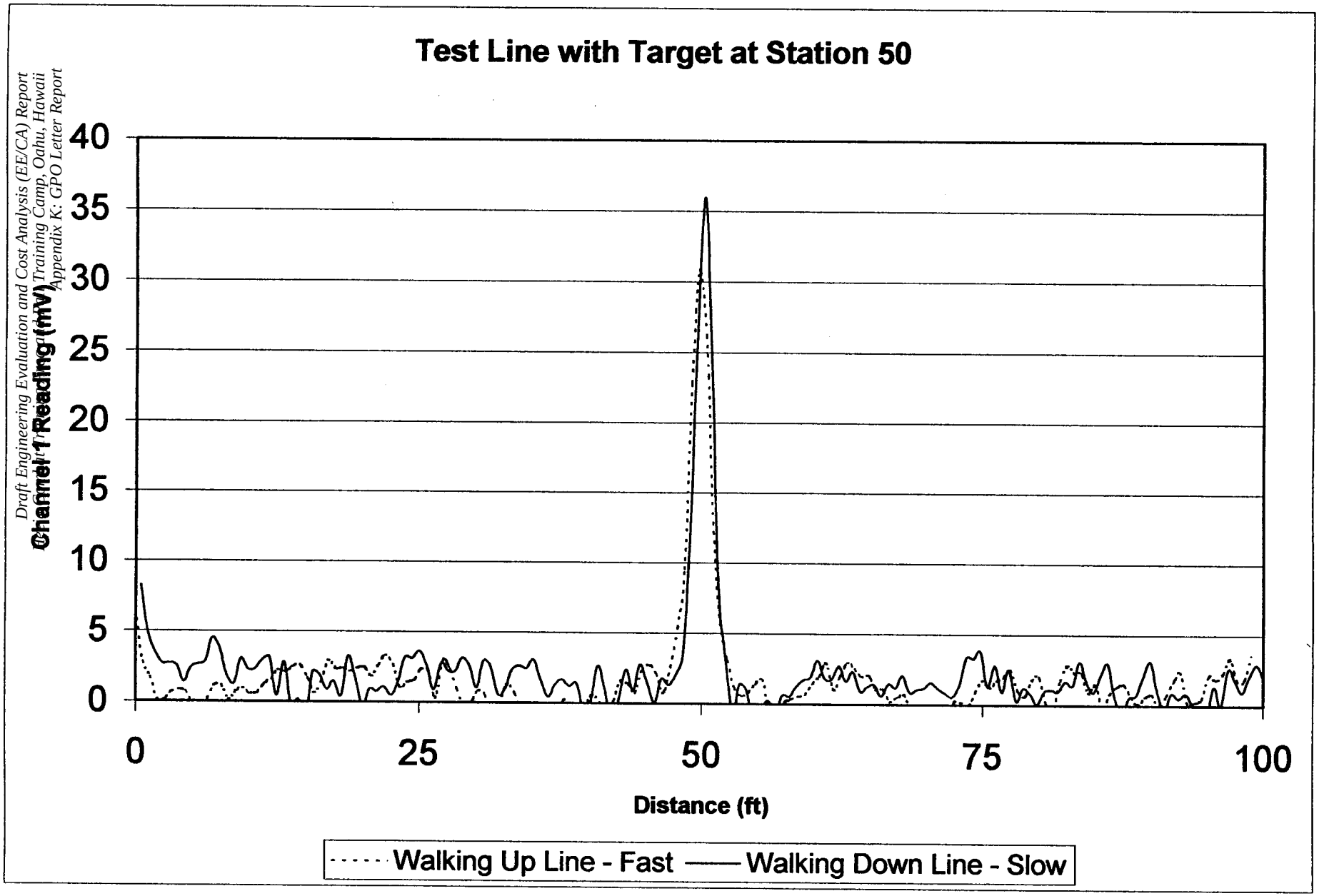
- Schraeder Windward Resort
  in Kane ohe

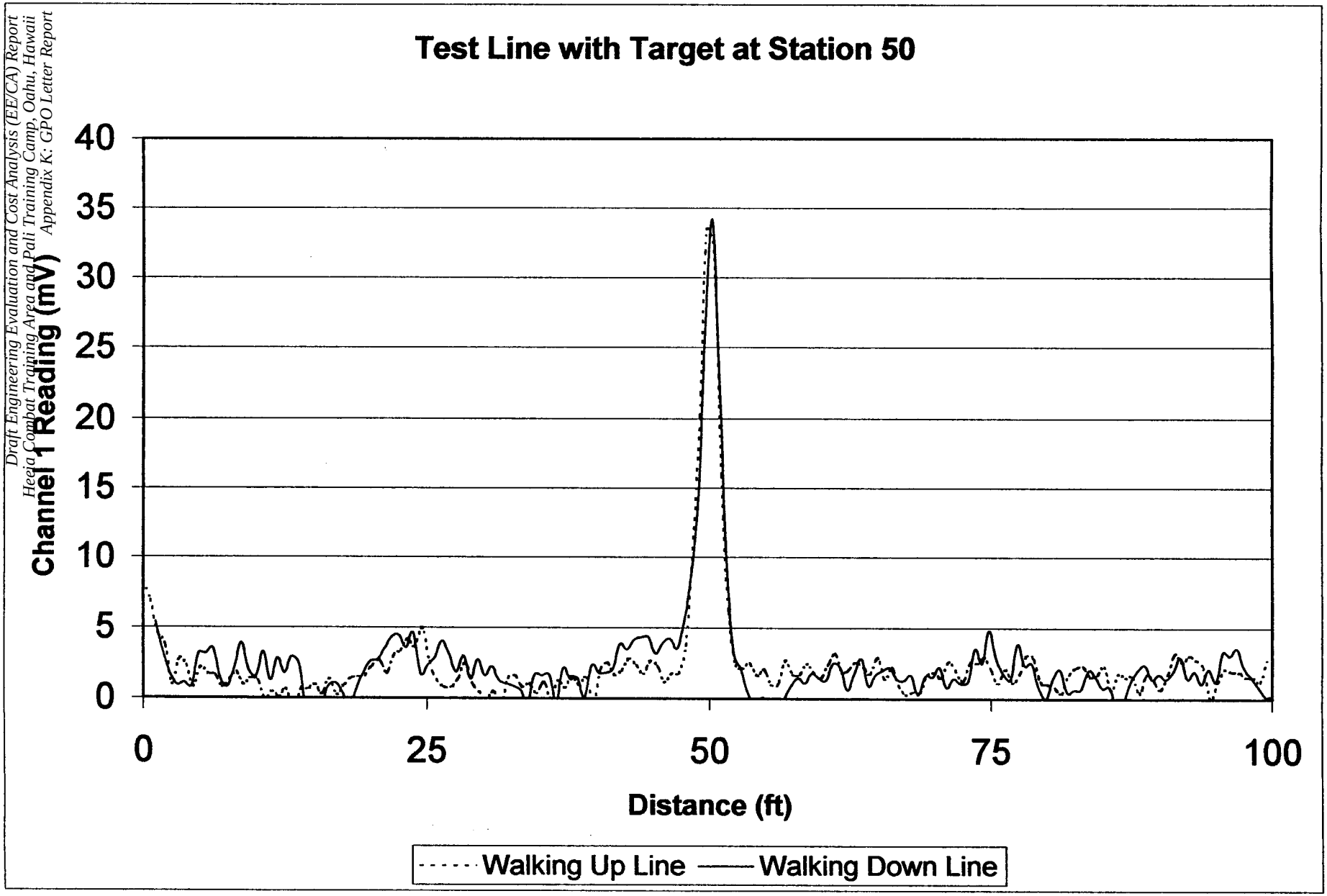
→ Manager of Film crew

→ 808 595 4539
Jerry Roberts
Luluku Banana Growers
Coop
Call for info about site
and poss helpers.

