Site Inspection Work Plan
Munitions Response Sites

WAIKANE VALLEY TRAINING AREA
KANEOHE, HAWAII

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ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
ARAR	Applicable or Relevant and Appropriate Requirement
ASR	Archives Search Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CSM	Conceptual Site Model
CTO	Contract Task Order
CWM	Chemical Warfare Materiel
DGPS	Differential Global Positioning System
DMM	Discarded Military Munitions
DOD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
°F	Degrees Fahrenheit
GIS	Geographical Information System
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations and Emergency Response
HERO	Hazards of Electromagnetic Radiation to Ordnance
in/ft	Inches per foot
MC	Munitions Constituents
MCBH	Marine Corps Base Hawaii
MEC	Munitions and Explosives of Concern
MGFD	Munition With the Greatest Fragmentation Distance
MOPC	MEC of Potential Concern
MRA	Munitions Response Area
MRS	Munitions Response Site
MSD	Minimum Separation Distance
msl	Mean sea level
NAVFAC Pacific	Naval Facilities Engineering Command, Pacific
OSHA	Occupational Safety and Health Administration
PDA	Personal Data Assistant
POSM	Program Occupational Safety Manager

PPE	Personal Protective Equipment
PQCM	Program Quality Control Manager
PHSM	Program Health and Safety Manager
PWS	Performance Work Statement
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QD	Quantity Distance
RIPRA	Range Identification and Preliminary Range Assessment
RPM	Remedial Project Manager
RTK	Real-Time Kinematic
SI	Site Inspection
SHSP	Site Health and Safety Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TP	Technical Paper
USACE	U.S. Army Corps of Engineers
USAE	USA Environmental, Incorporated
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
UXOTI	Unexploded Ordnance Technician I
UXOTII	Unexploded Ordnance Technician II
UXOTIII	Unexploded Ordnance Technician III
WP	Work Plan

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1.0 INTRODUCTION

USA Environmental, Incorporated (USAE) has prepared this work plan (WP) in accordance with the Performance Work Statement (PWS), dated 3 August 2006. This work plan describes site inspection (SI) activities planned for a Munitions Response Site (MRS) located at Waikane Valley Training Area (WVTA), Kaneohe, on the island of Oahu, Hawaii (see Figure B-1). The SI is being conducted to determine whether there is a release or potential release and the nature of the associated threats, with respect to past use of munitions and explosives of concern (MEC) and Munitions Constituents (MC). The findings of this SI will augment the data collected in the Preliminary Assessment and will provide a basis for determining if further response actions are necessary. This SI is not intended as a full-scale study of the nature and extent of contamination or explosives hazards.

1.1 ORGANIZATION OF THE DOCUMENT

This WP identifies the data quality objectives and describes the rationale, activities, and requirements needed to achieve them. This WP provides procedures for detection, management, and avoidance of MEC, and a plan for quality control throughout the project. An Accident Prevention Plan (APP) and Site Health and Safety Plan are included as Appendix E of this Work Plan. A Quality Assurance Project Plan (QAPP) provides procedures for collection of samples, shipping, analysis for Munitions Constituents (MC), and data validation.

1.2 SITE HISTORY AND BACKGROUND

1.2.1 SITE HISTORY

The MRS consists of 187 acres located in the Waiahole and Waikane Valley, on Oahu's windward side approximately 10 miles northwest of Kaneohe Bay. It was once part of a 2,000 acre lease used for jungle training and field maneuvers. The remaining acreage falls under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) and is not addressed under this SI.

WVTA's military history dates back to the early 1940's when the Army leased over 2,000 acres in the Waiahole and Waikane Valleys for jungle training, field maneuvers and a bombing range for air-to-ground ordnance delivery practice. The area was known as the Waiahole Training Area and managed by the U.S. Army as property of Fort Hase.

Between 1943 and 1953, the Army leased this property for maneuvers, jungle training, and small arms, artillery, and mortar firing. The U.S. Marines leased 1061 acres of the training area in 1953. Training consisted of small arms fire, 3.5-inch rockets, and possibly medium artillery fire. Live fire apparently stopped in the early 1960's. Due to fire hazards, incendiaries were prohibited and all ammunition in excess of .50 caliber was to be fired into the designated impact area. The lease was terminated in 1976 and returned to the original owners who farmed and developed it.

In 1944, four people were injured, two fatally, when a 60mm mortar discovered in Waikane Valley accidentally detonated. Three children were injured in 1963 when a souvenir rifle grenade reportedly discovered in Waikane Valley exploded after it was thrown against a wall. There are no other reports of fatalities or injuries attributable to MEC discovered at Waikane Valley.

The USMC conducted ordnance clearance sweeps in 1976 and 1984. The 1976 clearance effort resulted in the removal of over 24,000 pounds of practice ordnance and fragments, including 42 items of unexploded ordnance. The after action report stated that 187 acres of the WVTA can never be certified free of unexploded ordnance due to the ground cover and topography. In December 1983, heavy rain exposed ordnance on the property and Marine EOD removed a number of 3.5-inch rockets. In January 1984, Marines conducted a sweep and removed 480 3.5-inch rockets. In June 1984, an intensive ordnance clearance resulted in the removal of 16,000 pounds of demilitarized practice ordnance and 190

items of unexploded ordnance from the parcel. The after action report supported the conclusions of the 1976 report that the property could never be certified clear of ordnance.

In 1989, the government acquired title to the 187-acre ordnance contaminated area of the original WVTA. Fencing of the property was completed in 1992 and remains as government property due to it being deemed improbable that it can be cleared of all ordnance contamination. The area is currently controlled and maintained by Marine Corps Base Hawaii (MCBH). The project site is managed as an "other than operational range", with access controlled by MCBH such that civilians may only enter the property when accompanied by EOD personnel.

1.2.2 PREVIOUS INVESTIGATIONS

The 187-acre MRS was identified for further evaluation as a result of a Range Investigation and Preliminary Range Assessment (RIPRA) and Archives Search Report (ASR) completed in 1998. MCBH contracted with U.S. Army Engineer District, Honolulu to prepare an Environmental Assessment (EA) to evaluate the effects of a Proposed Action of conducting non-live fire jungle orientation and maneuver training within the 187-acre property. The Proposed Action was cancelled in September 2004 after the Marine Corps determined that Waikane Valley is unsuitable for troop training because of safety concerns.

From June 2005 until May 2006, U.S. Army Corps of Engineers conducted field work for an Engineering Evaluation/Cost Analysis (EE/CA), evaluating MEC risks over 874 acres of the FUDS portion of WVTA adjoining the southern and western boundaries of the MRS. The EE/CA consisted of evaluation of 150 grids (100 ft by 100 ft) and 9 miles of transect. During the investigation, seven MEC items were recovered; two 81mm HE rounds, three 60mm HE rounds, and two 37mm HE projectiles. All of the MEC items were recovered in the southeastern portion of the FUDS site, which adjoins the southern boundary of the MRS. Projectile fragmentation, fuze pieces, tail fins, base plates, and other munitions debris was located throughout the valley.

1.2.3 LAND USE

The EA report indicated that the site has had no modern construction. The property is bounded to the north, south, and west by undeveloped forest lands owned by Kualoa Ranch and SMF Enterprises, Inc. In 1997, the City and County of Honolulu began to acquire lands to the southeast of the project site from Azabu USA Corporation. These lands were then designated as the Waikane Nature Preserve. The Roberts family owns a small parcel adjacent to the southern border of the project site. Non-contiguous coastal lands to the east of the project site include a mix of residential areas, beach parks, and private property. Approximately 51.963 acres (less than 28 percent) of the southern portion of the project site were leased for agricultural purposes prior to land acquisition by the federal government. The State of Hawaii land use classification for this leased area was Agriculture. Roughly 17 acres (33 percent) of this leased area was farmed with edible crops. Five vacant living units existed within the leased area. The remaining 135.393 acres are lands designated by the State of Hawaii Land Use Commission as Conservation and were within the area designated as the Waiahole Forest Reserve.

The Draft Engineering Evaluation/Cost Analysis (EE/CA) Report Plan, Former Waikane Valley Training Area, Island of Oahu, Hawaii indicates that the City and County of Honolulu has produced a Master Plan to develop the FUDS portion of WVTA (874 acres) into the Waikane Valley Nature Park. The plan involves establishment of trails, rest and picnic areas, and lookouts to view surrounding landmarks, a ceremonial gathering place (halau), re-vegetation areas for native plants, stream ecology study areas, ponds for aquatic wildlife studies, agricultural fields, parking areas, and a visitor orientation area. The majority of the acreage within Waikane Valley consists of inaccessible terrain that cannot be developed due to steep gulches, canyons, rocky outcrops, and mountains rising over 2,200 feet above sea level. However, evidence exists that show the whole of Waikane Valley has been used, and in all probability will continue to be used, by sportsmen hunting wild boar and other game.

With the exception of some new homes along Haupoa Road and Kamehameha Highway, very little housing development has taken place in Waikane.

1.3 PHYSICAL CHARACTERISTICS

1.3.1 TOPOGRAPHY AND GEOLOGY

Waikane Valley is located on windward Oahu approximately 10 miles (16 kilometers) northwest of MCBH. It is one of several valleys with watersheds draining into the northern part of Kaneohe Bay. Windward Oahu is the remnant of the Koolau Volcano. Waikane was carved into the basalt of the Koolau Range through erosion. Some of the gravel and clay formed by weathering and erosion of the shield were deposited on valley floors. In addition, alluvium of marine origin accumulated in the valleys as the sea level rose during interglacial periods and fell during glacial periods.

The project site extends along a gradient from 100 feet above mean sea level at the southern boundary to approximately 1,400 feet along the northern boundary. Much of the project area has slopes exceeding 45 percent, with some sections containing steep vertical cliffs (Tuggle and Wilcox 1998).

According to the U.S. Department of Agriculture, Soil Conservation Service (1972), the five soil types within the project site exhibit the following characteristics:

Waikane silty clay, 25 to 40 percent slope (WpE). This soil type is found on steep terraces and alluvial fans. WpE soils are very strongly acid in the surface layer and subsoil, with moderately rapid permeability, medium to rapid runoff, and a moderate to severe erosion hazard.

Waikane silty clay, 40 to 70 percent slope (WpF). On WpF soil, runoff is rapid to very rapid and the erosion hazard is severe.

Waikane silty clay, 40 to 70 percent slope (WpF2). This soil type is very similar to WpE except that it is very steep. Most of the surface layer and, in some places, part of the subsoil has eroded. Soft weathered rock is exposed in a few areas. On WpF2 soil, runoff is rapid to very rapid and the erosion hazard is very severe.

Rock land (rRK). This classification refers to areas where exposed rock covers 25 to 90 percent of the surface. The main characteristics of rRK are rock outcrops (of mainly basalt and andesite) and very shallow soils.

Hanalei silty clay, 0 to 2 percent slope (HnA). This soil type is found on stream bottoms and flood plains. HnA soils are strongly acid to very strongly acid in the surface layer and neutral in the subsoil, with moderate permeability. On HnA soil, runoff is very slow and the erosion hazard is no more than slight.

Waikane Series soils (WpE, WpF, and WpF2) are found on approximately 75 percent or the majority of the project site (Belt Collins & Associates 1990 and Tuggle and Wilcox 1998). The WpE soils type is primarily found below the 300-foot contour (Belt Collins & Associates 1990). Land at the top of the ridge at the northern boundary of the project comprises rRK whereas HnA is found at the southeastern corner of the site along Waikane Stream (Belt Collins & Associates 1990 and Tuggle and Wilcox 1998).

1.3.2 WATER RESOURCES

Waikane Stream traverses the project site along its southern border at approximately the 150-foot elevation. The U.S. Geological Survey has monitored stream flow at the 75-foot elevation approximately 1,150 feet downstream from the eastern border of the property since 1959. Its records indicate Waikane Stream to be perennial (Belt Collins & Associates 1990).

Since 1916, the Waiahole Ditch Tunnel System has intercepted water at the most productive portion of the Waikane catchment upstream from the site, thereby altering flow volume and other hydrological characteristics of Waikane Stream (Drigot et al 2001).

Water quality sampling of the perennial Waikane Stream was accomplished in May 2003 at four sampling stations from above to below the project area to measure temperature, pH, conductivity, dissolved oxygen, turbidity, total suspended solids, and nutrients (as ammonia, nitrate plus nitrite, total nitrogen, and total phosphorous). Differences between stations were found to be small and values were within ranges indicating good water quality (AECOS Consultants 2003).

1.3.3 CLIMATE

The climate of Hawaii is warm and humid year round. The daily average temperature on Oahu ranges between 65 to 85 degrees Fahrenheit (°F) with relative humidity ranging from 30 to 90 percent (Juvik and Juvik 1998). The project site is located in the interior of the forested Waikane Valley. All of these windward valleys, from Kaneohe in the south to Hakipuu in the north, support lush vegetation owing to an abundance of water.

1.3.4 BIOLOGICAL RESOURCES

Literature and field surveys of the project site conducted by biologists and environmental specialists conducted (AECOS Consultants 2003) resulted in the following findings:

1. Vegetation. The project site has been highly disturbed in the past such that only remnants of native vegetation remain. Native plant communities such as *'Ohi'a Scrub* and *Koa/'Uluhe Woodland* occur on some of the ridges that extend to the northern ridge line. The *Ohi'a Scrub* community occurs on the ridges at the north side of the project site, and particularly on the eastern end. It is characterized by low and shrubby *'ohi'a* trees with dense clumps of the native fern *pala'a (Sphenomeris chinensis)* between the shrubs. *Koa/'Uluhe Woodland* dominates the northwestern portion of the project site on the ridge leading up the hills that separate Waikane Valley from Kaaawa Valley. This plant community comprises *Dicranopteris linearis ('uluhe)*. Two plant communities (i.e., Managed Land Vegetation and Secondary Forest) found in most of the flat to sloping areas south of the hills on the northern portion of the project site reflect extensive disturbance. Managed Land Vegetation exhibits the characteristics of abandoned agricultural clearings that cover large patches on the alluvial plain of the Waikane Stream, and the areas around the abandoned living sites. Most of the lowlands of the site are covered by Secondary Forest, which is a plant community almost entirely dominated by alien tree species. The most prevalent of these alien tree species is *Paraserianthes falcataria ("albizia")*, which is a huge, fast-growing tree with an open, spreading canopy. No distinct wetlands were found within the project site.

   A total of 104 vascular plant species were recorded. Of the 104 species, 17 are native but only five of the native species are endemic to Hawaii: *Cibotium chamissoi (haupu'u i'i), Acacia koa (koa), Scaevola gaudichaudiana (naupaka kuahiwi), Metrosideros polymorpha ('ohi'a lehua)*, and *Wikstroemia oahuensis ('akia)*.

2. Fish and Wildlife. The non-native arthropod, mammalian, and avian species identified at the project site are consistent with the habitat found at the project site. Many common non-native species are present. Medically important species (i.e., centipedes, scorpions, widow spiders, western yellow jacket wasps, and common paper wasps) were not observed but may be present. Four mammalian species – domestic dog *(Canis f. familiaris)*, small Indian mongoose *(Herpestes a. auropunctatus)*, domestic cat *(Felis*

catus), and feral pig *(Sus s. scrofa)* – were observed. Fifteen species of birds from 11 separate families were observed. The findings of the avian survey were consistent with the habitat and altitude of the study area. No native avian species were detected. A few native species of aquatic life were found in the middle and lower reaches of Waikane Stream, but were noted as not especially unusual or unique.

3. Listed Species. Surveys of the project site conducted by Char and Associates (1989) and AECOS Consultants (2003) found no federally listed threatened or endangered plant species and no plants proposed for such status. Snail species listed as threatened or endangered under federal or state statutes (i.e., *Achatinella*) were not found (AECOS Consultants 2003). The endemic Hawaiian sub-species of the Short-eared Owl *(Asio flammeus sandwichensis)* was not detected during surveys but may occasionally use resources present within the site, especially in the more open *'uluhe* dominated higher elevations of the valley wall. The Oahu population of this sub-species is listed as endangered by the State of Hawaii, but it is not listed under federal statues (DLNR 1998 and Federal Register 1999a, 1999b, 1002, 2002). Typical nesting habitat used by the threatened Newell's Shearwater *(Puffinus auricularis newelli)* is found on the upper *'uluhe* covered slopes. There are no known nesting colonies of this species on Oahu; however, a small number of these birds are downed annually on the island, most near the lighted entrances to the Pali Highway tunnel. (AECOS Consultants 2003).

1.3.5 CULTURAL RESOURCES

The Environmental Assessment notes that field investigations and ethnographic interviews were conducted in 2003, and a *heiau* or shrine within National Register of Historic Places was identified and recorded in February 2004 (Magnuson et al. 2004). The project site was divided into three sampling zones based on terrain variations in Waikane Valley. Zone A, along Waikane Stream where archaeological sites had previously been identified, was subjected to a systematic and intensive survey and re-recordation of previously documented sites. Zone B, a transition area between the flatter areas near Waikane Stream and the extremely steep slopes along the valley walls, was subjected to a reconnaissance level survey. Zone C, comprising extremely steep slopes along the valley walls, was visually inspected from available vantage points in Zone B and from the ridgeline above. Seven sites were evaluated, several of them within a National Historic Register site. Four were reconfirmed as significant, two were recommended for deletion from state inventory, and one was newly identified as historic. All culturally significant sites appear to be located in Zone A, less than 0.2 kilometers from Waikane Stream. Archaeological monitoring will be required during intrusive activities in Zone A.

1.4 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) (see Figure A-3) describes the MEC and MC contaminant sources, MEC and MC migration pathways, and receptor exposure pathways potentially present at the site. This preliminary CSM is a dynamic model, developed after evaluating the physical, demographic, and MEC information from previous investigations. For the purposes of the CSM, the current and future land use practices are assumed to be the same, although it is recognized that the site is currently uninhabited. The data collected during this SI will be used to revise the CSM (if necessary), and confirm or deny the preliminary conclusions presented in this CSM section.

1.4.1 TRANSPORT AND FATE

1.4.1.1 MEC

In 1944, four people were injured, two fatally, when a 60mm mortar discovered in Waikane Valley accidentally detonated. Three children were injured in 1963 when a souvenir rifle grenade reportedly discovered in Waikane Valley exploded after it was thrown against a wall. Historic use of the project site as an impact area resulted in the USMC conducting ordnance clearance sweeps in 1976 and 1984. The

1976 clearance effort resulted in the removal of over 24,000 pounds of practice ordnance and scrap from the impact areas in Waikane Valley. An additional 16,000 pounds of demilitarized practice ordnance were removed from the site in 1984. The continued presence of MEC at the site was evidenced in 1990 when unexpended mortar rounds, a grenade, and shrapnel were discovered during an archaeological inventory of the property (U.S. Army Engineer District Honolulu 1996). Potential MEC at WVTA are listed below in Table 1-1.

Depleted uranium is not listed in Table 1-1 as a potential MEC at WTVA. Although the Davy Crockett system was used at Schofield Barracks, it was an Army system (Archive Search Report On the Use of Cartridge, 20mm Spotting M101 for Davy Crockett Light Weapon M28). It was not issued to the Marines and it is therefore unlikely that it was used at WVTA. However, the field team will be trained in recognition of Davy Crockett system components and will report on any such components if found during the field investigations.

The presence of MEC is relevant because it may be an explosive hazard. MEC in the surface and subsurface soil may also release MC into the site soils through impact and detonation, corrosion, or leakage. Based on evidence collected from archives research work performed to date, chemical warfare materiel has not been used at WVTA.

1.4.1.2 MC

MCs for WVTA can be grouped into three categories: explosives, metals, and perchlorates. Based on the type of munitions used at WVTA and their composition as described in Table 1-1, explosives and metals are the main components of the munitions used. Although perchlorates are used in propellants for 3.5" rockets (7.8 percent), the compounds are expected to have been burned off while propelling the rocket to the target area and during detonation of the warhead. If the projectiles containing these perchlorates did not explode, it is likely that the main hazard posed by the particular munitions is from explosion, rather than exposure to the perchlorates. In addition, perchlorate is a soluble salt, and any perchlorate on the surface would not be detected in surface samples because the site has not been used since 1976. Since the SI only involves surface samples, perchlorates will not be considered MC for this SI.

Previous testing has been done at the project site to determine the existence of nitroaromatics and nitramines. During the EA, matrix sampling was performed that consisted of discrete surface and near-surface soil, and surface water samples. All samples were tested for presence of nitroaromatics, nitramines, nitroglycerin and pentaerythritol tetranitrate, and picric acid. Ten surface and near-surface soil samples collected proximal to Waikane Stream at the east and west ends of the project site did not exhibit targeted explosive compounds above the analytical laboratory's method reporting limits. Surface water samples were collected to determine if contaminants of concern were being transported during rain events. Five surface water samples collected on May 9, 2003 during what was considered a "dry period" (i.e., little or no rainfall for several days) from Waikane Stream at two locations within the parcel and along Kamehameha Highway contained no measurable explosive compounds above reporting limits. Five additional surface water samples were collected from the same locations in Waikane Stream on June 16, 2003, following a rain event during which rain fell constantly from the prior evening into the following morning. Again, no explosive compounds were detected above reporting limits, indicating no transport of contaminants of concern.

Chemicals from MEC items may have leached into the soil, but groundwater is not a likely transport mechanism for MC at this time.

TABLE 1-1: KNOWN/SUSPECTED MC

Known/Suspected Munitions	Associated Metals	Associated Explosives
Mortars, 60mm and 81mm	Cr, Fe, Ni	Composition B

Known/Suspected Munitions	Associated Metals	Associated Explosives
Rockets, 2.6”	Cr, Fe, Ni	Ballistite, Composition B, Pentolite
Rockets, 3.5”	Cr, Fe, Ni	M7 Propellant, Composition B
Demolition Explosives	None	HMX, PETN, RDX, TNT
Grenade, HE	Fe	TNT
Grenade, Smoke	Cr, Fe, Ni	HC Smoke Mix, Smoke Mix
Projectiles, HE	Cr, Cu, Fe, K, Ni, Sb	Amatol 50/50, Black Powder, Composition B, RDX, Tetryl, TNT
Signals	Al, Ba, Cr, Fe, K, Ni	Black Powder, Flash Powder, White Phosphorus
Small arms	Cu, Fe, Pb, Sb, Zn	None

Al – aluminum, CAS No. 7429-90-5
Amatol 50/50 – 50% TNT, 50% ammonium nitrate
Ba – barium, CAS No.7440-39-3
Ballistite (Cordite) – Nitrocellulose and Nitroglycerin with stabilizer
Black Powder – 74% potassium nitrate, 15.6% charcoal, 10.4% sulfur
Composition B – 36% TNT, 63% RDX, 1% wax
Composition B4 – 60% RDX, 39.5% TNT, 0.5% calcium silicate
Cr – chromium, CAS No. 7440-47-3
Cu – copper, CAS No. 7440-50-8
Fe – iron, CAS No. 7439-89-6
Flash Powder – pyrotechnic mixtures of barium nitrate, potassium nitrate, potassium perchlorate, or potassium permanganate with aluminum and sulfur
HC Smoke Mix – 45% hexachloroethane, 45% zinc oxide, 10% aluminum
HMX – octahydro-1,3,5,7- tetranitro-1,3,5,7-tetrazocine, Octogen, $C_4H_8N_8O_8$, CAS No. 261-41-0
K- potassium, CAS No. 7440-09-7
M7 Propellant – 54.6% Nitrocellulose, 35.5% Nitroglycerin, 7.8% Potassium Perchlorate
Ni – nickel, CAS No. 7439-92-1
Pb – lead, CAS No. 7439-92-1
Pentolite – 50/50 mixture of PETN and TNT, CAS NO. 8066-33-9
PETN – pentaerythritol tetranitrate, $C_5H_8N_4O_{12}$, CAS No. 78-11-5
RDX – hexahydro-1,3,5-trinitro-1,3,5-triazine, Cyclonite, $C_3H_6N_6O_6$, CAS No. 121-82-4
Sb – antimony, CAS No. 7440-36-0
Smoke Mix – 55% sulfur, 40% potassium nitrate, 5% charcoal
Tetryl - 2,4,6-trinitrophenyl-N-methylnitramine, $C_7H_5N_5O_8$, CAS No. 479-45-8
TNT – Trinitrotoluene, $C_7H_5N_3O_6$, CAS No. 118-96-7
Zn – zinc, CAS No. 7440-66-6.

1.4.2 POTENTIAL HUMAN RECEPTORS AND EXPOSURE PATHWAYS

The human health CSM (Figure A-3) evaluates three potential human receptor groups: (1) future onsite residents and construction workers, (2) current and future offsite residents, and (3) current and future recreational users. There are no current onsite residents.

1.4.2.1 MEC

The source of MEC contamination is presumed to be MEC that may still exist at or below the ground surface. MEC may be transported through human activities, surface water run-off, or soil erosion. The exposure route for MEC hazards is exclusively direct contact. Onsite residents and construction workers, offsite residents and recreational users (or trespassers) may come into contact with surface MEC if they wander over the site, and will come into contact with subsurface MEC if they excavate on the site. Assuming that offsite residents will occasionally wander over the site, the transport pathway for all three human receptors is considered complete for encountering surface MEC. The pathway for encountering subsurface MEC is considered complete for onsite residents and construction workers, and incomplete for offsite residents and recreational users. The pathway for encountering MEC exposed by erosion is the equivalent of encountering surface MEC and is therefore considered complete for onsite residents and construction workers. Offsite receptors are likely to experience low site-related exposure to MEC because of the attenuating effect of distance.

1.4.2.2 MC

After a chemical is released to the environment, it may be retained in one or more media, including the receiving medium, or be transported to other media. The movement or retention of contaminants is conceptually referred to as the "transport mechanism." The source of MC contamination is presumed to be MEC that still resides at or below the ground surface. MC may be transported with surface water or groundwater in the dissolved phase. Transport pathways leading to potential exposure to onsite and offsite receptors also tend to result in reduced MC concentrations at receptor points distant from the MRS. Thus attenuation of MC concentrations along the exposure pathway in the offsite areas is expected to result in lower exposure levels for offsite receptors.

1.4.2.2.1 Subsurface Soil

Excavation conducted by future onsite residents and construction workers may result in direct contact exposure to contaminated subsurface soil. The exposure pathway to offsite residential and recreational receptors is considered incomplete because of the attenuating effect of distance.

1.4.2.2.2 Groundwater

Although MC may migrate through subsurface soil to the groundwater, groundwater at the site is not used as a potable water source. This significantly reduces the potential for human exposure to MC in groundwater. However, the potential does exist for onsite residents and construction workers to contact MC in onsite groundwater, although the contact is expected to be infrequent and of short duration.

1.4.2.2.3 Surface Water

Chemical transport with groundwater may result in MC entering the Waikane Stream which runs along the southern boundary of the site. While attenuation processes are likely to reduce chemical concentrations significantly such that offsite exposure is insignificant, this pathway is considered potentially complete for dermal exposure of onsite residents and construction workers and for recreational users.

1.4.3 POTENTIAL ECOLOGICAL RECEPTORS AND EXPOSURE PATHWAYS

The ecological receptor CSM (Figure A-3) evaluates two potential receptor groups: (1) terrestrial wildlife, and (2) aquatic wildlife. MEC and MC will have no effect on plant life except in the form of nitrate breakdown products, which may act as fertilizers.

1.4.3.1 MEC

The source of MEC hazards is presumed to be MEC that may still exist at or below the ground surface. Onsite ecological receptors may be exposed to MEC lying on the surface or in the root zone. Terrestrial animals are subject to exposure to MEC hazards, either by traveling across the surface or burrowing.

1.4.3.2 MC

1.4.3.2.1 Subsurface Soil

Burrowing activities of terrestrial animals located on the site may result in direct contact exposure to contaminated subsurface soil.

1.4.3.2.2 Groundwater

The potential does exist for terrestrial animals to contact MC in onsite groundwater if the water table is near the surface.

1.4.3.2.3 Surface Water

Chemical transport with groundwater may result in MC entering the Waikane Stream. While attenuation processes are likely to reduce chemical concentrations significantly such that substantial exposure is insignificant, this pathway is considered potentially complete for terrestrial and aquatic wildlife.

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2.0 TECHNICAL MANAGEMENT PLAN

This section documents the approach, methods, and operational procedures USAE will employ to execute the SI. Fieldwork for MEC will be conducted by a team consisting of a SUXOS, a UXOSO, a UXOQCS, a UXOTIII team leader, five UXOTII/I team members, and an Emergency Medical Technician. Fieldwork will consist of mobilization, limited vegetation clearance, and an instrument-assisted visual reconnaissance of the site to identify any evidence of MEC. Concurrent sampling for evidence of MC will be conducted as part of the field effort. Approach, methods, and operational procedures for the MC effort are explained in the QAPP.

2.1 PROJECT AUTHORIZATION

This WP was prepared for the Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) under contract number N62742-05-D-1868, contract task order (CTO) number 0004 of the Munitions Response Contract for Worldwide Sites. This WP was prepared in accordance with Environmental Protection Agency Guidance for Performing Site Inspections under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and with U.S. Army Corps of Engineers (USACE) guidance on munitions response actions under the Defense Environmental Restoration Program for Formerly Used Defense Sites.

2.2 GENERAL PURPOSE AND SCOPE

The scope of the CTO includes preparation of this planning document and a QAPP, execution of the fieldwork, laboratory analysis of soil samples, and preparation of an SI Report. The MEC fieldwork will consist of visual inspection using metal detectors as an aid. Surface evidence of MEC, along with data previously gathered, will be used to delineate boundaries and assess the risk/hazard posed by any MEC found at the site in order to support the final recommendations.

2.3 CHEMICAL WARFARE MATERIEL

There is no evidence of chemical warfare materiel (CWM) being stored, tested, or existing within the area comprising this project. Therefore, air monitoring is not warranted during the SI. However, if onsite UXO personnel suspect that an item is a potential CWM item, the USAE team will implement the following procedure:

- Work will immediately stop and all personnel will leave the area and move to an upwind location;
- The SUXOS will notify the NAVFAC Pacific RPM, and the USAE home office. The RPM will notify Explosive Ordnance Disposal (EOD);
- Onsite UXO personnel will secure the site and will post two UXO technicians to guard the site until direction is received from NAVFAC Pacific or until military EOD or a Technical Escort Unit arrives to take control of the site. USAE will stand ready to support the military or NAVFAC Pacific as required.

2.4 PROJECT ORGANIZATION

Figure 2-1 depicts the organization team for this project. The team consists of NAVFAC Pacific, MCBH, and USAE personnel. The roles of these team members are described below.

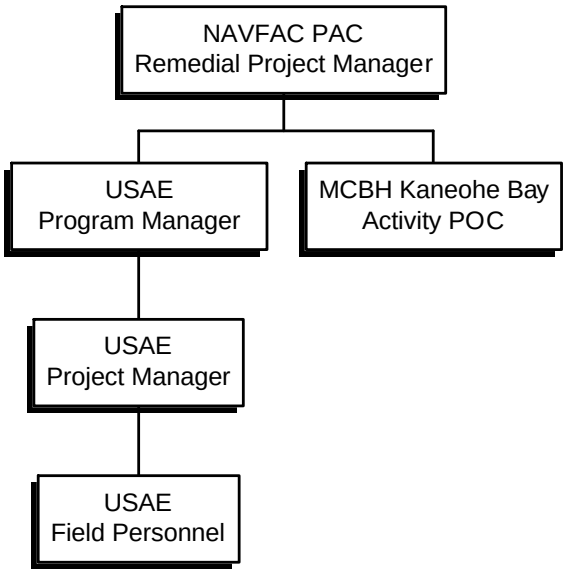

FIGURE 2-1: PROJECT TEAM STRUCTURE

2.4.1 NAVAL FACILITIES ENGINEERING COMMAND, PACIFIC

NAVFAC Pacific is the lead technical, project management, and funding agency for this project. NAVFAC Pacific responsibilities include review and approval of project plans and documents, working with the news media and the public, and coordinating with state and local regulatory agencies on issues pertaining to public safety and the environment. As the Contracting Officer's Technical Representative (COTR), NAVFAC Pacific is responsible for directing the munitions response contractor and controlling the budget and schedule. NAVFAC Pacific will provide archaeological monitoring expertise during the MC sampling effort.