- SITE, WITH PASSWORDS


Test Line Background
Channel 1 Reading (mV)
0
1
2
3
4
5
6
7
8
0
25
50
75
100
Distance (ft)
Walking Up Line
Walking Down Line


Test Line with Target at Station 50
Channel 1 Reading (mV)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
Distance (ft)
Walking Up Line - Fast
Walking Down Line - Slow


Test Line with Target at Station 50
Channel 1 Reading (mV)
40
35
30
25
20
15
10
5
0
0
25
50
75
100
Distance (ft)
Walking Up Line
Walking Down Line

MTADS DAS TARGET REPORT
Pali Proveout
300-Foot Prove-out Line with 2.5-Foot Line Spacing
NAD83, Hawaii Zone 3, State Plane Coordinates

ID	Easting (US feet)	Northing (US feet)	Magnitude (mV)	Caliber (mm)	Depth (in)	Description
1	1721716.50	75518.70	11.10	28.3	17.1	Background Anomal
2	1721714.70	75519.00	12.30	28.6	16.3	Background Anomal
3	1721708.70	75527.40	1.90	28.4	23.0	Background Anomal
4	1721716.50	75528.30	20.50	29.7	15.7	Background Anomal
5	1721713.50	75542.10	90.50	42.4	9.3	
6	1721709.90	75549.00	28.90	57.0	30.1	
7	1721714.40	75561.60	24.60	25.3	4.4	
8	1721710.50	75561.90	36.70	28.0	5.5	
9	1721710.50	75595.80	23.60	40.9	27.4	
10	1721716.50	75595.80	2.70	35.8	31.0	Background Anomal
11	1721708.10	75603.30	14.70	26.7	17.3	Background Anomal
12	1721715.30	75609.30	3.00	28.9	23.1	Background Anomal
13	1721710.50	75609.60	8.30	20.5	10.2	
14	1721710.50	75613.20	6.20	22.7	17.5	Known Item #4
15	1721712.30	75621.30	13.40	26.0	18.1	Background Anomal
16	1721707.20	75622.20	43.60	48.6	20.9	
17	1721709.30	75632.70	2.40	41.3	36.1	Known Item #5
18	1721709.00	75645.90	30.50	28.8	13.7	Known Item #6
19	1721706.30	75647.40	18.30	25.9	13.6	Background Anomal
20	1721707.20	75675.90	41.20	25.0	1.9	
21	1721705.10	75676.80	40.60	33.0	12.4	
22	1721704.50	75682.80	9.50	22.8	12.2	Background Anomal
23	1721702.10	75684.90	5.90	27.6	20.2	Background Anomal
24	1721709.30	75692.10	7.90	21.4	13.2	Known Item #9
25	1721704.20	75693.30	6.90	26.6	18.7	
26	1721711.40	75699.90	3.00	35.1	28.9	
27	1721706.00	75704.70	7.80	33.4	24.1	
28	1721708.10	75714.90	2.40	27.4	22.0	
29	1721705.70	75716.40	2.40	27.3	20.9	Known Item #11
30	1721705.10	75731.10	7.20	27.1	19.3	
31	1721707.20	75732.90	4.70	25.5	18.9	
32	1721702.10	75738.60	5.60	22.0	18.1	Background Anomaly
33	1721699.40	75743.10	2.10	28.2	24.1	Background Anomaly
34	1721704.20	75750.00	40.90	45.0	18.5	
35	1721701.50	75754.20	111.60	32.7	-1.2	
36	1721709.00	75756.90	1.80	27.1	24.7	
37	1721703.60	75760.50	26.10	26.4	7.5	
38	1721698.50	75762.00	4.20	26.9	20.2	Background Anomaly
39	1721703.30	75763.20	32.90	27.5	7.5	Known Item #14
40	1721708.70	75766.50	6.30	33.6	28.1	Background Anomaly
41	1721708.70	75768.30	6.90	20.1	11.2	Background Anomaly
42	1721701.80	75800.40	1.90	30.7	29.1	Known Item #15
43	1721706.90	75800.40	2.80	26.9	21.2	Background Anomaly
44	1721704.50	75807.00	3.10	23.7	20.0	

MTADS DAS TARGET REPORT
Pali Proveout
300-Foot Prove-out Line with 3-Foot Line Spacing
NAD83, Hawaii Zone 3, State Plane Coordinates

ID	Easting (US feet)	Northing (US feet)	Magnitude (mV)	Caliber (mm)	Depth (in)	Description
1	1721714.70	75519.30	14.40	20.0	8.2	Background Anomaly
2	1721717.10	75519.30	15.10	29.0	14.3	Background Anomaly
3	1721707.80	75527.70	37.90	23.1	7.5	Background Anomaly
4	1721716.80	75528.90	18.00	29.7	14.0	Background Anomaly
5	1721719.20	75542.10	3.00	33.0	29.3	
6	1721713.50	75542.40	96.40	34.8	8.3	
7	1721709.90	75548.10	32.20	42.9	17.9	
8	1721709.90	75561.60	36.30	232.4	108.7	
9	1721710.50	75596.10	23.30	29.7	13.5	
10	1721717.10	75596.10	4.30	25.8	21.6	Background Anomaly
11	1721707.50	75603.00	12.10	25.4	17.4	Background Anomaly
12	1721710.50	75610.20	5.80	23.0	14.7	
13	1721710.20	75613.20	6.00	26.4	17.7	Known Item #4
14	1721703.90	75616.20	13.50	22.4	9.5	
15	1721712.90	75621.30	14.50	20.5	7.5	Background Anomaly
16	1721706.90	75621.90	45.00	51.3	20.4	
17	1721708.70	75645.90	32.50	27.0	7.5	Known Item #6
18	1721706.90	75676.20	43.30	37.3	15.1	
19	1721703.90	75682.80	8.20	28.4	19.9	Background Anomaly
20	1721701.20	75683.70	6.70	26.7	16.3	Background Anomaly
21	1721703.90	75693.00	4.40	24.2	17.5	Known Item #9
22	1721709.30	75693.60	3.40	24.0	19.1	
23	1721706.00	75705.30	5.30	25.2	18.5	
24	1721699.70	75710.40	3.10	32.4	33.0	
25	1721705.70	75715.80	3.30	46.1	46.7	Known Item #11
26	1721711.70	75721.50	3.10	40.3	35.9	
27	1721705.10	75731.70	7.40	28.7	18.6	
28	1721701.50	75738.30	3.60	17.6	15.5	Background Anomaly
29	1721703.90	75750.30	42.40	75.9	44.1	
30	1721701.50	75754.80	77.00	72.6	28.0	
31	1721703.60	75760.80	27.90	65.2	41.2	Known Item #14
32	1721709.30	75768.60	32.30	26.4	8.3	Background Anomaly
33	1721706.00	75780.00	3.60	23.5	19.1	
34	1721708.10	75792.00	8.10	25.3	19.4	Background Anomaly
35	1721704.50	75809.70	4.60	24.2	19.7	
36	1721709.50	75631.90	1.50	23.1	19.6	Known Item #5
37	1721712.50	75699.10	2.40	30.5	25.2	
38	1721713.40	75668.50	2.70	18.3	16.5	
39	1721705.64	75647.78	10.14	27.3	15.0	Background Anomaly
40	1721713.76	75561.79	23.75	27.3	5.9	

APPENDIX L

Photographs

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HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **HE'EIA KEA** **OAHU, HI**	
DATE: July 2003	
DIRECTION: Down	
PHOTO BY: Ed Deibert	
DESCRIPTION: Munition Debris: 2.36" Rocket Motor	

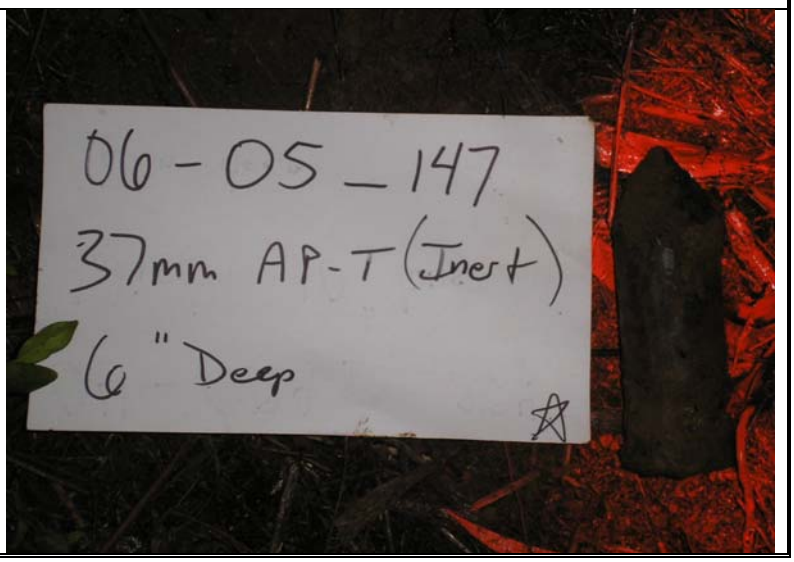
HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **HE'EIA KEA** **OAHU, HI**	
DATE: July 2003	
DIRECTION: Down	
PHOTO BY: Ed Deibert	
DESCRIPTION: Munition Debris: MKII Practice	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **HE'EIA KEA** **OAHU, HI**	
DATE: July 2003	
DIRECTION: Down	
PHOTO BY: Ed Deibert	
DESCRIPTION: Munition Debris: 2.36" Rocket, Practice	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **HE'EIA KEA** **OAHU, HI**	
DATE: July 2003	
DIRECTION: Down	
PHOTO BY: Ed Deibert	
DESCRIPTION: Cultrual Debris: Pipe	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **HE'EIA KEA** **OAHU, HI**	
DATE: July 2003	
DIRECTION: Down	
PHOTO BY: Ed Deibert	
DESCRIPTION: Small Arms and Cultural Debris: 7.62mm Bullets and Nails	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Small Arms: 5.56mm Cartridge and Magazine	