2.4.2 USA ENVIRONMENTAL, INCORPORATED

USAE is the prime munitions response contractor to NAVFAC Pacific for this project. USAE provides comprehensive engineering, project management, and QC services in support of this SI. USAE is responsible for managing the schedule and budget to ensure completion of the tasks detailed in the PWS. USAE will provide unexploded ordnance (UXO) Technicians and other qualified personnel as necessary for the safe conduct of the SI. The mix of UXO Technician positions may vary, depending on any CTO modifications. Subcontractor Wil Chee Planning, Inc., provides MC sampling expertise and support. The NAVFAC Pacific will direct all work performed by USAE and its subcontractors.

2.5 PROJECT PERSONNEL

USAE field personnel on this project have completed the training requirements found in Table 2-1 as required for their specific responsibilities. Additional site-specific training in accordance with the Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120 for Hazardous Waste Operations and Emergency Response (HAZWOPER) as well as Engineer Manual 385-1-1 (U.S. Army Corps of Engineers Safety and Health Requirements Manual) will be provided to all personnel upon their initial mobilization. Additionally, all USAE field personnel will participate in a Medical Surveillance Program, with the latest exam occurring within 12 months of field operations.

TABLE 2-1: PERSONNEL TRAINING

TRAINING COURSE	PERSONNEL ATTENDING
40-Hour Hazardous Materials Workers Training (HAZWOPER)	All personnel who have not previously received this training or who do not qualify for certification through documented experience or training equivalent to that in paragraphs (e)(1) through (e)(4) of 29 CFR 1910.120. (Reference: Paragraph (e)(9) 29 CFR 1910.120
8-Hour Supervisor Course	All USAE management and supervisory personnel. This includes the UXO Safety Officers, Senior UXO Supervisors, UXO QC Specialists, and all UXO Technicians III.
8-Hour Refresher Course	All site personnel, except those that have completed their initial 40-Hour HAZWOPER training within the past year.
First Aid and CPR Training	At least two site personnel will have current first aid and CPR training.

2.5.1 PROGRAM MANAGER

The USAE Program Manager is responsible for monitoring and controlling project costs and quality control, assigning personnel consistent with contract requirements, assuring compliance with regulations, and performing as USAE's chief representative in all contract responsibilities.

2.5.2 PROGRAM QC MANAGER

The USAE Program Quality Control Manager (PQCM) is responsible for reviewing and updating the Quality Control Plan and verifying compliance with the plan. The PQCM will verify compliance through audits of project activities and review of corrective actions.

2.5.3 PROGRAM HEALTH AND SAFETY MANAGER

The Program Health and Safety Manager (PHSM) has the following responsibilities:

- Reports directly to the Vice President of USAE for all safety and health matters;
- Assists in preparation and conducts a final review of the SHSP;
- Provides UXO safety and health consultation to the UXO Safety Officer (UXOSO);
- Coordinates with the Program Occupational Safety Manager (POSM) to ensure site compliance with the SHSP and the USAE Corporate Safety and Health Program; and
- Maintains an alternate line of communication with the President of USAE.

2.5.4 PROGRAM OCCUPATIONAL SAFETY MANAGER

The USAE POSM develops and coordinates the APP including the implementation of the Activity Hazard Analysis (AHAs). The POSM is the contact for regulatory agencies on matters of health and safety.

2.5.5 PROJECT MANAGER

The USAE Project Manager (PM) is responsible for managing the overall progress of the CTO, ensuring timely submittal of project deliverables, schedule and budget tracking, coordinating subcontractor's work, and ensuring that sufficient and appropriate resources are available to field personnel. The PM maintains close communication with the COTR to assess customer satisfaction regarding USAE performance on this CTO.

2.6 FIELD TEAM ORGANIZATION

The USAE Team will consist of a mix of UXO Technicians and other personnel. USAE project UXO personnel will meet the requirements set forth in the *Department of Defense Explosive Safety Board (DDESB) Technical Paper TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel*, dated 20 December 2004. Tasks will include location surveys, site preparation, soil sampling, and instrument-assisted ground reconnaissance. The team will consist of a Senior UXO Supervisor (SUXOS), UXOSO, UXO Quality Control Specialist (UXOQCS), UXO Technicians III (UXOTIII), UXO Technicians II/I (UXOTII/I), and an EMT (see Figure 2-2).

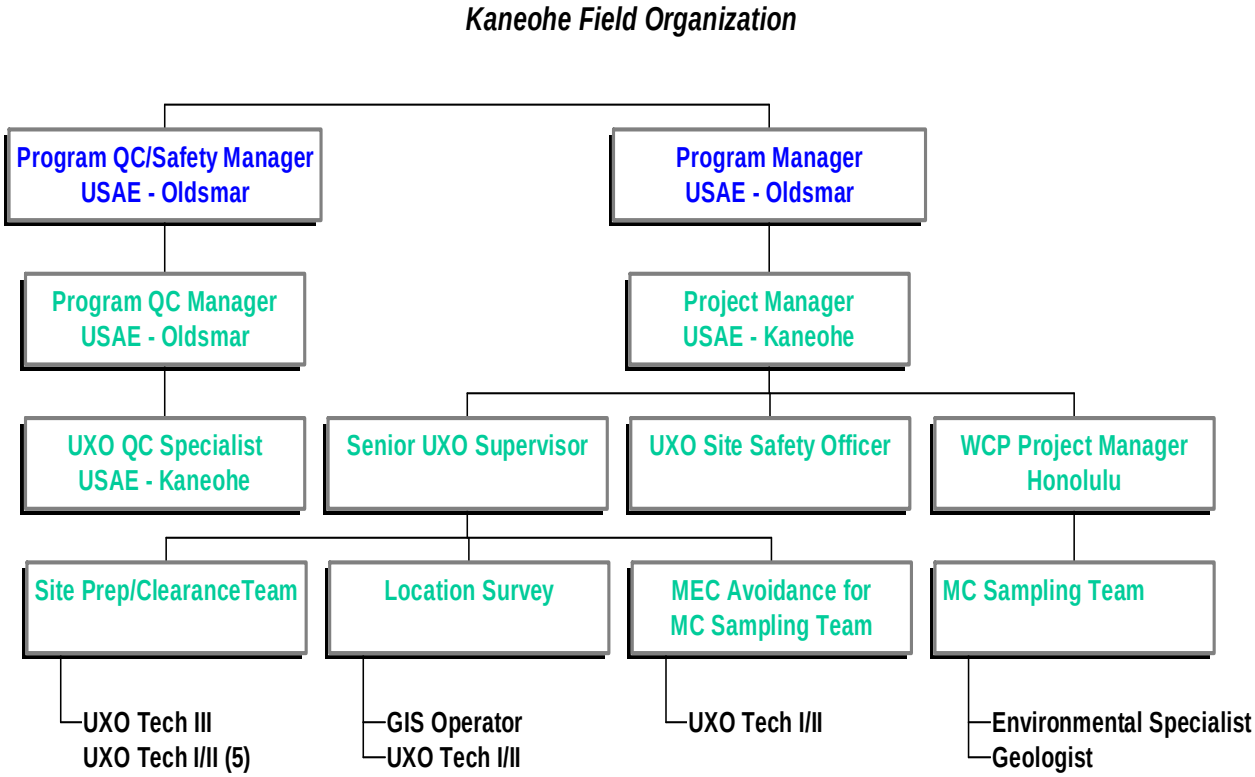

FIGURE 2-2: FIELD ORGANIZATION

2.7 MOBILIZATION AND SITE SETUP

The goal of the mobilization phase is to ensure that all project personnel are prepared and properly

equipped to perform applicable field activities. Upon notice to proceed from the NAVFAC Pacific Contracting Officer, an advance team consisting of the SUXOS, the UXOSO, and a UXOTII will mobilize a week ahead of the rest of the team. This advance team performs an initial geophysical instrument test to evaluate the performance and suitability of the Minelab Explorer II all-metals detectors to site-specific conditions. Additional actions performed during this phase include:

- Identify/procure, package, ship, and inventory project equipment, materials, and supplies;
- Organize support facilities;
- Perform site-specific training;
- Coordinate communications and other support;
- Confirm that all personnel have the proper training records and are under medical surveillance;
- Coordinate details with MCBH personnel; and
- Finalize operating schedules.

2.7.1 SITE-SPECIFIC TRAINING

As part of the mobilization, USAE will perform site-specific training for all personnel assigned to this project. The purpose of this training is to ensure that personnel fully understand the procedures and methods USAE will use to perform operations at site areas, their individual duties and responsibilities, and all safety and environmental practices/procedures associated with site operations. Training topics/issues and training responsibilities are as follows:

- Prior to mobilization, the SUXOS will receive operational briefings on his duties and responsibilities, and will review the work and safety plans;
- Prior to mobilization, USAE UXO personnel will receive HAZWOPER 40-hours (or 8-hour refresher) training as required;
- All UXO personnel on site will have completed a pre-placement or annual physical examination that complies with the requirements of 29 CFR 1910.120. All personnel will be certified as fit to work by an Occupational Physician certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. USAE onsite personnel will be participants in the USAE medical surveillance program. Documentation as to the medical qualifications of personnel is on file on site and is provided to the Contracting Officer upon request;
- Prior to the start of operations, the USAE team will receive MEC recognition and UXO safety precautions. This training will be performed by the SUXOS and UXOSO;
- Prior to the start of operations, the USAE team will receive training in map reading, the selected all-metals detector, and operation of the handheld GPS/Data Collection tool;
- Prior to the start of operations, the USAE team will receive biological and cultural awareness training from MCBH archaeological and ecological monitoring staff.
- All site personnel will receive training on the APP and the AHAs.

2.8 GENERAL SITE PRACTICES

All operational activities will be performed under the supervision and direction of qualified UXO personnel. A certified Emergency Medical Technician (EMT) will be on site during all field activities. Non-UXO qualified personnel will be prohibited from performing operations unless they are accompanied and supervised by a qualified UXO Technician. Detailed safety precautions and procedures are contained in the APP. Throughout operations, USAE will strictly adhere to the following general practices.

2.8.1 WORK HOURS

USAE will work 10-hour work days, 4 days per week during the fieldwork. The workweek will be Monday-

Thursday, with Friday reserved as a make-up day in case of bad weather.

2.8.2 SITE ACCESS

USAE personnel will visually monitor pedestrian and vehicle traffic around work areas and will limit access to only those essential personnel necessary to accomplish the specific operations, or who have a specific purpose and authorization to be on the site.

2.8.3 HANDLING OF MEC

USAE will instruct and closely supervise all site personnel to ensure they do not handle or are not exposed to any MEC. If MEC is located during the SI, UXO personnel will not disrupt the item, but will note its location using provided site maps or GPS equipment, photograph and describe the item. Munitions debris will not be handled or touched unless a qualified UXO Technician has first checked the item.

THIS POLICY WILL BE STRICTLY ENFORCED

2.8.4 SAFETY TRAINING/BRIEFING

USAE will routinely conduct two distinct safety meetings and briefings:

- Daily general briefing; and
- Daily tailgate safety briefing.

In addition, the SUXOS may hold a safety stand-down at any time he notes any degradation of safety or a safety issue that warrants a review.

2.8.4.1 Daily General Briefing

The SUXOS and UXOSO will conduct daily general briefings for all personnel at the site prior to beginning work. USAE will maintain a written record of this training and the signatures of personnel attending the training. The briefing will cover general hazards for the project and any new safety issues or hazards identified since the last briefing.

2.8.4.2 Daily Tailgate Briefing

At the job site the UXOTIII (Team Leader) will conduct tailgate safety briefings on specific hazards anticipated at the work site during that day's operations and the safety measures to eliminate or mitigate those hazards. The tailgate safety brief will also refer to other operations within the area whose proximity may have safety ramifications. As work progresses and team locations change within a site, the briefings will also review any corresponding changes in ingress/egress routes and emergency evacuation routes. The applicable AHAs for the work at hand will be reviewed on a daily basis during the tailgate briefing.

2.8.4.3 Visitor Safety Briefing

Site visitors must receive a safety briefing prior to entering the operating area and a qualified UXO Technician must escort visitors at all times while on site. All visitors must sign the visitors' log prior to entering the site.

2.8.5 ENVIRONMENTAL AWARENESS

Environmental concerns and issues will be discussed as part of safety and operational briefs, with the objective of minimizing impact. County, State, and community concerns will be taken into consideration. Items that will be discussed, as needed, include the following;

- Minimization and monitoring for soil erosion and siltation;
- Minimization of vegetation removal;
- Minimizing impacts to wildlife;
- Location of any archaeological or items of cultural significance;
- Monitoring for any sensitive plant species;
- Keeping vehicles on the established roads and trails to the degree possible; and
- Other such items depending on the work being conducted.

2.8.6 SAFETY AND ENVIRONMENTAL VIOLATIONS

Safety violations or unsafe acts will be immediately reported to the SUXOS and UXOSO. Failure to comply with safety rules/regulations or failure to report violations may result in immediate termination of employment. Reckless interference with sensitive species or blatant disregard for environmental issues will likewise not be tolerated and may lead to termination of employment.

2.8.7 WORK CLOTHING AND FIELD SANITATION

Work clothing will be appropriate for the conditions encountered. In most cases, this will be Level D Personal Protective Equipment (PPE), which includes:

- Short or long sleeve cotton coveralls or work clothing;
- Footwear is sturdy work boots or rubber boots as appropriate (i.e., lug sole and of sufficient height for ankle support). UXO personnel will not wear steel-toe safety boots when using metal detectors;
- Hand protection will consist of leather or canvas work gloves. Rubber inner or outer gloves may be required where increased protection is needed;
- Safety glasses, face shields, respirators, hearing protection, hard hats and protective chaps or aprons will be available and worn when engaged in activities where their use is prudent or required; and
- In no case will tennis/running shoes or abbreviated attire such as tank tops or shorts be permitted.

The UXO team will be outfitted with field decontamination equipment, which will consist of containers of wash water, paper towels, and soap. Good housekeeping and decontamination measures will be practiced.

2.8.8 COMPLIANCE WITH PLANS AND PROCEDURES

USAE will conduct operations at the MRS in a systematic manner using proven operating methods and techniques. All activities will be conducted under the direction, supervision, and observation of the SUXOS. All personnel will strictly adhere to approved plans and established procedures. When operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted by onsite supervisory personnel. Any new course of action or desired change in procedures will be submitted to the Contracting Officer with justification for approval as required. Approved changes will be implemented in a manner that will ensure uniformity in procedures and end-product quality on the part of the USAE team.

2.9 PREPARATION OF WORK AREAS

Prior to initiating work, the project site will be visually accessed by the SUXOS, UXOSO and the UXOTIII to determine the safest way to proceed with SI activities. USAE will ensure that the access routes are clear of MEC prior to commencement of operations.

2.9.1 INSTRUMENT TEST AREA

USAE will use Minelab Explorer II hand-held analog detection for all MEC reconnaissance. An instrument test area for the geophysical instruments will be established at the site using appropriate inert items or simulants. Testing of the Minelab Explorer II metal detectors will be accomplished prior to the start of the surface reconnaissance operations. The test area will serve as a validation for the geophysical equipment and will be used as a function check area for daily pre and post verification of equipment operability.

The test area will be located in a convenient location that simulates the MRS site conditions and permits efficient daily use. The selected location will be checked with each instrument type for background anomalies prior to any blind seed item (BSI) placement. If necessary, the test area will be relocated to avoid background anomalies. The ground surface of the test area will be seeded with inert MEC items (or equivalent simulants), collectively referred to as BSI, at various orientations. The test area will consist of the following inert BSIs: MkII hand grenade, 40mm rifle grenade, 37mm projectile, 3.5-inch rocket, and 75mm projectile.

Performance of the Minelab Explorer II will then be evaluated at the Test Area. Minelab Explorer II settings will be optimized to detect the seed items and reject the high Basalt geology. Optimum settings will be stored in each Minelab Explorer II unit for use on this project. Any change to the established settings, needed to maximize the test strip detection results while minimizing background responses, will be documented and reported.

A brief performance report will be issued documenting the geophysical instrument's ability to detect the seed items, and sensitivity to the high magnetic background conditions (e.g., the instrument's ground compensation ability to discriminate local geology). The report will recommend the initial, best performing settings for the geophysical investigation task, with the understanding that the site geological conditions are likely to change and may require adjustments to the established settings.

2.9.2 VEGETATION CLEARANCE

UXO personnel will cut the vegetation where necessary to clear transects, using machetes. The MEC Team will conduct the site inspection of the WVTA, traversing around vegetative obstructions or using machetes to clear 5-foot wide transects through the rainforest. Vegetation clearance will be limited to removal of brush, vines and tree limbs that would directly impede the movement of the metal detection instruments.

2.10 DELIVERABLES

Deliverables will be in accordance with contract and PWS requirements.

2.10.1 PROJECT STATUS REPORT

USAE will submit a Status Report with invoices to the NAVFAC Pacific COTR RPM in accordance with the contract and PWS requirements.

2.10.2 SI REPORT

Throughout the execution of task order modifications, USAE will collect data that will be incorporated into the SI Report. USAE will submit a Draft SI Report 60 calendar days after all fieldwork is completed. A Draft Final SI Report will be submitted 21 calendar days after receipt and successful incorporation of all comments received from the Contracting Officer. The Final SI Report will be submitted 14 days after receipt and successful incorporation of the government's final comments. Format for the report will be as specified in the PWS.

The SI Report will document findings of data collection efforts and field investigation, present a refined CSM, assess potential MEC and MC hazards, provide conclusions and recommendations as to future actions required at each MRA, and provide a cost-to-complete estimate for each MRS recommended for future action.

2.11 FIELD OPERATIONS MANAGEMENT

During the SI, the SUXOS will direct and supervise the activities of onsite personnel. The USAE Project and Safety Managers will remain off site but will be available by telephone for consultation on safety or operational issues. The USAE GIS Manager, who is responsible for control of data included in and used as part of the project GIS, will be available by telephone for consultation.

2.12 PROJECT COMMUNICATION AND REPORTING

2.12.1 ONSITE COMMUNICATIONS

The USAE team will use radio communications while at WVTA. If at any time communications are unavailable, the team will exit the range and return to a staging area until communications are available. Due to the type of ordnance present it is anticipated that Hazards of Electromagnetic Radiation to Ordnance (HERO) requirements will not be applicable, however, for good practice USAE personnel will not use handheld radios within 100 feet of a suspect ordnance item.

2.12.2 PROJECT CORRESPONDENCE

USAE will document substantive phone conversation and written correspondence related to the performance of the SI in accordance with contract requirements.

2.12.3 FIELD RECORDS

During field efforts, USAE will maintain records in the project field office with copies sent weekly to the project files in Oldsmar, Florida. Following completion of the fieldwork, USAE will deliver all files to the project files in Oldsmar, Florida. Such records will include daily summary sheets, and related field and daily logs. USAE will maintain a detailed digital account of MEC encountered during operations. This accounting will include the unique identifying number, location of the item, and a digital photograph as part of the official project record. The SUXOS will provide specific details regarding the items found to include, but not limited to, specific nomenclature, type of fuzing, condition, and external markings. This data will be stored in a daily digital reconnaissance data base file and the project digital database.

USAE will maintain field logs to record site activities and field data in a neat and legible manner. USAE personnel will make log entries in indelible ink. USAE will enter the following information during the course of the SI activities.

- Date and team location;
- Personnel and work performed;

- Equipment and instrument checks;
- Injuries and/or illnesses;
- Changes to work instructions;
- GPS/map coordinates for MEC items;
- Work stoppage;
- Visitors;
- Other relevant events; and
- Signature of SUXOS.

USAE personnel may supplement logs and records by the use of preprinted forms (i.e. safety inspection forms, tailgate safety briefings). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms are located in Appendix B of this WP. All handwritten records and logbook entries will be scanned into an acceptable digital form and submitted as part of the digital data package.

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3.0 MEC MANAGEMENT AND CONTINGENCY PLAN

This section describes the MEC anomaly avoidance procedures and accounting processes that will be used if MEC is encountered. No explosives will be stored or used by USAE on site. MEC encountered will be recorded in the handheld GPS/Data collection tool with the following data:

- The date and time of MEC encounter;
- The location, unique identifying number, type, orientation, soil type, surrounding vegetation, and description of UXO and MEC items encountered.

3.1 MINIMUM SEPARATION DISTANCE

The Minimum Separation Distance (MSD) for the public will be 200 feet. The 200 foot MSD is based on the fact that no MEC operations are being conducted, that no team member will be allowed to handle or move any MEC item found, all operations will be based on the concept of MEC avoidance, and therefore the public will not be endangered.

3.2 ANOMALY AVOIDANCE SUPPORT

UXO technicians will escort non-UXO personnel during performance of their duties within areas of potential MEC risk. Activities most likely to require anomaly avoidance support include archaeological monitoring and MC sampling operations. Anomaly avoidance escort consists of a visual surface search for MEC and a search for subsurface anomalies. Any surface MEC encountered will be marked, avoided, and reported to the appropriate authorities. Prior to digging for soil samples during MC sampling operations, the UXO Technician will search the location with a Minelab Explorer II. Any subsurface anomaly will be assumed to be MEC and an anomaly-free location will be chosen.

Project personnel will report all MEC encounters to the SUXOS, and UXO technicians will mark all subsurface anomalies for avoidance. The SUXOS will be responsible for directing the actions of the anomaly avoidance support personnel. Throughout these operations, the SUXOS will closely monitor performance to ensure that procedures are being performed with due diligence and attention to detail. For any surface MEC item encountered, the daily log shall provide a description of the suspected MEC item in standard ordnance terminology, date encountered, and location.

3.3 MEC SITE INSPECTION

The MEC investigation reconnaissance is targeted to potential areas of concern identified during the historical records review. At a minimum, a MEC investigation reconnaissance will be traversed over 14 acres of the WVTA. Every effort will be made to investigate to as high an elevation as is safely possible. However, terrain that is too steep to safely traverse on foot, as determined by the UXOSO, will be avoided. Data collected during the reconnaissance, along with existing archival data, will be used to determine the amount and location of areas requiring further investigation. The site maps provided in Appendix A depict the MRS and proposed idealized instrument-assisted ground reconnaissance transects. These maps will be refined based on information gained from site observations.

3.3.1 DATA COLLECTION PROCEDURES

The MEC Reconnaissance Team will consist of the UXOTIII team leader and five UXOTII/I team members. Three groups of two personnel each will be assigned to inspect separate 5-foot wide transects. Each group will be equipped with a metal detector to aid with the detection of surface MEC and to evaluate the sub-surface anomaly density. Due to the sites heavy vegetative canopy, GPS will not be relied upon as a primary means of navigation. Each group will be equipped with site contour maps,

compasses and range finders to aide in navigation while traversing the site. A Personal Data Assistant (PDA)/DGPS tool will be used by each group to record required MEC and reconnaissance data and as a backup means of navigation. Each group will attempt to follow contours along pre-determined topographic map terrain features, and will explore ravines, which may serve as collection points for washed-down MEC items. Where terrain permits, the team will attempt to investigate two 100-ft by 100-ft grids for each mile of transects inspected. At not less than 300-foot intervals, or when a clear view of the sky is traversed, and at grid locations, the team will attempt to obtain a GPS location and collect a waypoint, but will rely mainly on map-reading skills to identify their location on the ground. Each team member will visually inspect the ground surface for evidence of munitions use and will also be alert for visual evidence beyond the limits of the 5-foot lanes. As the planned transects primarily serve as a guide for the reconnaissance, the MEC Team will visually survey the surrounding areas and have the flexibility to inspect significant site features beyond the limits of those planned transects. Intrusive investigation of anomalies will not be performed during this reconnaissance effort.

3.3.2 REQUIRED DATA

Location, terrain, and vegetation data will be recorded along traversed reconnaissance transects. A waypoint or map location, brief description, and digital photograph will be electronically recorded for any MEC related items and significant metal detector responses. Locations and descriptions of ground scars, craters, vegetation, and terrain will also be recorded using PDA DGPS/Data Collection equipment.

3.3.3 EQUIPMENT AND INSTRUMENTS

Each group will utilize a compass, laser rangefinder and site contour map for navigation and to obtain position data relative to a known GPS position or known terrain features. For data collection, back-up navigation, and when available, GPS tracking, the Trimble GeoXT DGPS/Data Collection tool will be integrated with ArcPad mobile Geographical Information System (GIS) software and a site map. This GPS unit will track the team path if overhead vegetation allows. Where overhead vegetation does not allow a clear signal, the MEC Team will manually enter the position data into the GPS/Data Collection Tool, until sufficient GPS coverage is available. The MEC Team will record the reconnaissance data into the GPS/Data Collection Tool using a series of check-selection and pull-down menus to ensure consistent, normalized data and to minimize operator error. This data includes:

- The size, type, and location of MEC encountered;
- The approximate amount and type of surface munitions debris encountered and the number of significant sub-surface metal detector responses since the last data collection point;
- The distance and bearing of significant site features (e.g., large and/or fixed hard targets, terrain, variations in vegetation, and manmade and natural features of interest) from the last known GPS location;
- The location of potential sampling points in preparation for the subsequent MC sampling activities; and
- Digital photographs of MEC encountered.

At lunch time and at the end of each reconnaissance day, collected data will be downloaded to the project laptop computer.

For metal detection, the Minelab Explorer II hand-held metal detector will be used. Photographs will be taken using a standard digital camera.

3.3.4 EQUIPMENT AND INSTRUMENT TESTING

Operators will conduct daily tests on instruments and equipment systems, in accordance with Chapter 4 of the Quality Control Plan, to ensure that accuracy and reproducibility of the collected data is consistent with manufacturer's specifications. Operators will continuously monitor their equipment during operations to ensure that battery voltages are within the acceptable range and that the equipment is fully operational.

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4.0 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

This section details procedures that USAE will use to perform mapping and GIS integration during the SI.

4.1 ACCURACY

During SI activities, USAE will use integrated hand-held PDA/DGPS units. These DGPS units are able to obtain sub-meter accuracy by receiving coordinate corrections from U.S. Coast Guard Beacons placed throughout the United States and Coast Guard patrolled waters. No survey control monuments are needed for ground reconnaissance surveys. If DGPS units are unable to receive Coast Guard Beacon data because of terrain or other environmental factors, USAE will perform differential correction from the appropriate GPS base stations. It is USAE's responsibility to locate and utilize the appropriate GPS base station.

4.2 GIS INCORPORATION

The GIS database will be maintained at the USAE corporate office located in Oldsmar, Florida. The GIS Manager will manage the database. This database is used to store preliminary and final or published versions of project GIS data. It is the official project repository of GIS data, including unprocessed feature and attribute data sources that may be used outside the GIS. The Oldsmar based database is the main location for processing data sources into draft and final GIS products as well as production work.

All GIS data will be in ESRI personal geodatabase Version 9.1 format, with an x,y domain precision of 1000. Raster data such as orthophotography, will be in Tagged Image File Format (TIFF) or MrSID-compliant format. Associated databases will be in Microsoft Excel format. All data layers shall be compliant with the Spatial Data Standards for Facilities, Installations and Environment (SDSFIE) Version 2.6 and will be referenced to the Hawaii State Plane Coordinate System, North American Datum of 1983 with units in feet. All geospatial data will be documented in accordance with the Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM). Both ‘Mandatory’ and ‘Mandatory as Applicable’ fields, as defined by the FGDC Standards, shall be completed for each GIS Data layer.

4.3 GIS DATA COLLECTION

During survey activities, all position data will be sent back to the GIS Manager for inclusion into the project GIS. Survey data will include points along geophysical transects, locations of any MEC, cultural features, or archaeological sites found during field activities. During the SI field activities, ArcPad 7.0 mobile GIS will be used. ArcPad will be loaded onto the PDA/DGPS handheld units. As data is collected, location data and attributes are saved directly into ESRI Shapefiles. The shapefiles can be incorporated directly into the project GIS without any formatting or conversions. SI field data will be downloaded daily and sent back to the USAE Oldsmar office for processing and inclusion into the project GIS.

4.4 PLOTTING

Maps will be plotted at an appropriate scale and have a revision block, title block, index sheet layout, legend, grid lines, scale bar, and a true north arrow. In general, the direction of north will run from the bottom of the file to the top, with no skew. A sheet index for the project will be prepared that includes enough of the planimetric data to indicate the sheets geographical location in the project area. This index will be shown on each map with the current sheet crossed-hatched or heavily outlined. If required, a separate sheet file may be utilized for the index.

4.5 MAPPING

The location, identification, coordinates, and elevations of all control points recovered at the site will be plotted on a map from attribute data stored in the geodatabase. Locations of individual recovered MEC items will be located to a horizontal accuracy of plus or minus 1 foot within the grid and plotted on a map.

4.6 DIGITAL DESIGN DATA

All GIS data will be delivered in ESRI personal geodatabase version 9.1 format. Metadata will be completed for each feature class following the standards described in section 4.2.

4.7 COMPUTER FILES AND DIGITAL DATA SETS

All final document files will be delivered to NAVFAC Pacific in Microsoft Office 2003 format. The drawing and plot data will be provided in Hawaii State Plane Coordinate System, North American Datum of 1993 with units in feet. GIS data will be submitted in ESRI Personal Geodatabase Version 9.1. Raster data, such as U.S. Geological Survey Topographic Quadrangles or Orthophotography, will be provided in either GEOTIFF or MrSid format.

All ArcGIS project files (.mxd) will be supplied with the appropriate final report. All GIS/geospatial projects (.mxd's) shall be delivered with all related source files in a specific project file, including extension, graphics, photos, CAD, source code (non-encrypted, Visual Basic) based on ArcGIS Version 9.1. Embedded file path information shall include only relative paths. A readme file shall be included with instruction to load the project file and any environment variables needed to capture the path information. In addition to GIS data and project files, maps will delivered in pdf format for viewing without modification.

All final GIS data generated from this project will conform to SDSFIE.

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5.0 PROJECT MANAGEMENT PLAN

This Project Management Plan is prepared for the purpose of effective management of allocated funds and manpower. All work will be accomplished in order of precedence set forth in CTO 0004. This plan defines the approach to managing the project, the method of cost control, and outlines a schedule for implementing the project.

Effective management is an essential element in delivery of a quality product. USAE is committed to providing a management structure that meets this goal and is tailored to the operational requirements of the project. Early in the mobilization process, USAE brings its management personnel on line. This ensures that from the onset managerial, safety, and QC personnel are integrated into the operation. USAE's experience has shown that dedication of these resources during the initial phases of a project results in significant manpower and cost savings during the operational phase.

5.1 PROJECT MANAGEMENT APPROACH

USAE has evaluated the work requirements for this CTO and developed a comprehensive approach for meeting its objectives. The goals and objectives of each operational phase and its specific manpower requirements are identified in Section 2 of this WP.

5.2 COMMUNICATION

Communication is a key aspect of project management. A work task proposal was prepared to define the statement of work and plan the project deliverables. A copy of the work task proposal was given to each member of the project team as a reference guide for the project. The role of the Project Manager is to direct the project team to implement the plan to prepare the deliverables. This will be accomplished via team meetings, one-on-one meetings with team members, and review of deliverables during the preparation process.