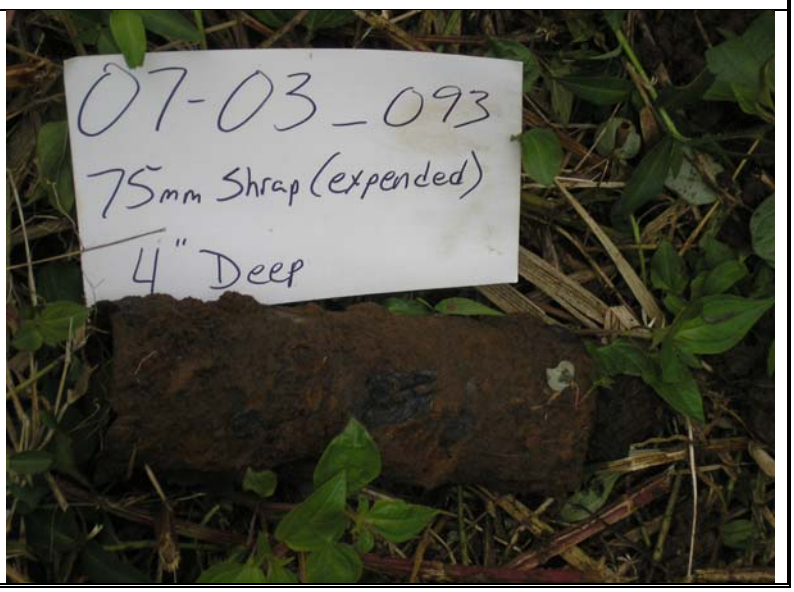
HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Munition Debris: 37mm Target Practice Tracer Round	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Pete Redmond	
DESCRIPTION: Munition Debris: Shrapnel Round Fuze	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Munition Debris: High Explosive Fragment	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Munition Debris and Geology: Point Detonating Fuze and Hot Rock	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Munition Debris: 75mm High Explosive Base Ordered	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Chris Rose	
DESCRIPTION: Munition Debris: 75mm Shrapnel Round, MK I	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: November 2006	
DIRECTION: Down	
PHOTO BY: Derek Anderson	
DESCRIPTION: Munition Debris: Fuze Head, Point Detonating, M521, M48, or M52	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Down	
PHOTO BY: Derek Anderson	
DESCRIPTION: Munition Debris: Fuze, M51A1 without Booster (approximately 2.8" X 2.2")	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: November 2006	
DIRECTION: Down	
PHOTO BY: Derek Anderson	
DESCRIPTION: Munition Debris: 81mm Tail Fin	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: November 2006	
DIRECTION: Down	
PHOTO BY: Derek Anderson	
DESCRIPTION: Munition Debris: 81mm Tail Fin	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **OAHU, HI**	
DATE: August 2006	
DIRECTION: Northwest	
PHOTO BY: Pete Redmond	
DESCRIPTION: Conducting Digital Geophysical Mapping (DGM)	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: September 2006	
DIRECTION: Northwest	
PHOTO BY: Pete Redmond	
DESCRIPTION: Collecting Global Positioning System (GPS) Data	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: August 2006	
DIRECTION: North	
PHOTO BY: Pete Redmond	
DESCRIPTION: Vegetation Removal Operation	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: August 2006	
DIRECTION: South	
PHOTO BY: Pete Redmond	
DESCRIPTION: Magnetometer (Mag) and Flag Operations	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: July 2006	
DIRECTION: South	
PHOTO BY: Derek Anderson	
DESCRIPTION: Maunawili Demonstration Trail Head	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: July 2006	
DIRECTION: Northeast	
PHOTO BY: Derek Anderson	
DESCRIPTION: Intersection of Mauanawili Connector and Demonstration Trails	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP
MAUNAWILI IMPACT AREA
OAHU, HI

DATE: July 2006

DIRECTION:

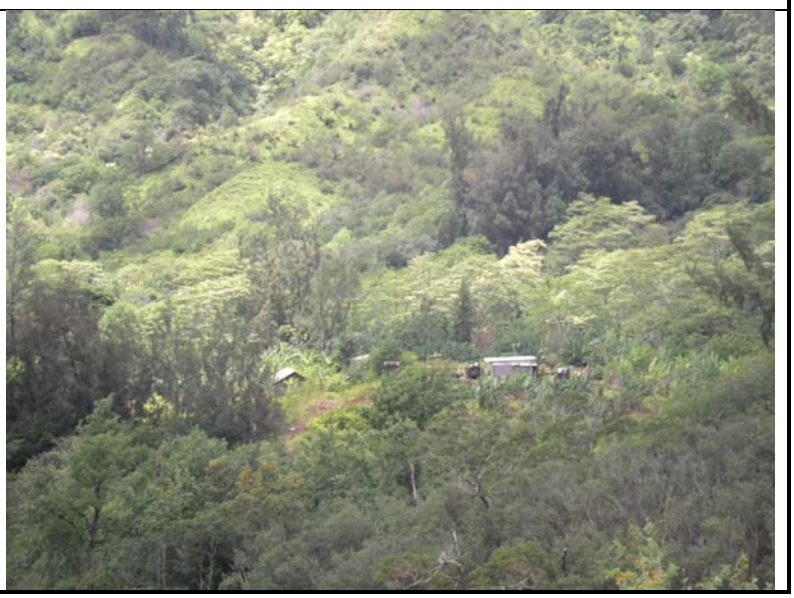
South

PHOTO BY:

Derek Anderson

DESCRIPTION:

Luluku Banana Farmers Buildings



HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP
MAUNAWILI IMPACT AREA
OAHU, HI

DATE: July 2006

DIRECTION:

Northeast

PHOTO BY:

Derek Anderson

DESCRIPTION:

Olomana Mountains and Ridge

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: November 2006	
DIRECTION: Northeast	
PHOTO BY: Derek Anderson	
DESCRIPTION: Makalili Valley Area/North Side of Olomana Ridge (Observation Points)	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: August 2006	
DIRECTION: Southeast	
PHOTO BY: Pete Redmond	
DESCRIPTION: Conducting DGM in Area 6	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: July 2006	
DIRECTION: North	
PHOTO BY: Derek Anderson	
DESCRIPTION: Area 7	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP **MAUNAWILI IMPACT AREA** **OAHU, HI**	
DATE: July 2006	
DIRECTION: North	
PHOTO BY: Derek Anderson	
DESCRIPTION: Landslide	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: July 2006	
DIRECTION: Southeast	
PHOTO BY: Derek Anderson	
DESCRIPTION: Overview of Site and Maunawili Connection Trail Ridge	

HE'EIA COMBAT TRAINING AREA AND PALI TRAINING CAMP MAUNAWILI IMPACT AREA OAHU, HI	
DATE: July 2006	
DIRECTION: East	
PHOTO BY: Derek Anderson	
DESCRIPTION: Maunawili Falls	

APPENDIX M

Corrective Action Requests and Daily Logs

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CORRECTIVE ACTION REQUEST	NO. :CEHNC-ED-CS-G-FY07_0001
Originator: Debbie Edwards	**Date Issued:** 31 October 2006
Issued to: Derek Anderson, Zapata Engineering **Project:** Heeia Pali **CEHNC Project Manager:** Chad Berthelson **CEHNC Project Engineer:** Debbie Edwards **Response Due:** 8 November 2006	
Description of Condition Found: (As observed or reported) 1. QA item QA4 was not excavated. The anomaly associated with the item was selected and is target number 06-07-087. The dig sheet declares the target as "hot soil."	
Apparent Cause: (As determined by or reported) Unknown as the DIG_YN column states QA.	
(Appropriate personnel, i.e. contractor PM, Safety Officer, Team Leader, etc., receiving the CAR will provide the following information to the originator by the "Response Due" date above. Please contact the originator if you have any questions)	
Actual Cause: (Appropriate personnel will investigate and determine cause of condition reported above. Actual cause should be stated as specifically as possible) This item was mis-relocated because of incorrect local coordinates.	
Action Taken to Correct Condition: (Corrective Action should address root cause, not the symptom) All local coordinates were reviewed and corrected in the field with the exception of 06-06_080, 06-06_105, 06-06_124, 06-06_264, which are also slated for reinvestigation. QA4 was also flagged during geophysical QC and reported to the Corp on 10/25/06 as being flagged for reinvestation.	
Action Taken to Prevent Recurrence: Upon realization of problem with local coordinates, all local coordinates were reviewed and anomalies reinvestigated (in field, while in grid) with the exception of those above, which were reported to the Corp 10/25/06.	
Action Taken to Monitor Effectiveness of Corrective Action: (Generate data as proof. State the monitoring method put in place and who is responsible for reviewing data.) All anomalies were reviewed for geophysical agreement, as part of our SOP and local coordinates reviewed. Additional anomalies were flagged for reinvestigation.	
Team Manager Signature/Title/Date Signed: (Form must be signed before returning) [signature], Project Manager, 07 November 2006	
(Government Use Only)	

Form 1401, 15 April 1997

CORRECTIVE ACTION REQUEST	**NO. :CEHNC-ED-CS-G-FY06 0002**
Originator: Debbie Edwards	**Date Issued:** 15 August 2006
Issued to: Derek Anderson, Zapata Engineering **Project:** Heeia Pali **CEHNC Project Manager:** Chad Berthelson **CEHNC Project Engineer**: Debbie Edwards **Response Due:** 25 Aug 2006	
Description of Condition Found: (As observed or reported) 1. PM (afternoon) QC test on August 9, 2006, failed. The static test with standard did not meet DID MR-005-05 requirement. 2. Data from time gates on afternoon of August 9, 2006, does not exhibit normal decay. Time gate 1 is not responding properly. See the comments section at the end of this form for examples of data problems.	
Apparent Cause: (As determined by or reported) Based on field observation and discussion, the cause was instrument malfunction.	
(Appropriate personnel, i.e. contractor PM, Safety Officer, Team Leader, etc., receiving the CAR will provide the following information to the originator by the "Response Due" date above. Please contact the originator if you have any questions)	
Actual Cause: (Appropriate personnel will investigate and determine cause of condition reported above. Actual cause should be stated as specifically as possible) The actual cause was instrumentation malfunction. The EM61-MK2 console malfunctioned resulting in abnormal decay of time gate 1.	
Action Taken to Correct Condition: (Corrective Action should address root cause, not the symptom) The corrective action implemented was replacement of the EM61-MK2 console. Subsequent tests show the root cause was addressed. The effected data has been recollected (lines 129 through 198).	
Action Taken to Prevent Recurrence: Defective instrumentation has been replaced.	
Action Taken to Monitor Effectiveness of Corrective Action: (Generate data as proof. State the monitoring method put in place and who is responsible for reviewing data.) Zapata Engineering Geophysicists will continue to review daily AM-PM QC static/standard/static tests.	
Team Manager Signature/Title/Date Signed: (Form must be signed before returning) PM. 08/16/06	

Form 1401, 15 April 1997

Zapata Engineering

Safety Inspection Log

Date: 04/07/03 Time: 1130 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: I Heeia Trng Area

Weather Conditions: Heavy rain, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill attempted to place control points for survey however work was stopped due to heavy rain. Heavy rain created a hazardous condition on site and interfered with survey equipment.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Fo

Zapata Engineering — Safety Inspection Log

Date: 04/08/03 Time: 1130 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: I Heeia Trng Area

Weather Conditions: Mostly Sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed in 6 control points and grids KEA3G and KEA4G. Points were tied in to known point at the top of the ridge.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/09/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: I Heeia Trng Area

Weather Conditions: Morning rain to partly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed in grids KEA1G, KEA6G, KEA10G and KEA13G and associated control points.

- Worked stopped due to safety violations: Yes _____ No XX
- No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 04/11/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: Heeia Trng Area

Weather Conditions: Mostly cloudy, scattered showers. High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			
Disposal Operations			
Overall Inspection Results	XX		

No field work on April 10.

111. Comments: R. M. Towill surveyed in grids K G (125' x 125') and associated control points.

- Worked stopped due to safety violations: No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required :

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (... equired)

Chris Rose
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/14/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: I Heeia Trng Area

Weather Conditions: Partly sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed 2650 feet of KEA3T and DEI cleared brush from approximately 45% of KEA2G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 04/15/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0010** Location: I Heeia Trng Area

Weather Conditions: Partly sunny, High of 80

Type of Inspection: Daily: XX Weekly ____ Special: ____ Reinspection ____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed grids KEA11G (150'x150') and KEA14G (125'x125') and 860 feet of KEA3T completing KEA3T. DEI completed KEA2G and began KEA5G and KEA10G.

- Worked stopped due to safety violations: Yes ____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes ____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose
Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 04/16/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Morning rain to partly cloudy, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed grid KEA8G (150'x150') and completed KEA2T (1800'). DEI completed clearing 90% of grid KEA10G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/18/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Morning rain to partly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R.M. Towill completed surveying grid KEA9G (130'x130'), and KEA1T (800').

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/21/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Partly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI completed clearing grid KEA3G and approximately 45% of KEA4T.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/22/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Partly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI completed clearing grid KEA4G and approximately 45% of KEA7T.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/23/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Partly sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI completed clearing approximately 95% of KEA7G.

- Worked stopped due to safety violations: Yes _____ No XX
- No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/24/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Partly sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI completed clearing KEA7G and approximately 30% of KEA13G. Carl Hornbeck of DEI cut his shin while weedeating and was given on site first-aid. Carl was taken to the doctor as a precaution and was released without needing additional treatment.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/28/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI completed clearing KEA13G and began KEA14G. Blackhawk arrived on Oahu. Arrangements have been made to access prove out area.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

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Zapata Engineering — Safety Inspection Log

Date: 04/29/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly sunny, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI continued clearing in KEA14G. DEI's chainsaw had mechanical problems so they switched from KEA14G to KEA3T to finish the day. Blackhawk conducted Geo Prove Out and toured Heeia Kea to develop plan for tomorrow.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 04/30/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly sunny, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI began clearing KEA2T and continued on KEA3T. Blackhawk collected data in grids KEA4G and KEA5G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/01/03 Time: 1400 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly cloudy, light morning rain, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI began clearing KEA1T and cleaned up grids KEA7G and KEA2G. Blackhawk collected data in grid KEA1G and prepped KEA3G for data collection.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/02/03 Time: 1400 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk collected data in grid KEA3G and recollected data in grid KEA1G and a portion of KEA4G because of data problems.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/05/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea Trng Area

Weather Conditions: Mostly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk collected data in grid KEA3G and 50% of KEA10G.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/06/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: Heeia Kea Trng Area

Weather Conditions: Mostly sunny, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk collected data in grid KEA10G and prepped KEA7G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/07/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny to cloudy, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, site mapping

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Zapata Engineering personnel GPS mapped roads a grid areas of Kahaluu and Blackhawk collected data in grid KEA8G and KEA6G.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/07/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly cloudy, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, site mapping

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Zapata Engineering personnel GPS mapped areas of Kahaluu and Blackhawk collected data in grid KEA7G.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/09/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny to cloudy, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk collected data in grids KEA12G and KEA15G and personnel from Wil Chee Planning were given a tour of Heeia Kea.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/12/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny to cloudy, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing, Archeology

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Grid areas of Kahaluu were checked for cultural significance, DEI cleared brush in grid KEA14G and Blackhawk continued data collection.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/14/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny to cloudy, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surveying

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed control points to grid KAH14G and surveyed grids KAH10G, KAH11G, KAH12G, KAH13G and KAH14G on the Kahaluu property.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/15/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Rain to mostly sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surveying, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed grids KAH5G(50x70), KAH6G(100x100), KAH7G(80x85), KAH8G(100x110) and KAH9G(100x100) on the Kahaluu property. DEI cleared grids KAH12G, 13G and 14G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/16/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surveying, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: R. M. Towill surveyed grids KAH3G(30x80), KAH2G(20x35), KAH1G(60x60), KAH15G(100x110), KAH17G(30x70) and KAH16G(100x160) on the Kahaluu property. DEI cleared grids KAH11G, 10G, 9G and began 8G.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/19/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI cleared grid KAH8G and was going to begin 15G. Black Hawk was to finish collecting data at Heeia Kea and begin data collection at Kahaluu.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/20/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly sunny, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI cleared grids KAH15G and 16G. Black Hawk collected data in grids KAH13G and KAH14G at Kahaluu.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/21/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly sunny, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI cleared grids KAH5G, 6G and began work on 7G. Black Hawk collected data in grids KAH8G, KAH10G, KAH11G and KAH12G at Kahaluu.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/22/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly cloudy, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI cleared grids KAH1G, 2G, 3G, 17G and began work on 4G. Black Hawk collected data in grids KAH15G and KAH16G. R.M. Towill surveyed grid KAH4G and transects KAH1T, 2T and 3T.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 05/23/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly cloudy, High of 81

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing, survey

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk collected data in grids KAH9G and KAH7G. R.M. Towill surveyed grid KAH18G and transect KAH4T.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/27/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk collected data in grids KAH5G, KAH6G and KAH17G. DEI cleared grid KAH4G and transects KAH1T, 2T and 3T.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/28/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Cloudy, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics, brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk collected data in grid KAH4G, and transects KAH1T, KAH2T and KAH3T. DEI cleared grid KAH18G and transect KAH4T. Brush clearing of surveyed area at Kahaluu is complete.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____ _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/29/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly sunny, High of 82

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk collected data in grids KAH1G and KAH2G along with transects KAH1T and KAH4T.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____
Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/30/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly sunny, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Geophysics

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk collected data in grid KAH18G. All surveyed has been geophysically mapped a Kahaluu.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Forms

Zapata Engineering — Safety Inspection Log

Date: 05/31/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk set up a relocation instrument test area and began relocating anomalies in grid KAH5G..