Communications for this project will generally flow along the lines established by the organization depicted in Section 2, Figure 2-2. All communications between USAE and the NAVFAC Pacific will primarily be directed through the COTR or the Contracting Officer at NAVFAC Pacific by the USAE Project Manager. Communication directly between USAE and other government entities associated with this project will only occur when directed by NAVFAC Pacific.

5.3 SUBCONTRACTOR MANAGEMENT

Before subcontract work is performed, USAE will negotiate and prepare subcontracts that will detail all necessary and appropriate terms and conditions, including the PWS. Once the subcontract is executed, USAE will perform periodic reviews to ensure that contractual requirements and milestones are met. These reviews will cover contractual progress, technical progress, and cost and schedule status. USAE technical staff will review data generated by the subcontractor as part of subcontract deliverables.

USAE will maintain overall supervisory responsibility for all operations. Subcontractors will work under the direction and oversight of USAE's SUXOS and will be monitored by USAE's UXOQCS. The SUXOS will schedule all operational activities and a strict accounting will be made of actions performed and activities completed. Throughout their operations, subcontractors will coordinate their operational schedules with USAE's SUXOS, and strictly adhere to this WP and associated APP.

The following subcontractors will perform work for USAE at the Waikane Valley Training Area:

- **Wil Chee Planning, Incorporated** (Wil Chee): – collecting and shipping soil samples, arranging for soil analysis and reports.

5.4 RECORDS MANAGEMENT

Hard copies of primary records for the site will be retained in the project files located in the Document Control Center in the USAE Oldsmar, Florida, office located at 720 Brooker Creek Boulevard, Suite 204, Oldsmar, Florida 34677. Such records will include the delivery order and any modifications, correspondence including meeting minutes and monthly reports, draft submittals, responses to comments and final submittals, and correspondence received from NAVFAC Pacific or other agencies. Electronic versions of working products will be retained within the USAE Oldsmar network server. Access to all servers is password controlled. Historical records and documents including previous study reports, historical drawings and maps, and related items will be retained in working files located in the Project Manager's office. Copies of these data will be provided as required by the PWS.

5.4.1 MONTHLY REPORTS

The Project Manager will prepare a monthly status report to accompany invoices. The report will be provided to the NAVFAC Pacific COTR. Information on the topics in the following subsections will be provided.

5.4.1.1 General

- Contract number, task order number, project location, and ending date of the report;
- Brief description of project scope and methodology/equipment used for detection of MEC; and
- Name of USAE's Project Manager, SUXOS, UXOSO, and UXOQCS.

5.4.1.2 Cost/Schedule/Progress Data

- Costs in a spreadsheet format. The data will show weekly expenditures for labor, materials, travel, and will include amounts showing authorized versus expenditures. The spreadsheet will provide a roll-up of balances and remaining funds including percentage of total;
- Progress by Task/subtask including actual completion versus planned (in grids and/or acres); and
- Project schedule indicating baseline schedule and explanations for deviations.

5.4.1.3 Discussion of Issues

- Discussion of ability to complete within funds currently authorized;
- List/status of pertinent correspondence related to the project;
- List/status of deliverables and dates submitted; and
- Discussions of any issue that impact completion of project on schedule.

5.4.1.4 Field Information

- Statistical Data: including percent of project completed; total grids/transects in project, grids/transects visually inspected; number of inert MEC items identified;
- Significant comments including types of MEC, presence of visitors;
- Results of daily QC/safety inspections; and
- Description of operations planned.

5.4.1.5 Personnel On Site

- Listing of personnel on site by position, and workday; and
- Summary of total man-hours expended.

5.4.2 WORK SCHEDULE AND DAILY SCHEDULE

USAE has prepared an initial project schedule (see Figure 5-1) for the work associated with this task order. The schedule depicts the activities associated with the work, the sequence in which the work will be performed and proposed start and finish dates for accomplishing the work. This schedule is based on a 40-hour workweek, consisting of four 10-hour days. Work schedules may vary depending on site requirements. Figure 5-1 presents a project schedule showing the logical progression of tasks and the number of working days estimated to complete each task.

5.5 COST CONTROL AND TRACKING

A computer-based cost control and tracking system will be used to prepare earned value monthly progress reports. The report will be prepared to assess the expenditures on each open task. The expenditures on each task will be rolled-up to total project expenditure.

5.6 DELIVERABLES

The Project Manager is responsible throughout the project for issuing the following documents, which are important with respect to the work, data, and cost management plan:

- Draft Work Plan (see Figure 5-1);
- Draft Final Work Plan (due 21 days after receipt of comments)
- Final Work Plan (due 14 days after receipt of comments);
- Draft SI Report (due 60 days after completion of field work);
- Draft Final SI Report (due 21 days after receipt of comments); and
- Final SI Report (due 14 days after receipt of comments).

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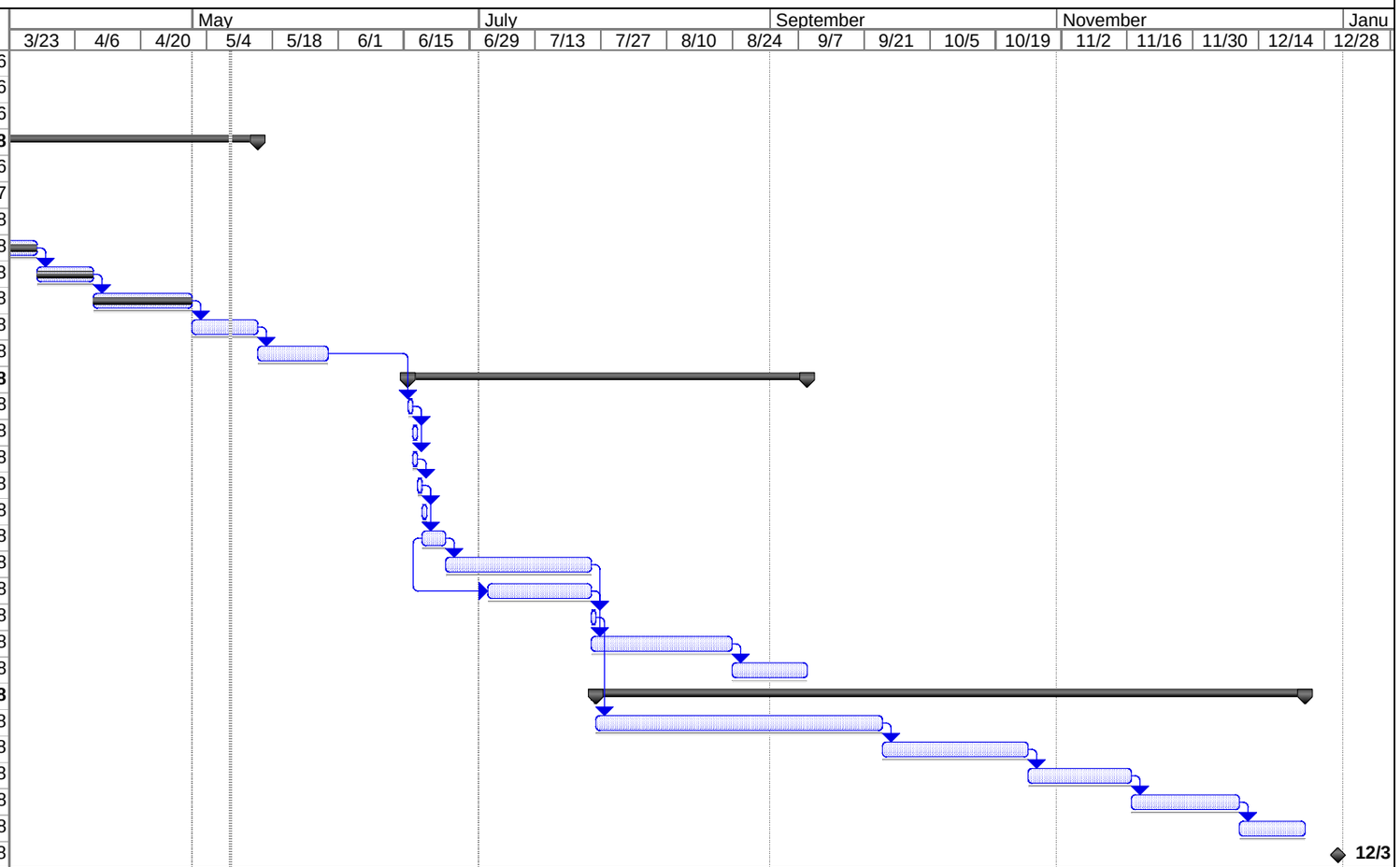
Figure 5-1. Schedule for Site Inspection
Waikane Valley Training Area, Kaneohe

ID	Task Name	Duration	Start	Finish
1	Task Order Award	0 days	Tue 9/26/06	Tue 9/26/06
2	Project Schedule	14 days	Wed 9/27/06	Tue 10/10/06
3	Initial Project Meeting	1 day	Tue 9/26/06	Tue 9/26/06
4	**Work Plans and SAP**	**578 days**	**Tue 9/26/06**	**Wed 5/14/08**
5	Draft Work Plan	60 days	Tue 9/26/06	Tue 11/28/06
6	Government Review	376 days	Wed 11/29/06	Thu 12/20/07
7	Draft Final WP	23 days	Fri 12/21/07	Mon 1/14/08
8	Review Comments	72 days	Tue 1/15/08	Fri 3/28/08
9	Response to Comments	12 days	Sat 3/29/08	Wed 4/9/08
10	NTP to Final WP	21 days	Thu 4/10/08	Wed 4/30/08
11	Final WP	14 days	Thu 5/1/08	Wed 5/14/08
12	Notice to Proceed - Fieldwork	14 days	Thu 5/15/08	Thu 5/29/08
13	**Field SI Activities**	**69 days**	**Mon 6/16/08**	**Mon 9/8/08**
14	Mobilize Advance Team	1 day	Mon 6/16/08	Mon 6/16/08
15	Geophysical Proveout	1 day	Tue 6/17/08	Tue 6/17/08
16	Survey Boundaries	1 day	Tue 6/17/08	Tue 6/17/08
17	Mobilize SI Team	1 day	Wed 6/18/08	Wed 6/18/08
18	Kickoff Meeting	1 day	Thu 6/19/08	Thu 6/19/08
19	Team Training	2 days	Thu 6/19/08	Mon 6/23/08
20	Detector-Aided Survey	19 days	Tue 6/24/08	Thu 7/24/08
21	Field Soil Sampling	13 days	Thu 7/3/08	Thu 7/24/08
22	Demobilize	1 day	Fri 7/25/08	Fri 7/25/08
23	Laboratory Analysis	30 days	Fri 7/25/08	Sat 8/23/08
24	Data Validation	15 days	Sun 8/24/08	Mon 9/8/08
25	**SI Report**	**146 days**	**Sat 7/26/08**	**Tue 12/23/08**
26	Draft SI Report	60 days	Sat 7/26/08	Wed 9/24/08
27	Government Review	30 days	Thu 9/25/08	Sat 10/25/08
28	Draft Final SI Report	21 days	Sun 10/26/08	Sun 11/16/08
29	All Review/Comments	21 days	Mon 11/17/08	Tue 12/9/08
30	Final SI Report	14 days	Wed 12/10/08	Tue 12/23/08
31	Contract Completion Date	0 days	Wed 12/31/08	Wed 12/31/08



Project: Waikane SI
Date: Fri 5/9/08

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External MileTask
Split

6.0 ENVIRONMENTAL PROTECTION PLAN

This section describes the approach, methods, and operational procedures to minimize pollution, protect and conserve natural resources, or restore damage during this SI. Project activities will comply with all Applicable or Relevant and Appropriate Requirements (ARARs).

The SI field activities will include; site preparation (geophysical test strip); collection of surface soil samples (0-6 inches); and a visual inspection of the ground surface along predetermined transects. Intrusive activities other than collection of soil samples will not be conducted.

Results of site inspections will be recorded in field notebooks, and photographs will be taken as necessary to document observations of species or suitable habitats. If protected species are identified, USAE will evaluate the surrounding area to recommend relocation of inspection activities, if possible. Proposed mitigation strategies would be coordinated with appropriate state or federal agencies.

6.1 ENVIRONMENTAL CONSIDERATIONS

Section 121(d) (1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act, requires that remedial actions must attain a degree of cleanup that assures protection of human health and the environment. ARARs include federal standards, requirements, criteria, and limitations under state environmental or facility siting regulations that are more stringent than federal standards. Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, U.S. Environmental Protection Agency's policy for response actions is that ARARs will be identified and attained to the extent practicable.

6.2 ENDANGERED/THREATENED SPECIES

The Endangered Species Act, 16 USC 1531 et. Seq. requires that this action not jeopardize the continued existence of endangered or threatened species, or their habitats. Surveys of the site conducted by Char and Associates (1989) and AECOS Consultants (2003) found no federally listed threatened or endangered plant species and no plants proposed for listing. The endemic Hawaiian sub-species of the Short-eared Owl was not detected during surveys but may use resources present within the site, especially in the higher elevations of the valley wall. Typical nesting habitat for the threatened Newell's Shearwater is also found on the upper slopes, but there are no known colonies of this species on Oahu. The SI fieldwork is scheduled to avoid the higher, steeper slopes and will not intrude on these areas.

6.3 WETLANDS

The Wetlands Protection Act, 33 CFR 320 et. seq., requires that this action be taken in such a manner as to minimize loss or degradation of wetlands. A field survey conducted at the project site (AECOS Consultants 2003) revealed no distinct wetlands.

6.4 CULTURAL AND ARCHAEOLOGICAL RESOURCES

The MCBH Kaneohe Bay Environmental Assessment identified several sites of cultural significance on the project site, most of them along the Waikane Stream. SI work practices will avoid cultural sites where possible, and an approved archaeologist will monitor the work in culturally significant areas to ensure that cultural artifacts are not disturbed. MCBH Kaneohe Bay has sent written Section 106 consultations to the SHPO and various Native Hawaiian organizations. An archaeological monitoring plan will be approved, work teams will be given appropriate training on recognition and avoidance of cultural sites, and will be accompanied by archaeological monitors when working near cultural sites.

6.5 TREES AND SHRUBS

Limited vegetation removal will be performed only to facilitate the safe conduct of the visual reconnaissance and soil sampling efforts. No trees or shrubs with trunks greater than 1 inch in diameter will be disturbed.

6.6 EXISTING WASTE DISPOSAL SITES

No known waste disposal sites exist at the project site.

6.7 MITIGATION PROCEDURES

6.7.1 MANIFESTING, TRANSPORTATION, AND DISPOSAL OF WASTES

USAE will store solid wastes (drinking water bottles, food containers, or other material) generated during the intrusive operations in plastic bags for disposal at the hotel or local waste transfer/disposal facility.

6.7.2 BURNING ACTIVITIES

No burning activities will take place during this project.

6.7.3 DUST AND EMISSION CONTROL

USAE will conduct operations in a manner that produces minimal dust and/or air pollution. Dust pollution will be limited to dust generated by vehicular traffic.

6.7.4 SPILL CONTROL AND PREVENTION

USAE does not anticipate having any hazardous/harmful liquids on site during this project.

6.7.5 CONTROL OF WATER RUN-ON AND RUN-OFF

SI activities will not disturb the local drainage patterns.

6.7.6 MINIMIZING AREAS OF DISTURBANCE

Procedures for minimizing areas of disturbance include such measures as:

- Driving on established roads as much as possible; and
- Limiting vehicle trips in areas without roads.

6.8 POST-ACTIVITY CLEAN-UP

At the conclusion of field activities, USAE will remove project materials and solid wastes from the project sites. USAE will backfill soil sampling locations with displaced soil and restore the site to its former condition.

6.9 AIR MONITORING

USAE will not perform air monitoring during this project.

7.0 REFERENCES

The following are references applicable to this project, but are not all-inclusive. USAE will comply with applicable Federal, State, and local requirements. Following all applicable requirements and regulations listed in the following publications will ensure the safety and health of onsite personnel and the local community.