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 05/31/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Huntsville Corp personnel site tour

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: A ste tour of Heeia Kea and Kahaluu was given to Bob Selfridge of the Huntsville geotech office.

- Worked stopped due to safety violations: Yes _____ No XX
- No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 06/02/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Mostly cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk set up a relocation instrument test area and began relocating anomalies in grid KAH5G..

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 06/03/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny to cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk completed anomaly relocation in KEA5G and began relocating anomalies in grid KAH8G. 51 anomalies were relocated. R. M. Towill replaced missing grid stakes at Heeia Kea.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

For

Zapata Engineering — Safety Inspection Log

Date: 06/04/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny to cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Black Hawk completed anomaly relocation in KEA8G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 06/13/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0015** Location: Schofield Barracks, HI

Weather Conditions: Mostly Sunny, High of 86

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surface Sweep, UXO Escort

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep	XX		
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments:

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose — Chris Rose

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 06/14/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0015** Location: Schofield Barracks, HI

Weather Conditions: Mostly Sunny, High of 88

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surface Sweep, UXO Escort

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep	XX		
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments:

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose — Chris Rose

Site Safety Officer

Zapata Engineering — Safety Inspection Log

Date: 06/15/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0015** Location: Schofield Barracks, HI

Weather Conditions: Mostly Sunny, High of 87

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surface Sweep, UXO Escort

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep	XX		
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments:

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose — Chris Rose

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 06/22/03 Time: 1630 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **0015** Location: Schofield Barracks, HI

Weather Conditions: Mostly Sunny, High of 84

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Surface Sweep

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep	XX		
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments:

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
  Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose
Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 06/27/03 Time: 1830 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny to cloudy, High of 83

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI brush cleared needed areas in grids KEA 3, 4, 7, 9, 10, 13, and 14G.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose
Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 06/30/03 Time: 1530 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny to cloudy, High of 84

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Brush clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: DEI brush cleared needed areas in grids KEA1G, KEA 2G, KEA2T and KEA3T.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer _____

Zapata Engineering

Safety Inspection Log

Date: 07/01/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny to cloudy, High of 85

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk relocated anomalies in grids KEA1G (39 flags), KEA2G (27 flags), and KEA6G (14 flags).

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Fo

Zapata Engineering

Safety Inspection Log

Date: 07/02/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny, High of 85

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk relocated anomalies in grids KEA2G (48 flags), QC picks in KEA8G (5 flags), and reset flags in KEA2G.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 07/03/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny, High of 85

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk relocated anomalies in grids KEA10G (31 flags), KEA15G (25flags) and QC picks in KEA5G (8 flags).

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer _____

Zapata Engineering

Safety Inspection Log

Date: 07/07/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Cloudy to sunny, High of 87

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation, Brush Clearing

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk relocated anomalies in grids KEA3G (40 flags) and KEA4G (37flags). DEI cleared brush in Kahaluu at grids KAH3, 8, 9 and 17G and KAH1T.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required : None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 07/08/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** Location: I Heeia Kea, Kahaluu Trng Area

Weather Conditions: Cloudy to sunny, High of 85

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly relocation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

111. Comments: Blackhawk relocated anomalies in grid KEA13G (67 flags).

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required : Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

Chris Rose _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 07/09/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny, High of 85

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. Comments: HFA completed intrusive operations in grids KEA2G (48 flags), KEA6G (15 flags), KEA5G (30 flags) QC'd 100% KEA2G & KEA6G. 1 contact in KEA6G failed QC.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required: None
- Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

Zapata Engineering

Safety Inspection Log

Date: 07/10/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Sunny, High of 87

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. Comments: HFA completed intrusive operations in grids KEA3G (40 flags), KEA7G (43 flags), 2 hits missing! QC'd 100% KEA5G 3 contacts in KEA5G failed QC. Blackhawk completed KEA12G (33 flags), KEA14G (18 flags) & T3 (26 flags)

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required: Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/10/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 2	**TOTAL EXCAVATIONS: 83**
TOTAL GRIDS TO DATE: 6	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: 10 HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
3		0	0	N	40		N	N
7		0	0	N	43		N	N
	8	0	0	N	15		N	N

COMMENTS: Grid 3 was along the Kam Hwy and within the exclusion zone, placed guard along hwy and directing the dig operations. Grid 8 was started but will be completed on 7/14/03.

Will total scrap later.

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/14/03 Time: 1730 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 80

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. Comments: HFA completed intrusive operations in grids KEA8G (29 flags), KEA9G (27 flags), KEA10G (31 flags), KEA11G (35 flags), KEA15G (25 flags) QC'd 100% of KEA3G, KEA8G, KEA9G, KEA15G. Blackhawk completed KAH1G, KAH5G, KAH6G, KAH7G, KAH8G, KAH9G, KAH18G & T4

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required: Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/14/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 5	**TOTAL EXCAVATIONS: 175**
TOTAL GRIDS TO DATE: 11	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
8		0	0	N	29		N	N
9		0	0	N	27		N	N
10		0	0	N	31		N	N
11		3	0	N	31		N	N
15		0	0	N	25		N	N
	13	0	0	N	30		N	N

COMMENTS: Team 2 dug 2 digs in grid 7 that were relocated by Blackhawk. The fisher metal detector from team one stopped working at 11:30 today. Contacted DEI and rented a Whites XLT. Total digs completed 388 through 7/14/03.

Late entry: Three pieces of ORS recovered in grid 11. Two sections of 2.36" rocket motors (expended) and one section of 2.36" warhead (practice).

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/15/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 84

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. Comments: HFA completed intrusive operations in grids KEA4G (37 flags), KEA12G (33 flags), KEA13G (36 flags), KEA14G (18 flags), KEAT1 (10 flags), KEAT2 (17 flags), KEAT3 (25 flags) QC'd 100% of KEA11G, & 30% of KEA4G, KEA13G, KEA14G. Blackhawk completed KAH11G, KAH12G,

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required: None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/15/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 7	**TOTAL EXCAVATIONS: 178**
TOTAL GRIDS TO DATE: 18	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
4		0	0	N	37		N	N
12		0	0	N	33		N	N
13		0	0	N	36		N	N
14		0	0	N	18		N	N
T1		0	0	N	10		N	N
T2		0	0	N	17		N	N
T3		1	0	N	25		N	N

COMMENTS: Completed all grids and Transects in the Heeia area. One dig in grid 9 relocated and dug today. One dig in grid 15 relocated and dug today. Reviewed records and found there were 48 digs conducted in grid 7 not the 45 that was reported.

Late entry: Recovered one section of ORS 2.36" rocket motor (expended) in Transect 3.

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/16/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 84

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. Comments: HFA completed intrusive operations in 14 Grids (75 flags) of Kahaluu, QC'd 100% of KAH11G, KAH12G, KAH13G, KAH14G. Blackhawk completed KAH10G, & T1, T3 (11 flags total). Escorted Arch through KEA7G & T-2

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required: Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/15/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 14	**TOTAL EXCAVATIONS: 75**
TOTAL GRIDS TO DATE: 32	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
1		1	0	N	7		N	N
2		0	0	N	3		N	N
3		0	0	N	4		N	N
4		0	0	N	4		N	N
5		0	0	N	8		N	N
6		0	0	N	5		N	N
7		0	0	N	8		N	N
11		0	0	N	3		N	N
12		0	0	N	3		N	N
13		0	0	N	10		N	N
14		0	0	N	4		N	N
17		0	0	N	4		N	N
18		0	0	N	6		N	N
T4		0	0	N	6		N	N

COMMENTS: Recovered one 37mm tpt outside grid 1. SEC 12n X 4e.

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/17/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 86

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. *Comments*: HFA completed intrusive operations in all remaining grids of Kahaluu, QC'd 100% of all remaining grids. Blackhawk demobed. Escorted Arch through all grids of Kahaluu. Assisted USACE in investigating additional QA picks in HEEIA, 2.5 hrs. Transfered WetBulb to Eric of DEI.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required: None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/17/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 8	**TOTAL EXCAVATIONS: 50**
TOTAL GRIDS TO DATE: 40	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
8		0	0	N	5		N	N
9		0	0	N	5		N	N
10		0	0	N	5		N	N
15		0	0	N	10		N	N
16		0	0	N	13		N	N
T1		0	0	N	6		N	N
T2		0	0	N	3		N	N
T3		0	0	N	3		N	N

COMMENTS: Completed all excavations in the Kahaluu area at noon today, the remained of the day was for training on the GPS and conducting admin. QC and QA conducted checks of the grids completed until 15:30, all grids passed QC/QA. GPS point for 37mm is 0618562/2372560

ORS was demilled and disposed as general scrap.

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/17/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 86

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. *Comments*: HFA completed intrusive operations in all remaining grids of Kahaluu, QC'd 100% of all remaining grids. Blackhawk demobed. Escorted Arch through all grids of Kahaluu. Assisted USACE in investigating additional QA picks in HEEIA, 2.5 hrs. Transfered WetBulb to Eric of DEI.

- Worked stopped due to safety violations: Yes _____ No XX
  No
- Personnel Involved: None
- Corrective Measures: None
- Reinspection required: Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/17/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 8	**TOTAL EXCAVATIONS: 50**
TOTAL GRIDS TO DATE: 40	**TOTAL SCRAP: LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
8		0	0	N	5		N	N
9		0	0	N	5		N	N
10		0	0	N	5		N	N
15		0	0	N	10		N	N
16		0	0	N	13		N	N
T1		0	0	N	6		N	N
T2		0	0	N	3		N	N
T3		0	0	N	3		N	N

COMMENTS: Completed all excavations in the Kahaluu area at noon today, the remained of the day was for training on the GPS and conducting admin. QC and QA conducted checks of the grids completed until 15:30, all grids passed QC/QA. GPS point for 37mm is 0618562/2372560

ORS was demilled and disposed as general scrap.

SUXOS SIGNATURE:

SUXOS DAILY JOURNAL

DATE: 7/17/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY: 8	**TOTAL EXCAVATIONS: 50**
TOTAL GRIDS TO DATE: 40	**TOTAL SCRAP: 0 LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N
8		0	0	N	5		N	N
9		0	0	N	5		N	N
10		0	0	N	5		N	N
15		0	0	N	10		N	N
16		0	0	N	13		N	N
T1		0	0	N	6		N	N
T2		0	0	N	3		N	N
T3		0	0	N	3		N	N

COMMENTS: Completed all excavations in the Kahaluu area at noon today, the remained of the day was for training on the GPS and conducting admin. QC and QA conducted checks of the grids completed until 15:30, all grids passed QC/QA. GPS point for 37mm is 0618562/2372560

Total of 3-5 lbs ORS was demilled and disposed as general scrap for this project. Total Scrap (Non UXO) 100 lbs for project.

SUXOS SIGNATURE:

Zapata Engineering

Safety Inspection Log

Date: 07/21/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 86

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Site

Activity inspected: Anomaly Investigation

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique	XX		
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. *Comments*: HFA started recon ops of Kahaluu; Assisted USACE in investigating additional QA picks for Huntsville in HEEIA, 2 hrs.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required: None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/21/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY:	**TOTAL EXCAVATIONS:**
TOTAL GRIDS TO DATE:	**TOTAL SCRAP: 0 LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N

COMMENTS: Started GPS survey today. **Point A to B**, waypoints 0618409-2372418: 0618397-2372446: 0618402-2372477: 0618453-2372536: 0618432-2372565: 0618464-2372599: 0618468-2372597: 0618432-2372636: 0618439-237671: 0618491-2372738 this point ended up being on the property line for private property. **Point E to D**, waypoints 0618200-2372291: 0618138-2372311: 0618101-2372340: 0618054-2372342: 0618014-2372353: 0617956-2372352: 0617906-2372350-had to turn around too steep, 0618097-2372375: 0618192-2372229. Following points were run along south side of road from Point O up to point Q. Due to many monkey pod trees there were not many waypoints put in along this area. We will try to get more points in this area tomorrow. 0618606-2372550: 0618613-2372400: 0618461-2372285: 0618422-2372125: 0618074-2371905: 0617750-2371679: 0617554-2371593. There was nothing found along these lines today.

SUXOS SIGNATURE:

Marty Ray

From: DMGirouard@aol.com
Sent: Monday, July 21, 2003 9:42 PM
To: Harmon.L.Slappy@usace.army.mil; mray@zapeng.com; rhanoski@hfactors.com
Subject: Daily

Suxos_Daily_Journal.doc8.doc

We worked along several lines today that were very steep terain. The trees are making it harder to collect waypoints than I expected, it may be because of the high walls of the valley as we get deeper into it. We will be back at it first thing in the morning again tommorow.
Don

Zapata Engineering

Safety Inspection Log

Date: 07/22/03 Time: 1800 Contract Number: **DACA-87-00-D-0034**

Delivery Order: **004** **Location:** Heeia Kea, Kahaluu Trng Area

Weather Conditions: Partly Sunny, High of 84

Type of Inspection: Daily: XX Weekly _____ Special: _____ Reinspection _____

Location inspected: Kahaluu

Activity inspected: _____

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			XX
Subsurface Sweep			XX
Excavation Technique			XX
Personal Protection Equipment	XX		
Work Practices	XX		
Site Control	XX		
First Aid Equipment	XX		
Fire Fighting Equipment	XX		
Explosive Transportation			XX
Explosive Storage			XX
Disposal Operations			XX
Overall Inspection Results	XX		

III. *Comments*: HFA continued recon ops of Kahaluu.

- Worked stopped due to safety violations: Yes _____ No XX
- Personnel Involved: No
- Corrective Measures: None
- Reinspection required: None

Yes _____ No XX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (If required)

JERRY COOK _____

Site Safety Officer

SUXOS DAILY JOURNAL

DATE: 7/22/03	**QC: Jerry Cook**
SUXOS: Don Girouard	**SS:** Jerry Cook
TOTAL % OF THE PROJECT FINISHED TODAY:	**TOTAL % OF THE PROJECT FINISHED TO DATE:**
TOTAL GRIDS TODAY:	**TOTAL EXCAVATIONS:**
TOTAL GRIDS TO DATE:	**TOTAL SCRAP: 0 LBS**
TOTAL UXO'S: 0	**CLIENT: Zapata**
FIELD OPERATION TIME: 10 HRS	**GOVMT DELAY TIME: HRS**
WEATHER: partly cloudy	**TEMP: DEGREES 85 F**

GRIDS CLEARED	GRIDS WORKING	TOTAL UXO INERT	TOTAL UXO LIVE	BIP Y/N	TOTAL DIGS	TOTAL SCRAP LBS	HAZ MAT FOUND Y/N	BKHOE REQ Y/N

COMMENTS: started collecting F to D to C line off the south side of grid 6, waypoint 0618212-2372231/had to back track and start track on south side of stream due to steepness of terrain, 0618119-23713; 0618038-2372081; 0618014-2372120; 0617938-2372107; 0617926-2372154 after this point the way became to dangerous to go on. Started Collecting from Q to T waypoint 0618070-2371890; 0618073-2371860; 0618062-2371781; 0618032-2371774; 0617994-2371756; 0617989-2371680; point U waypoint 0618152-2371850 worked about 1500 feet up towards the W and V points but could not collect any GPS data due to the heavy vegetation along the way. **We did not find any ORS or other military material today.**

SUXOS SIGNATURE:

A - B ✓

O - M ✓

M - L ✓

M - J ✓

J - P ✓

P - I

Q - S - R ✓ Today

Q - Y ✓

U - T ✓

F - D - C ✓

E - D ✓

FIELDWORK DAILY JOURNAL

DATE:	JULY 10, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:84	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							7	10
Peter Redmond	Zapata Eng.	SUXUS	X							7	10

*Note discrepancies below.

Total miles driven: 40
Total hours worked on site: 20 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: ARRIVE ZAPATA PALI OFFICE AT 0550 MADE CONTACT WITH MIKE WINNINGHAM. LOOKED OVER MAPS AND SURPPLIES THAT WERE NEEEDED FOR THE DIFFERENT PALI SITES. AT 1000 DEREK ANDERSON, DANA GASKELL AND PETE REDMOND MEET WITH SARA COLLINS AND STEPHEN CLARK OF THE PACIFIC CONSULTING, INC. AT THE AGRICULTURE SITE. LOOKED AT AREAS 1-5 TO SEE IF THEY NEEDED AN ARCHAEOLOGLY SURVEY, ALSO LOOKED AT GRIDS THAT WE CAN GET THE MOST ACREAGE COVERAGE. DEPARTED THE AGRICULTURE AREA AT 1315. AT 1400 DEREK ANDERSON AND PETER REDMOND MEET WITH DARIN SUMIMOTO DIRECTOR

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FIELDWORK DAILY JOURNAL

OF GOLF LUNA HILLS COUNTRY CLUB. DISCUSS ACCESS PERMISSION AND LOCATIONS AROUND THE GOLF COURSE. WENT AROUND THE GOLF COURSE AREA LOOKING FOR GRIDS. DEPARTED THE GOLF COURSE AT 1655 AND ARRIVED HOTEL AT 1750.

REPORT AUTHOR: PETE REDMOND SIGNATURE: _____

FIELDWORK DAILY JOURNAL

DATE:	JULY 11, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:85	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							7.5	10
Peter Redmond	Zapata Eng.	SUXUS	X							7.5	10

*Note discrepancies below.