7.1 FEDERAL REGULATIONS

- Code of Federal Regulations (CFR)
  - 33 CFR 320 Wetlands Protection Act
  - 40 CFR 300.430 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 1993.
  - 43 CFR 7.4 Protection of Archeological Resources
  - 43 CFR 10.4 Native American Graves Protection and Repatriation Act
- Endangered Species Act 16 U.S.C. 1531-154.

7.2 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

- Occupational Safety and Health Administration (OSHA) 1994 General Industry Standards, 29 CFR 1910 and Construction Industry Standards, 29 CFR 1926; especially 1910.120/29CFR 1926.65-Hazardous Waste Site Operations and Emergency Response.

7.3 NAVY REGULATIONS AND INSTRUCTIONS

- NAVSEA OP 5, Ammunition and Explosives Ashore;
- OPNAVINST 8020.14, Explosives Safety Policy Manual;
- OPNAVINST 5530.13B, Department of the Navy Physical Security Instruction for Conventional Arms, Ammunition, and Explosives.

7.4 STATE OF HAWAII GUIDANCE AND REQUIREMENTS

- HAR 11-451-15 Hawaii State Contingency Plan
- Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (Hawaii Department of Health; May 2005)

7.5 DEPARTMENT OF DEFENSE PUBLICATIONS

- DOD 4160.21-M-1 Defense Demilitarization Manual
- DOD 6055.9-STD, Ammunition and Explosive Safety Standards
- DDESB TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel

7.6 OTHER DOCUMENTATION

- ATFP 5400.7 Bureau of Alcohol Tobacco and Firearms, Federal Explosive Laws and Regulations.
- AECOS Consultants. 2003. *Biological resources report for a proposed Marine Corps Jungle Warfare Training Area in Waikane Valley on windward Oahu.* September.
- Belt Collins & Associates, 1990. *Final Environmental Assessment for Fencing/Warning Signs and Demolition Work for FY87 MCON Project P-106, Land Acquisition, Waikane, Oahu, Hawaii.* July.

- Tuggle, H.D. and Bruce A. Wilcox. 1998. *Strategic Integrated Resources Management Planning for Selected Properties of Marine Corps Base Hawaii: Camp H.M. Smith, Puuloa Training Facility, and a Portion of Waikane Valley.* October.
- Magnuson, Coral M. And Mike T. Carson and John A. Peterson. 2004. Cultural Resource Assessment for the Waikane Valley Impact Area, Island of Oahu, Hawaii: TMK 4-8-14. June.
- Marine Corps Base Hawaii. 2004. Draft Environmental Assessment (EA) for the Proposed United States Marine Corps (USMC) Jungle Warfare Training Waikane Valley, Oahu, Hawaii. September.
- U.S. Army Corps of Engineers Safety and Health Requirements Manual. Engineer Manual 385-1-1, latest edition
- U.S. Army Corps of Engineers St. Louis District, May 2007. Final Archive Search Report On the Use of Cartridge, 20mm Spotting M101 for Davy Crockett Light Weapon M28, Schofield Barracks and Associated Training Areas, Islands of Oahu and Hawaii.
- United States Army Engineering and Support Center, Huntsville. 2006. Draft Engineering Evaluation/Cost Analysis (EE/CA) Report Plan, Former Waikane Valley Training Area, Island of Oahu, Hawaii.
- United States Department of Agriculture, Soil Conservation Service (USDA SCS), Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. In cooperation with the University of Hawaii Agricultural Experiment Station, August 1972.

End of document.

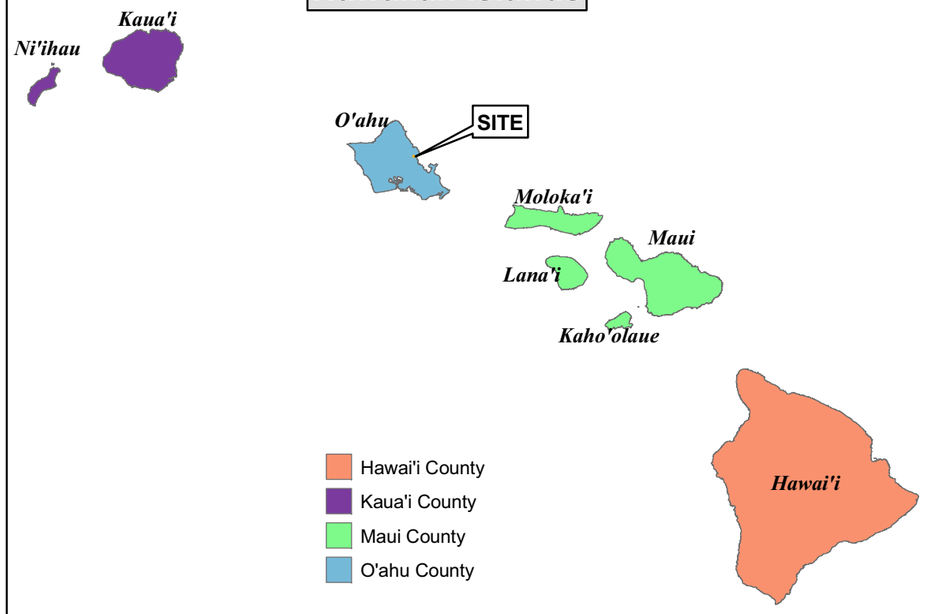
APPENDIX A

A.0 SITE MAPS AND DRAWINGS

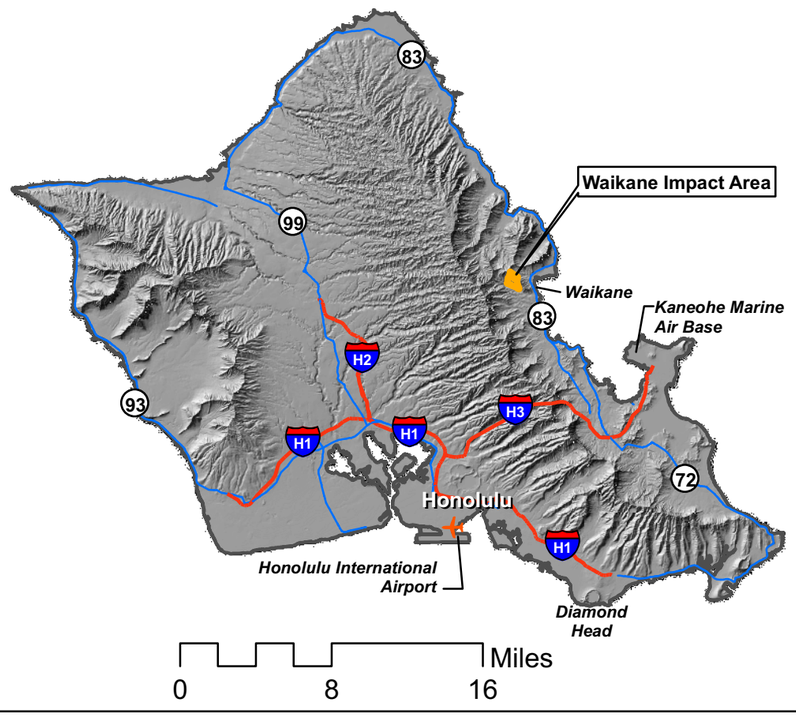
This appendix contains the following maps for the Munitions Response Site at the Waikane Valley Training Area:

- Figure A-1: Location Map
- Figure A-2: Site Map
- Figure A-3: Conceptual Site Model of Exposure Pathways
- Figure A-4: Investigative Transects Map
- Figure A-5: MSD Map

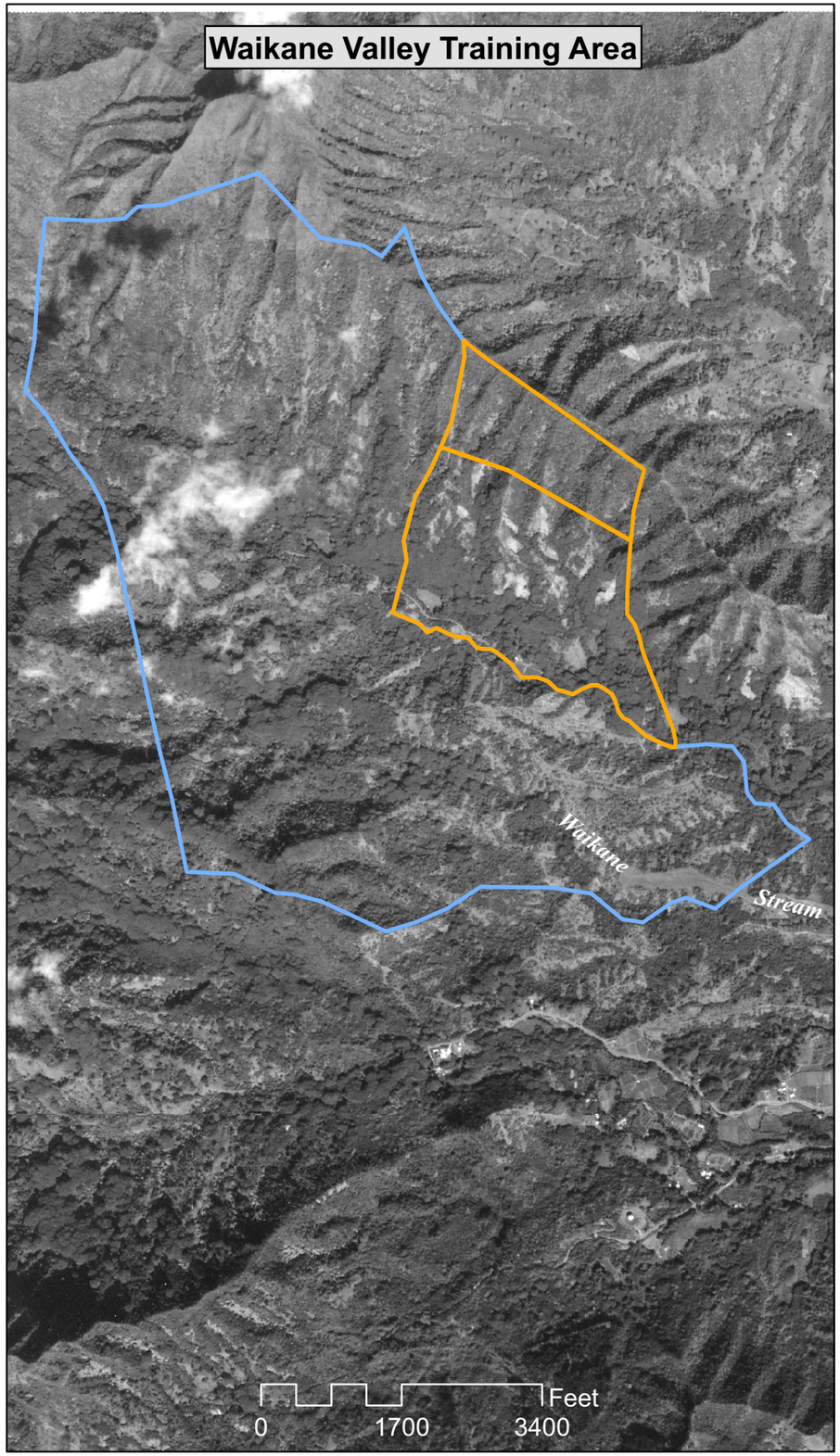
Hawaiian Islands



Island of O'ahu



Waikane Valley Training Area



N

Data is projected to the UTM Coordinate System: Zone X North, NAD83, Units in Meters.

Figure A-1

Location Map

Waikane Valley Training Area
Koolaupoko District, O'ahu, Hawai'i

Legend

- Freeway
- Highway
- Training Area Boundary
- Waikane FUDS Boundary

USA Environmental, Inc.

NAVFAC Naval Facilities Engineering Command

Drawn By:	WAC/JAL	Scale: Varies	Rev: 1
Checked By:		Date Drawn:	11-17-2006
Submitted By:	RN	Revision Date:	12-28-2007

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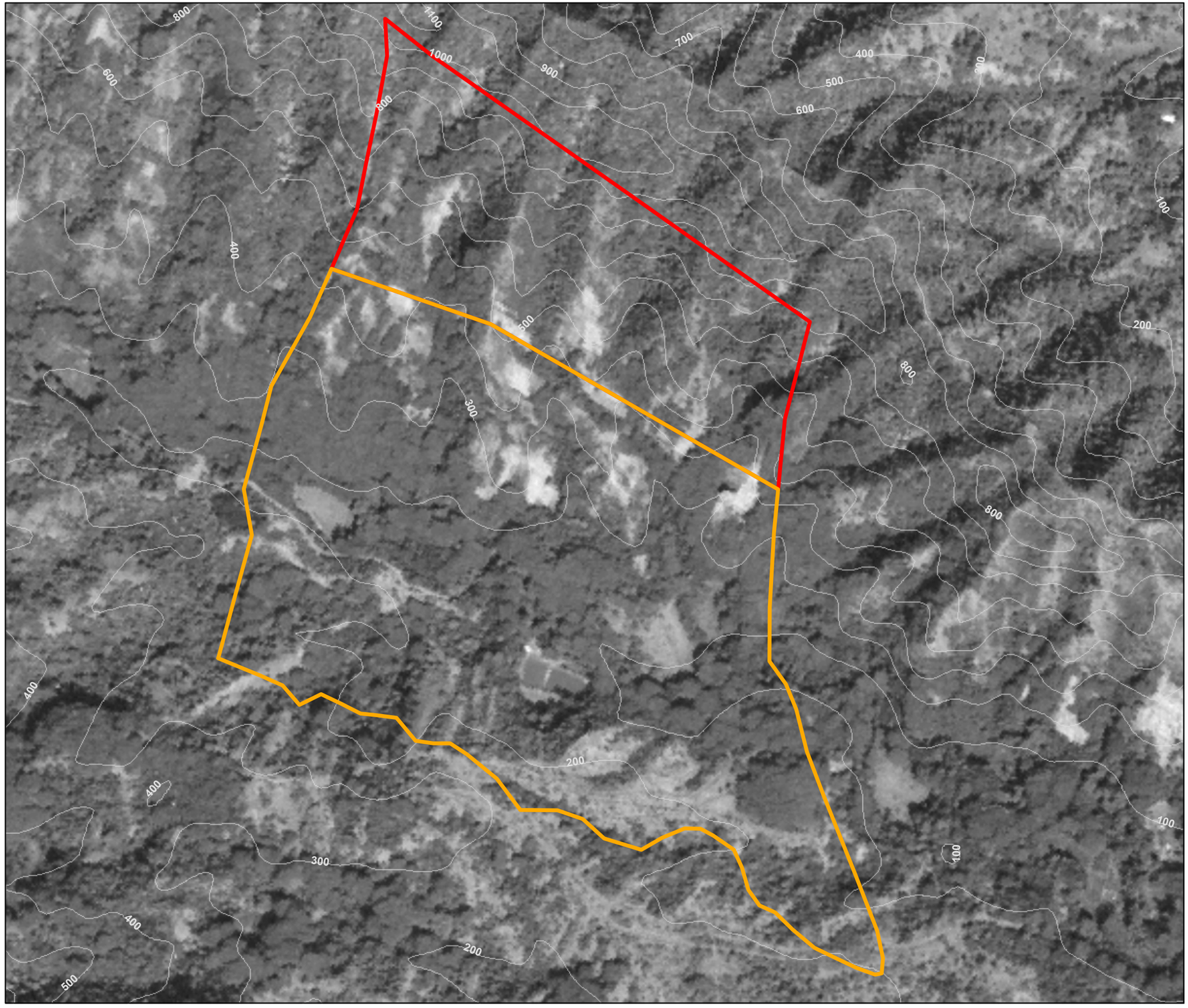

N

0 500 1,000 1,500

Feet

Data is projected to the UTM Coordinate System: Zone 15 North, NAD83, Units in Meters.

Figure A-2

Site Map

Waikane Valley Training Area
Koolaupoko District, O'ahu, Hawai'i

Legend

100 ft Contours

Training Area

Accessible for Investigation

Inaccessible for Investigation

USA Environmental, Inc.