Total miles driven: 65
Total hours worked on site: 20 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: 0610 ARRIVED SCHOFIELD BARRACKS TO PICKUP 8EA WEED CUTTERS AND 2EA CHAINSAWS FROM ZAPATA SITE AT THE FIRING RNGE. 0900 ARRIVED ZAPATA PALI OFFICE TO PICKUP EQUIPMENT. 1030 DEREK ANDERSON AND PETE REDMOND MEET WITH JOHN ROCKY THE LEAD AT THE PALI HAWAII AGRICULTURE SITE. WALK THROUGH SOME OF THE AREAS WE WOULD LIKE TO MAKE GRIDS. JOHN ROCKY WILL GET BACK WITH US FOR THE APPROVAL OF THOSE AREAS. 1400 GOT CONTAINER DROPPED OFF AT AGRICULTURE SITE FOR EQUIPMENT

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FIELDWORK DAILY JOURNAL

STORAGE.1415 DEREK ANDERSON AND PETE REDMOND SARTED MARKING OUT SOME OF THE GRIDS AT THE AGRICULTURE SITE. 1705 DEPARTED SITE AND 1745 ARRIVED HOTEL.

REPORT AUTHOR: PETE REDMOND SIGNATURE: _____

FIELDWORK DAILY JOURNAL

DATE:	JULY 12, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:85	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							7.5	10
Peter Redmond	Zapata Eng.	SUXUS	X							7.5	10

*Note discrepancies below.

Total miles driven: 45
Total hours worked on site: 20 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: 0600 ARRIVED PALI OFFICE RECEIVED SURPPIES AND GOING OVER SCHEDULES. 0725 PHONE CALL WITH STEPHAN CLACK OF PACIFIC CONSULTING INC. AND HE HAS GIVEN THE OK TO CLEAR BRUSH IN AREA 1, 3 AND 4. 0830 DEREK ANDERSON AND PETE REDMOND ARRIVED AGRICULTURE AREA AND TALK TO MARK STRIDE THAT IS LIVING IN THE LULUKA BANANA GROVE AREA. WE ASK HIM ABOUT IMFORMATION OF THE AREA AND TOLD HIM THAT WE WOULD BE WORKING IN THE AREA. 0900 USING THE TREMBLE AND MARKING POSSIBLE GRIGS IN THE

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FIELDWORK DAILY JOURNAL

SOUTHEN AGRICULTURE AREA. 1415 ARRIVED AT THE LUNA HILLS COUNTRY CLUB, LOOKING FOR POSSIBLE GRIDS. 1735 DEPARTED SITE AND 1805 ARRIVED HOTEL.

REPORT AUTHOR: PETE REDMOND SIGNATURE: _____

FIELDWORK DAILY JOURNAL

DATE:	JULY 13, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							8.5	10
Peter Redmond	Zapata Eng.	SUXUS	X							8.5	10

*Note discrepancies below.

Total miles driven: 45
Total hours worked on site: 20 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: DEREK ANDERSON AND PETE REDMOND WALKED THE BIRDHEAD AREA LOOKING FOR POSSIBLE GRIDS TO BE USED. AT THE AGRICULTURE AREA DEREK ANDERSON AND PETE REDMOND MEET WITH JERRY ROBERTS OF THE LULUKA BANANA GROVE. JERRY ROBERTS HAS GIVEN US PERMISSION TO WORK IN ALL OF LULUKA BANANA GROVE LAND. WALK THE SOUTHERN AGRICULTURE LAND LOOKING FOR POSSIBLE AREAS TO WORK.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 17, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:86	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM									10
Peter Redmond	Zapata Eng.	SUXUS	X							7	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC	X							5	10
Michael Field	Zapata Eng.	Team leader	X							7	10
Seth Alu	Zapata Eng.	Tech II	X							7	10

*Note discrepancies below.

Total miles driven: 63
Total hours worked on site: 26 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: NEW PERSONNEL RAYMOND ZAHAREVITZ, MICHAEL FIELD AND SETH ALU RECEIVED SITE BRIEF AND WALKED SITE LOCATIONS. WENT OVER BRUSH CUTTING EQUIPMENT AND PURCHASED PARTS NEEDED. GOT TWO FOUR WHEEL PICKUPS FROM UNITED RENTALS AND TURNED IN ONE TWO WHEEL PICKUP AT ENTERPRISE.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 18, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON
SLIGHTLY		SUNNY		TEMP °F:86	SUXOS:	PETER REDMOND
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD
VERY		FOGGY			OTHER:	

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							7	10
Peter Redmond	Zapata Eng.	SUXUS	X	X						9.5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X						6	10
Michael Field	Zapata Eng.	Team leader		X						9.5	10
Seth Alu	Zapata Eng.	Tech II		X						9.5	10

*Note discrepancies below.

Total miles driven: 39
Total hours worked on site: 41.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: STARTED BRUSH CUTTING IN GRID AREA 4 AND COMPLETED 20% OF THE AREA. ESCORTED RICK FROM JACOBSON LABORS IN GRID AREA 1 AND 3 FOR BRUSH CUTTING BID. DEREK ANDERSON AND I WALK THE LULUKA BANANA GROVE AREA FOR POSSIBLE GRIDS.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 19, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:89	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							3	10
Peter Redmond	Zapata Eng.	SUXUS		X						8.5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X						9.5	10
Michael Field	Zapata Eng.	Team leader		X						9.5	10
Seth Alu	Zapata Eng.	Tech II		X						9.5	10

*Note discrepancies below.

Total miles driven: 40
Total hours worked on site: 40 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: CONTINUE BRUSH CUTTING IN GRID AREA 4 AND COMPLETED 40% OF THE AREA.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 20, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:89	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Derek Anderson	Zapata Eng.	PM	X							2	10
Peter Redmond	Zapata Eng.	SUXUS		X						5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X						9.5	10
Michael Field	Zapata Eng.	Team leader		X						9.5	10
Seth Alu	Zapata Eng.	Tech II		X						9.5	10

*Note discrepancies below.

Total miles driven: 40
Total hours worked on site: 35.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: CONTINUE BRUSH CUTTING IN GRID AREA 4 AND COMPLETED 65% OF THE AREA. GRID AREA 1 WAS MARKED FOR BRUSH CUTTING. HAD A MEETING WITH CHUCK STREK FROM THE HONOLULU COE AND TALKED ABOUT THE PALI SITE. HE SUGGESTED THAT WE DO THE PALI TRAIL.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 24, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:87	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X						9.5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X						9.5	10
Michael Field	Zapata Eng.	Team leader		X						9.5	10
Seth Alu	Zapata Eng.	Tech II		X						9.5	10
Dominic Arthur	Zapata Eng.	Tech II		X						9.5	10

*Note discrepancies below.

Total miles driven: 47
Total hours worked on site: 47.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: JACOBSON LABOR SERVICES ARRIVEA AND STARTED BRUSH CLEARING IN GRID AREA #1. THEY COMPLETED 50% OF BRUSH CLEARING IN GRID AREA #1. SARA COLLINS AND STEPHEN CLARK FROM PACIFIC CONSULTING INC. WAS WALKED THROUGH GRID AREAS 6, 7, 8 AND 9. SARA AND STEPHEN HAS GIVEN THE OK TO WORK IN GRID AREAS 6, 7, 8, AND 9. CONTINUE BRUSH CLEARING IN GRID AREA #4 AND HAVE COMPLETED 80%.

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FIELDWORK DAILY JOURNAL

DATE:	JULY 25, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:86	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY	X	LIGHT RAIN	TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X						9.5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X						8	10
Michael Field	Zapata Eng.	Team leader		X						9.5	10
Seth Alu	Zapata Eng.	Tech II		X						9.5	10
Dominic Arthur	Zapata Eng.	Tech II		X						9.5	10

*Note discrepancies below.

Total miles driven: 39
Total hours worked on site: 46 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: JACOBSON LABOR SERVICES FINISHED GRID AREA #1 AND STARTED IN GRID AREA #3. TURNED IN THE TWO WHEEL DRIVE PICKUP TRUCK FOR AN ALL WHEEL DRIVE SUV AT ENTERPRISE. ZAPATA PERSONNEL COMPLETED 90% OF GRID AREA #4.

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 2, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY			TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X		X				9.5	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC		X		X				9.5	10
Michael Field	Zapata Eng.	Team leader		X		X				9.5	10
Seth Alu	Zapata Eng.	Tech II		X		X				9.5	10
Dominic Arthur	Zapata Eng.	Tech II		X		X				9.5	10

*Note discrepancies below.

Total miles driven: 42
Total hours worked on site: 47.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: ZAPATA PERSONNEL MAG AND DUG 3 GRIGS IN THE BIRDS HEAD AREA TOTALING .25 ACRE. ONLY FOUND .30 CAL BRASS AND TRASH. ALSO LOCATED THE GEOPHYSICAL PROVE OUT AREA AND THE AREA DOESN'T NEED MUCH IF ANY BRUSH CUTTING.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 3, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:84	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:	RAYMOND ZAHAREVTZ	
MOSTLY		RAINY	X	LIGHT RAIN	TEAM LEADER:	MICHAEL FIELD	
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS	X	X						9	10
Raymond Zaharevitz	Zapata Eng.	Safety/QC	X	X						9.5	10
Michael Field	Zapata Eng.	Team leader	X	X						9.5	10
Seth Alu	Zapata Eng.	Tech II	X	X						9.5	10
Dominic Arthur	Zapata Eng.	Tech II	X	X						9.5	10

*Note discrepancies below.

Total miles driven: 44
Total hours worked on site: 47 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: ZAPATA PERSONNEL WORKED IN GRID AREA #6 CUTTING BRUSH AND LAYING IN GRIDS. ABOUT 80% OF AREA #6 IS CLEAR OF BRUSH AND 25% OF THE GRIDS ARE IN. ALSO TURNIN VEHICLE 957 FROM UNITED RENTAL.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

ZAPATAENGINEERING
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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 9, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS			X					9.5	10
Seth Alu	Zapata Eng.	Tech II			X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 30
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: ZAPATA PERSONNEL COMPLETED RUNNING THE EM-61 OVER FOUR GRIDS IN AREA #4. HAD TWO VISITERS TODAY DEBRA EDWARDS USACE AND MIKE MULLEN USACE POH. THEY LOOKED AT THE DIFFERENT AREAS, WATCHED THE WORK BEING PERFORMED AND PLANTED GEOPHYSICAL SEEDS.

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FIELDWORK DAILY JOURNAL

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

FIELDWORK DAILY JOURNAL

DATE:	AUGUST 10, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 30
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: RECEIVED PHONE CALL FROM STEPHAN CLARK PACIFIC CONSULTING INC. ON 8/9/06 AND HE TOLD ME THAT THEY WILL HAVE TO BE ONSITE TO LOOK AT DIG HOLES DURING INTRUSIVE OPPERATIONS. ALSO WHEN DEBRA EDWARDS USACE AND MIKE MULLEN USACE POH ARRIVED YESTERDAY AND TODAY IN A SEDAN, THEY NEEDED TO BE DIVEN AROUND BY PETE REDMOND IN A FOUR WHEEL DRIVE PICKUP. THEY WERE ONSITE 5 HOURS 8/9/06 AND 3 HOURS ON 8/10/06. ZAPATA PERSONNEL BRUSH CUT FOR ABOUT TWO HOURS AND USED THE

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FIELDWORK DAILY JOURNAL

TREBLE BASE STATION TO TAKE GRID AND BOUNDERY POINTS OF AREA #4. THE EM-61 HAS A BROKEN PART AND ARE AWAITING NEW PART TO ARRIVE.

REPORT AUTHOR: PETE REDMOND SIGNATURE: _____

FIELDWORK DAILY JOURNAL

DATE:	AUGUST 14, 2006			PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA
CONTRACT NO:	DACA87-00-D-0034			TASK ORDER NO.:	0005
WEATHER: PARTLY CLOUDY				PROJECT MANAGER:	DEREK ANDERSON
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS: PETER REDMOND
PARTLY		CLOUDY	X		UXO QC/SO:
MOSTLY		RAINY			TEAM LEADER:
VERY		FOGGY			OTHER:

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS			X					8.5	10
Seth Alu	Zapata Eng.	Tech II			X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 36
Total hours worked on site: 27.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: RAN THE EM-61 AT THE GPO WITH THE NEW ELECTRONIC PART THAT WAS SHIP IN. ALL THE DATA WAS GOOD. RAN THE EM-61 IN AREA #4 FINISHED ONE FULL GRID AND FIVE PARTIAL GRIDS. THERE IS ONLY ONE MORE PARTIAL GRID LEFT IN AREA #4.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 15, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:88	SUXOS:	PETER REDMOND	
PARTLY		CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY	X	LIGHT RAIN	TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II			X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 31
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: FINISHED RUNNING THE EM-61 IN AREA 4, HAD TO RERUN LINES 125-160. MOVED UP TO AREA 6, PUT MORE GRID HUBS IN AND COMPLETED ONE GRID WITH THE EM-61. ALSO DID A LITTLE MORE BRUSH CUTTING IN AREA 6.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 16, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:86	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXOS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 25
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: COMPLETED ONE FULL GRID AND TWO PARTIAL GRIDS IN AREA 6 WITH THE EM-61. THE AREA COVERED IS ABOUT .6 ACRES TODAY, ALSO DID SOME BRUSH CLEARING.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 17, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:85	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 29
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: RERAN ONE PARTIAL GRID IN AREA 4 WITH THE EM-61. SET UP THE BASE STATION TO TRY TO GET POINTS IN AREA 6. COMPLETED TWO PARTIAL GRIDS AND ONE FULL GRID WITH THE EM-61 IN AREA 6. ALSO CONTINUE SOME BRUSH CLEARING. COULD NOT GET GOOD SATELLITE COVERAGE IN AREA 6.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 21, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: LIGHT RAIN					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:87	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY	X		TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXUS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 45
Total hours worked on site: 25.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: COMPLETED ONE FULL GRID AND TWO PARTIAL GRIDS IN AREA 6 WITH THE EM-61. TOTAL ABOUT .5 ACRES , ALSO CLEAR BRUSH IN AREA 6.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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FIELDWORK DAILY JOURNAL

DATE:	AUGUST 23, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:89	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXOS		X	X					9	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 46
Total hours worked on site: 28 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: COMPLETED RUNNING THE EM-61 AND CLEARED BRUSH ON ONE GRID IN AREA 1.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

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DATE:	AUGUST 24, 2006				**PROJECT NAME:**	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				**TASK ORDER NO.:**	0005	
WEATHER: LIGHT RAIN					**PROJECT MANAGER:**	**DEREK ANDERSON**	
SLIGHTLY		**SUNNY**		**TEMP °F:87**	**SUXOS:**	**PETER REDMOND**	
PARTLY	X	**CLOUDY**	X		**UXO QC/SO:**		
MOSTLY		**RAINY**	X		**TEAM LEADER:**		
VERY		**FOGGY**			**OTHER:**		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXOS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 45
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: COMPLETED RUNNING THE EM-61 AND CLEARED BRUSH ON ONE GRID IN AREA 1. AREA 1 IS FINISHED WITH THE EM-61. HAD TWO VISITER TODAY CHARLES DONALDSON DEI AND ERIC GUINTHER AECOS AND THEY LOOKED AT AREAS 1,3,4,6,AND 7. ERIC GUINTHER IS A BOTANIST AND HE WAS LOOKING AT THE PLANT LIFE IN THOSE AREAS. ALSO DID SOME BRUSH CLEARING IN AREA 7.

FIELDWORK DAILY JOURNAL

DATE:	AUGUST 29, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:90	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXOS		X	X					9.5	10
Seth Alu	Zapata Eng.	Tech II		X	X					9.5	10
Rich Blohm	Zapata Eng.	Geophysics			X					9.5	10

*Note discrepancies below.

Total miles driven: 47
Total hours worked on site: 28.5 MH

FIELDWORK ACTIVITIES ACCOMPLISHED: COMPLETED ONE FULL GRID AND ONE PARTIAL GRID IN AREA 3 WITH THE EM-61. THE AREA COMPLETED IS ABOUT .40 ACRES IN AREA 3.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____

FIELDWORK DAILY JOURNAL

DATE:	AUGUST 31, 2006				PROJECT NAME:	HEEAI COMBAT TRAINING AREA AND PALI TRAINING CAMP EE/CA	
CONTRACT NO:	DACA87-00-D-0034				TASK ORDER NO.:	0005	
WEATHER: PARTLY CLOUDY					PROJECT MANAGER:	DEREK ANDERSON	
SLIGHTLY		SUNNY		TEMP °F:85	SUXOS:	PETER REDMOND	
PARTLY	X	CLOUDY	X		UXO QC/SO:		
MOSTLY		RAINY			TEAM LEADER:		
VERY		FOGGY			OTHER:		

OE INVESTIGATIONS AND REMOVALS:

Grids/Transects Investigated	Investigation Method	% Complete	% QC (P/F)	Anomalies Investigated	Scrap (lbs.)		UXO	OE	Disposition
					OE	Non-OE			

PERSONNEL INFORMATION:

Personnel	Company	Position	Land Surveying	Brush Clearing	Geophysical Invest.	Intrusive Investigation	Site Visit	Reacquisition	Surface Sweep	Hours Onsite	Hours Worked*
Peter Redmond	Zapata Eng.	SUXOS			X					9	10
Seth Alu	Zapata Eng.	Tech II			X					9	10
Rich Blohm	Zapata Eng.	Geophysics			X					9	10

*Note discrepancies below.

Total miles driven: 61
Total hours worked on site: 27 MH

FIELDWORK ACTIVITIES ACCOMPLISHED. COMPLETED TAKING GPS POINTS AT AREAS 1, 6 AND 7. ALSO WENT UP TO THE BIRD HEAD AREA AND TOOK GPS POINTS AT GRID A, BUT COULD NOT GET GOOD SATALITE COVERAGE AT GRIDS B AND C. TOOK MORE EQUIPMENT TO THE STORAGE PLACE AND THE OFFICE.

REPORT AUTHOR: PETE REDMOND **SIGNATURE:** _____