NAVFAC Naval Facilities Engineering Command

Drawn By:	WAC/JAL	Scale: 1" = 500 ft	Rev:
Checked By:		Date Drawn: 11-20-2006	
Submitted By:	RN	Revision Date:	

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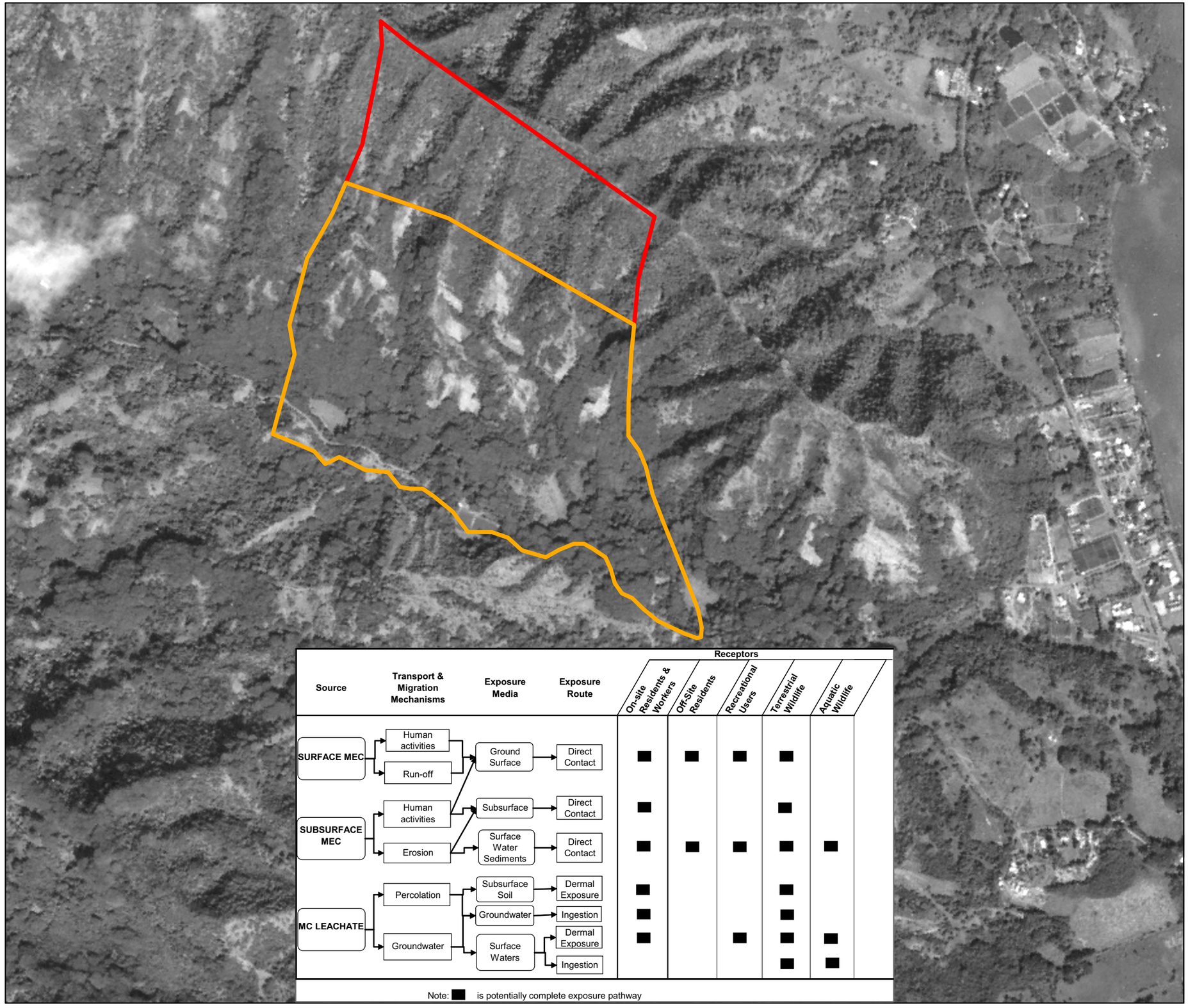

N

0 775 1,550 2,325

Feet

Data is projected to the UTM Coordinate System: Zone 15 North, NAD83, Units in Meters.

Figure A-3

Conceptual Site Model of Exposure Pathways

Waikane Valley Training Area
Koolaupoko District, O'ahu, Hawai'i

Legend

Training Area

Accessible for Investigation

Inaccessible for Investigation

USA Environmental, Inc.

NAVFAC Naval Facilities Engineering Command

Drawn By: JAL	Scale: 1" = 775 ft	Rev:
Checked By:	Date Drawn: 4-30-2008	
Submitted By: RN	Revision Date:	

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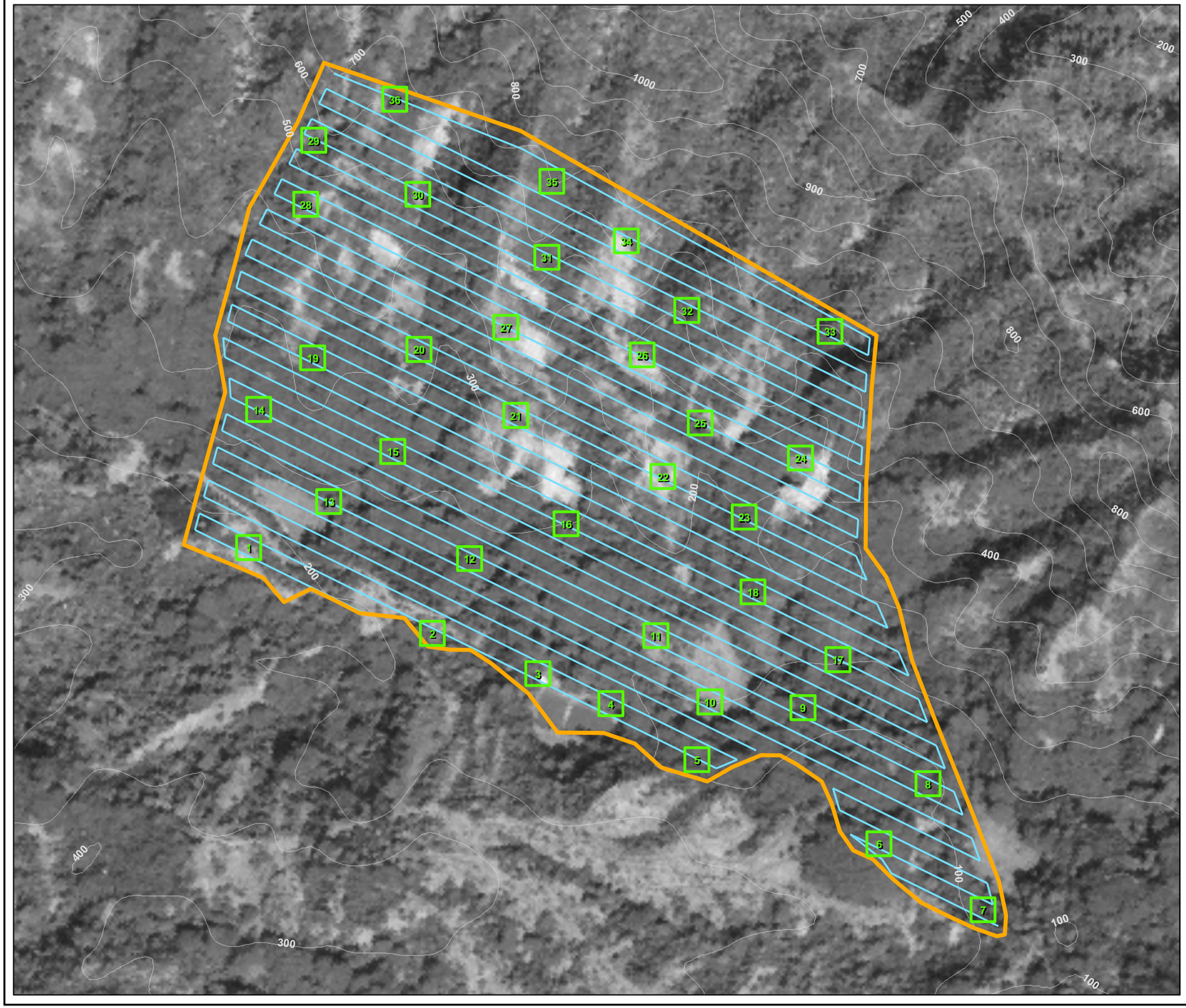
N
0
400
800
1,200
Feet
Data is projected to the UTM Coordinate System:
Zone 15 North, NAD83, Units in Meters.
Figure A-4
Investigative Transects Map
Waikane Valley Training Area
Koolaupoko District, O'ahu, Hawai'i
Legend
Idealized Transects (10 ac +/-)
100 ft Contours
100' x 100' Cell (8.3 ac +/-)
Training Area (144 ac +/-)
USA Environmental, Inc.
NAVFAC Naval Facilities Engineering Command
Drawn By: WAC/JAL
Scale: 1" = 400 ft
Rev: 2
Checked By:
Date Drawn: 11-20-2006
Submitted By: RN
Revision Date: 11-29-2007
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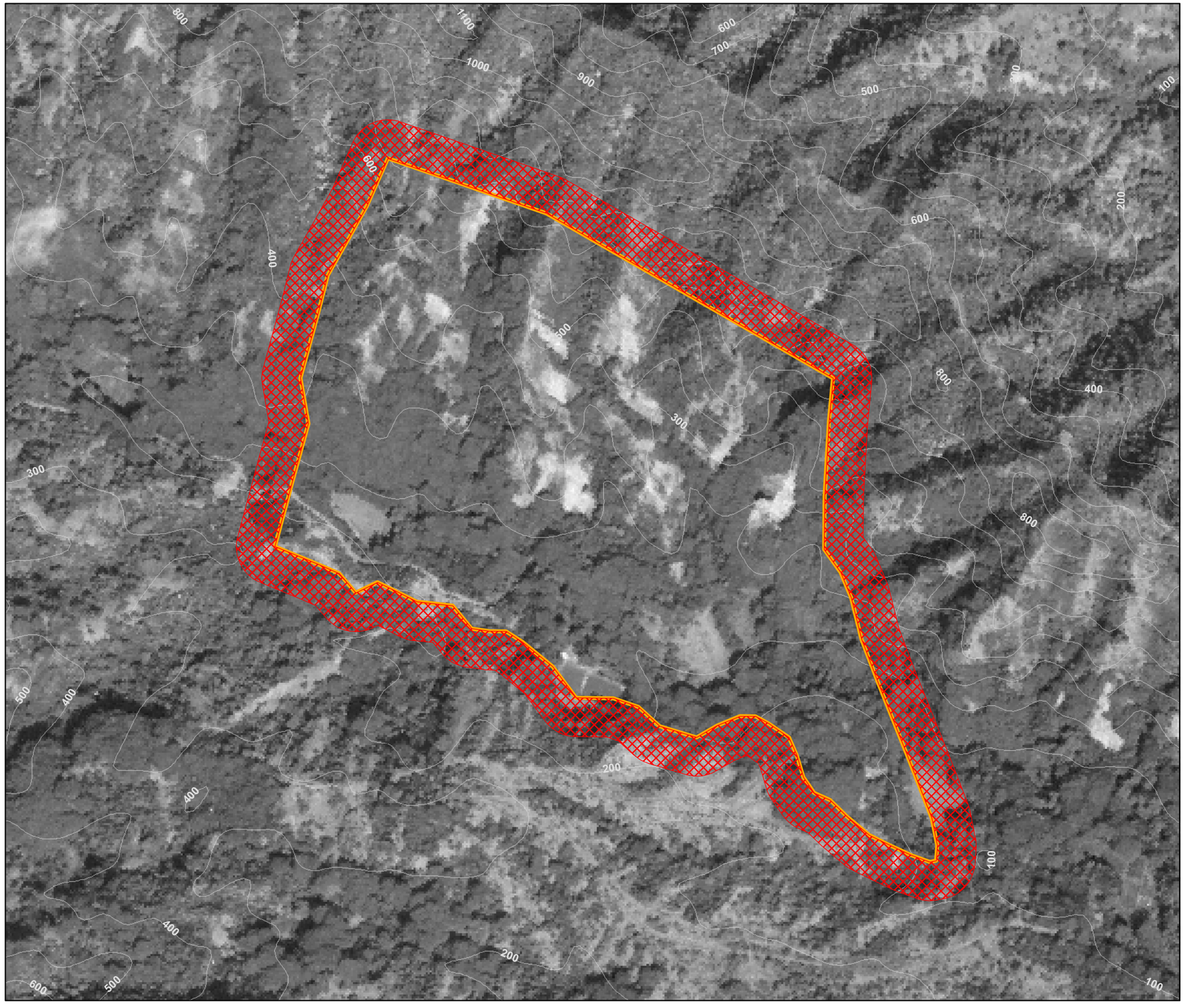


N

0 500 1,000 1,500

Feet

Data is projected to the UTM Coordinate System: Zone 15 North, NAD83, Units in Meters.

Figure A-5

MSD Map

Waikane Valley Training Area
Koolaupoko District, O'ahu, Hawai'i

Legend

- 100 ft Contours
- 200' MSD
- Training Area (144 ac +/-)

USA Environmental, Inc.

NAVFAC Naval Facilities Engineering Command

Drawn By:	WAC/JAL	Scale:	1" = 500 ft
Checked By:		Date Drawn:	11-17-2006
Submitted By:	RN	Revision Date:	

Rev:

Path: S:\Waikane\MSD_map.mxd

APPENDIX B

B.0 USAE PROJECT FORMS

This appendix contains the following project forms for the Munitions Response Site at the Waikane Valley Training Area:

- Daily Operations Summary
- MEC Accountability Log.

DAILY OPERATIONS SUMMARY

DATE: ____/____/____ **PAGE 1 OF 5 PAGES**

SITE / LOCATION: _____

1. WORK SUMMARY

a. Work Accomplished:	**Number Completed**	**Total Remaining**
(1) Survey	_____	_____
(2) Preparation	_____	_____
(3) Mag & Flag	_____	_____
(4) Geophysical	_____	_____
(5) Intrusive	_____	_____
(6) Quality Control	_____	_____
(7) Quality Assurance	_____	_____

b. Discrepancies: _____
_____
_____
_____

c. Inspection Results:	**Pass**	**Fail**
(1) Quality Control	_____	_____
(2) Quality Assurance	_____	_____
(3) Safety	_____	_____

2. INSTRUCTIONS RECEIVED FROM CUSTOMER REPRESENTATIVE: _____
_____
_____
_____
_____

3. UXO SUMMARY

a. UXO Located:

Type:	Quantity:	Live/Prac.:	Remarks:

b. Demolition Supplies Expended:

Type:	Quantity:	Remarks:

c. Scrap Generation / Deposition:

Type:	Quantity:	Weight:	Remarks:

4. Utilization

a. Daily Man-hours:

Labor Category:	Task #	M/H Today:	M/H 0% :	M/H 4%	M/H 8%
Site Manager					
SUXOS					
UXO Technician III					
UXO Technician II					
UXO Technician I					
Laborer					
UXOSO					
UXOQCS					
Admin Personnel					
Visitor					
Sub-Contractor Personnel (List by Category)					

b. Daily Equipment:

Description:	Task:	Hours Used:	Hours Remaining:	% Hours Remaining:	Remarks:

5. Operational Remarks:

_____
_____
_____
_____
_____
_____

6. Signature / Date:

_____ **Date: ____/____/____**

SUXOS

USA Environmental, Inc.

MEC ACCOUNTABILITY LOG

SITE: _____ CONTRACT: _____ TASK ORDER: ___ PAGE: _____ of _____

Grid	Date	Identification	Northing	Easting	Type	Fired (Y/N)	Remarks

APPENDIX C

C.0 USAE STANDARD OPERATING PROCEDURES

This appendix contains the following standard operating procedures for Waikane Valley Training Area:

- MEC Avoidance
- MEC Surface Sweeps
- Global Positioning System
- Minelab Explorer II
- Vegetation Removal
- Field Procedure Document Change Protocol

STANDARD OPERATING PROCEDURE
MEC AVOIDANCE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide all USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to perform avoidance operations at sites potentially containing unexploded ordnance (UXO) and/or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the conduct avoidance operations on a UXO/MEC contaminated site. The following USAE policies and procedures are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with Work Plans, other USAE SOPs, the USAE Site Safety and Health Plan (SSHP), applicable Federal, State, and local regulations, and contract restrictions and guidance. Consult the documents listed in Section 8.0 of this SOP for additional compliance issues.

3.0 MEC/UXO BASIC AND GENERAL SAFETY PRECAUTIONS

These basic safety precautions are the minimum MEC safety requirements required of all personnel on site. Other precautions and requirements are in other applicable MEC manuals.

3.1 BASIC CONSIDERATIONS

The following should be taken into consideration when planning or conducting MEC avoidance support operations:

- SAFETY IS PARAMOUNT
- Do not move or disturb unidentified items
- Do not collect souvenirs
- Do not smoke except in designated areas
- Do not carry fire or spark producing devices into the site
- All MEC operations will use the "Buddy" system
- Prohibit non-essential personnel from visiting the site

3.2 BASIC SAFETY PRECAUTIONS

The following safety precautions are applicable to all MECs:

- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions and grounding procedures when working with, or on, electrically initiated or susceptible MEC.
- Do not unnecessarily dismantle, strip, or handle any MEC.

- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and MEC residue.
- Do not attempt to extinguish burning explosives or any fire that might involve explosive materials.
- Do not manipulate external features of ordnance items.
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting MEC operations.
- Do not subject MEC to rough handling or transportation. Sand bag, chock, and block appropriately.
- Hand carry no more than two items (one in each hand) at a time and then only as required by the operation being performed.
- Do not transport damaged white phosphorous munitions unless fully submerged in water.
- Avoid unnecessary movement of armed or damaged UXOs.
- Avoid the forward portions of munitions employing proximity fuzing.
- Assume unknown fuzes contain cocked strikers or anti-disturbance features.

3.3 GENERAL SAFETY PRECAUTIONS

The following sub-paragraphs describe safety precautions for various types of munitions/disposal operations:

3.3.1 BOMBS

- Ensure fuze wells do not contain fuze components.

3.3.2 CLUSTERS, DISPENSERS, LAUNCHERS

- Approach and work from the sides of a dispenser.
- Consider an intact dispenser as fully or partially loaded.
- Consider any payloads outside the container or dislodged inside as armed.
- Take precautions for the most hazardous payloads until positively identified.

3.3.3 PROJECTILES

- Determine if the projectile has been fired and if so consider it armed.
- Check for the presence of unburned tracers.
- Avoid the rear and front of rocket assisted projectiles,
- Handle projectile components such as powder increments, cartridges, and primers with caution.

- Seal the open ends of projectiles or sheared projectile components with tape or other suitable material before transporting.

3.3.4 GRENADES

- Do not attempt to re-install safety pins on a dud-fired grenade.
- Do not attempt to withdraw impinged firing pins from the fuze of a dud-fired grenade.
- Do not dispose of grenades by functioning them as designed.

3.3.5 ROCKETS

- Approach and work on rockets from the side.
- Do not dismantle or strip dud fired rockets or rocket motors.
- Do not expose electrically fired munitions to radio transmissions within 25 feet.
- Do not transport an unfired rocket motor until having shielded the motor igniter from EMR.

3.3.6 GUIDED MISSILES

- When found, restrict vehicular movement in the area of a guided missile.
- Avoid entanglement with guidance wires of wire guided missiles.
- Restrict radio communications in the vicinity of a dud-fired missile.
- Approach and work on missiles from the side and rear quarter.
- Do not dismantle or strip dud-fired missiles or missile motors.
- Do not transport an unfired missile motor until having shielded the motor igniter from EMR.

4.0 MEC AVOIDANCE FOR SAMPLING AND DRILLING OPERATIONS

MEC avoidance operations may be required in support of soil sampling operations and the drilling of monitoring wells on some contracts. Avoidance operations will consist of a team composed of two UXO qualified personnel. The team will consist of a UXO Technician III and a UXO Technician II or UXO Technician I. The team will not destroy any MEC encountered. All MEC contacts and suspected MEC anomalies will be reported to the Site Manager who will in turn notify the On-site Safety Representative or local Explosive Ordnance Disposal (EOD) unit.

4.1 ACCESS ROUTES TO SAMPLING LOCATIONS

Prior to sampling or well drilling crews going on site, the MEC team will conduct a reconnaissance of the sampling area. The reconnaissance will include locating the designated sampling or drilling location and insuring that it is free of anomalies. If anomalies are detected the point will be relocated as directed in the Work Plan. Once the designated point has been cleared, an access route for the sampling crews, vehicles and equipment will be cleared. The access route, at a minimum, will be twice the width of the widest vehicle and the boundaries will be clearly marked to prevent personnel from straying into un-cleared areas. If surface MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. A magnetometer will be used to ensure there are no subsurface MEC

within the approach path. If a subsurface magnetic anomaly is encountered, it will be assumed to be a possible MEC and the path diverted to avoid it.

4.2 SOIL SAMPLING AND WELL DRILLING SITES

The MEC team will clear a work site for soil samples and well drilling and clearly mark the boundaries. The area will be large enough to accommodate the drilling equipment and provide a work area for the crews. As a minimum, the cleared area will be a square, with a side dimension equal to twice the length of the largest vehicle or piece of equipment for use on site. If a pre-selected area indicates magnetic anomalies, a new sampling/drilling site will be chosen.

4.3 AVOIDANCE PROCEDURES FOR BOREHOLE SAMPLING

If surface samples are required they will be obtained prior to the start of boring. The borehole procedures will be completed using a hand auger, powered auger, or Direct Push Technology (DPT) equipment. The MEC Team will check the borehole with a down-hole magnetometer, a minimum of every 2 feet, to the deepest sampling depth, or a minimum of 6 feet, to ensure that smaller items of MEC, undetectable from the surface, will be detected.

- **Hand Auger Procedures:** The hand auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean auger bucket will be attached to the handle, returned to the borehole and a sample will be collected. At this point the MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure repeated to obtain the required samples.

- **Power Auger Procedures:** The power auger will be advanced to the first sampling depth and the auger will be withdrawn. A clean hand auger will then be used to collect the sample. The MEC Team will check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.

- **DPT Procedures:** The DPT rig will be positioned over the sampling point and the rod will be advanced to a maximum depth of 2 feet. The DPT rig will then move a minimum of 20 feet away from the sampling point to prevent the rig from influencing the magnetometer. The MEC Team will then check the borehole with a magnetometer and if no magnetic anomalies are found, the procedure will be repeated to collect the required samples.

4.4 AVOIDANCE PROCEDURES FOR MONITORING WELL INSTALLATION

Prior to drilling equipment being moved to the proposed site, the MEC Team will have checked the designated site, using a magnetometer; to assure that the well location is anomaly free to a depth of 2 feet. If surface samples are required they will be collected prior to the start of drilling. To complete the subsurface magnetometer checks, one of two methods may be used:

- Monitoring, at 2-foot increments, during the actual well drilling operation. This will require the withdrawal of the drill rod or augers from the well and moving the drill rig a minimum of 20 feet away from the well location to prevent the rig from influencing the magnetometer, or

- Installing an offset monitoring hole within 2 feet of the well location. This monitoring hole can be installed by the MEC Team, with a hand or power auger, and monitored at 2-foot increments to the desired well depth or a minimum of 6 feet. This will then allow uninterrupted well installation and/or sampling to continue.

5.0 MEC AVOIDANCE AND CONSTRUCTION SUPPORT

MEC avoidance support is normally comprised of a two-man team consisting of a UXO Technician III (Team Leader) and a UXO Technician II. At sites where the expectation of encountering MEC is low, the MEC support may only consist of the UXO Technician III as MEC safety escort. The intent of MEC avoidance is to detect and avoid MEC and UXO. The following paragraphs outline minimum procedures for the designated operations.

5.1 LOCATION SURVEYS AND GEOPHYSICAL ESCORT

MEC escort for survey and geophysical operations consists of a visual surface search for MEC. Any UXO or MEC encountered will be marked, avoided, and reported to the appropriate authorities. Prior to driving stakes for grid corners or installing monuments, the UXO Technician will search the location with a magnetometer. Any subsurface anomaly will be assumed to be MEC and an alternate anomaly-free location will be chosen.

5.2 TRENCHING AND PIT EXCAVATIONS

Prior to trenching or excavation crews going on site, the MEC Team will conduct a reconnaissance of the approach route to the site. The reconnaissance will include locating a clear path for the crews, vehicles, and equipment. The approach path, at a minimum, will be twice the width of the widest vehicle. The boundaries of the approach path will be clearly marked to prevent personnel from straying into un-cleared areas. If MEC is encountered, the MEC team will mark and report the item, and divert the approach path around the MEC. Personnel will be instructed to remain within the marked boundary limits. A magnetometer will be used to search for near surface anomalies within the approach path. If a magnetic anomaly is encountered, it will be assumed to be a possible MEC, it will be marked, the approach path diverted, and reported.

5.2.1 EXCAVATION

During excavation operations the UXO Technician(s) will position themselves near (outside the reach of the swing) the earth moving machinery (EMM) (backhoe) where they can observe the excavation. If UXO or MEC is spotted the UXO Technician will signal the EMM operator to stop digging, move the bucket and place it on the ground outside the trench, and remove his hands from the controls. The UXO Technician will then investigate the MEC, which will be handled in accordance with Section 6.0. If MEC that cannot be moved is encountered the excavation operations will be either relocated to another area of operations or suspended until the item is disposed of or rendered safe to move.

5.2.2 HEAVY EQUIPMENT OPERATION

Heavy equipment safety will be in accordance with the SSHP.

5.2.3 EXCAVATION SAFETY

Excavation safety will be in accordance with the SSHP.

5.2.4 EQUIPMENT

The minimum equipment requirements for this activity include:

- Level D PPE
- EMM, (trenching & excavation)
- Schonstedt GA-52CX Magnetometer
- Marking material listed in Table 1

- Miscellaneous common hand tools (e.g. hammer, shovel, etc.)

Table 1: Color Codes – MEC Avoidance

Color	Description
Red Pin Flag/Caution Tape	Danger, identified suspect MEC/UXO, special precaution required
White Pin Flag	Boundary or temporary marker
Green Paint	Marking MEC-related scrap

6.0 LIVE AND SUSPECT MEC

UXO or MEC items encountered a will be inspected by the UXO Technician(s). Items that are safe to move may be relocated to a bermed or sandbagged area a safe distance from ongoing operations. No items will be moved unless positively identified and determined safe to move. The item(s) will be marked and reported to the Site Manager. MEC encountered that is ***NOT*** safe to move will be marked in place and operations will be moved to another location. MEC will be marked by installing four wooden stakes and encircling the stakes with flagging tape (see Table 1). Prior to installing stakes the location will be checked with a magnetometer to avoid driving the stake into a subsurface anomaly. All live and suspect live items will be inspected and identified by UXO Technicians. If the item cannot be positively identified and determined to be inert and safe to move, it will be marked and reported.

Note: If during identification of UXO or MEC it becomes necessary to move or handle the item, non-UXO qualified personnel will withdraw to a safe distance.

6.1 MEC RELATED MATERIAL

Adjacent to each operating area, the UXO Technicians will establish a MEC-related scrap (munitions debris) collection point. During operations items that are free of explosive contamination (i.e., fragments, parachutes, etc.) will be placed into these collection points and marked (see Table 1). Upon completion of operations the materials in these temporary collection points will be transferred to a central collection point for disposal. As the material is being loaded, the UXO Technician(s) will perform a second inspection of the material to ensure it is free of explosives and other hazardous materials.

7.0 DISPOSAL OPERATIONS

All MEC and Material Potentially Presenting and Explosive Hazard (MPPEH) will be disposed of in accordance with the project scope or the Work Plan. All hazardous material encountered will be reported to the Site Manager for disposition.

8.0 SUMMARY

USAE uses proven procedures and methods to provide MEC Support Services. Only qualified UXO personnel will perform tasks associated with MEC location, identification, and item condition determination. The procedures outlined in this SOP are based on industry standards and ensure that operations are safely and efficiently performed.

9.0 REFERENCES

- DOD 4145.26-M, DOD Contractor's Safety Manual for Ammunition and Explosives
- DOD 4160.21-M, Defense Reutilization and Marketing Manual

- DOD 6055.09-STD, DOD Ammunition and Explosives Safety Standards
- DDESB Technical Paper 18, Minimum Qualifications for UXO Technicians and Personnel
- Department of the Navy Environmental Restoration Program Manual
- NAVSEA OP5, Volume 1, Ammunition and Explosives Safety Ashore, with Change 6
- OPNAVINST 8020.15/MCO 8020.13, Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions
- TM 60 Series Publications
- USAE Corporate Safety and Health Program (CSHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual

STANDARD OPERATING PROCEDURE
MEC SURFACE SWEEPS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide all USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to perform surface sweep operations at sites potentially containing unexploded ordnance (UXO) and/or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the conduct surface sweep operations on a UXO/MEC contaminated site. The following USAE policies and procedures are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with Work Plans, other USAE SOPs, the USAE Site Safety and Health Plan (SSHP), applicable Federal, State, and local regulations, and contract restrictions and guidance. Consult the documents listed in Section 5.0 of this SOP for additional compliance issues.

3.0 SURFACE SWEEP OPERATIONS

All surface sweep operations at MEC sites will be performed under the direct supervision of UXO qualified personnel. Non-UXO qualified personnel will not be allowed in the EZ during intrusive operations. If access is required by non-UXO qualified personnel, all work will stop while they are in the EZ. During operations, USAE personnel will strictly adhere to the SSHP and the following general safety practices:

- Operations will be conducted during daylight hours only.
- Access to operating areas will be limited to only those personnel necessary to accomplish the specific operation.
- UXO will only be handled by qualified UXO Technicians.
- During UXO operations the minimum separation distance (MSD) between UXO and non-UXO operations is fragmentation distance of the munition with the greatest fragmentation distance (MGFD), as stated in the Work Plan.
- During demolition operations personnel remaining on site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.
- All personnel will attend the daily safety briefing (tailgate safety briefing) prior to entering the operating area.
- Anyone can stop operations for an unsafe act or situation.
- Safety violations and/or unsafe acts will be immediately reported to the UXO Safety Officer (UXOSO).
- Failure to comply with safety rules/procedures may result in termination of employment.

3.1 SITE LAYOUT PROCEDURES

Depending on the method selected and approved by the customer, the site layout and search grids will be established using a Global Positioning System (GPS), licensed surveyor, or compass and measuring

tape. Survey crews will be escorted in the field by a UXO Technician II who will provide UXO avoidance including checking the intended survey stake locations with a magnetometer prior to driving stakes into the ground, which will prevent driving stakes into buried MEC. The site layout procedures are as follows:

- Identify and mark the operating area boundaries:
    - The boundary will be marked with survey wooden stakes, with black and yellow survey tape, approximately every 200 meters. The stakes should be visible from one to the next. Therefore depending on the terrain, it may be necessary to place them closer together.
- Identify and mark search grids:
    - Search grids will vary in size depending on the site and the number of personnel to be used in sweeping. The grid width should be in multiples of 5 feet as the typical individual can cover a 5-foot wide lane with a magnetometer. For example, a 30-foot wide grid would accommodate six sweepers on line.
    - Grid boundaries will be marked with survey wooden stakes, with orange survey tape, and temporary survey lanes with white pin flags or twine/string.
- Establish and, mark if required, search lanes:
    - A typical search lane will be a width of approximately 5 feet. The lanes may or may not be established prior to sweeping. If temporary lanes are marked prior to sweeping it will be done by a UXO technician to ensure safety.
    - For wide area surface clearances, sweep lane boundaries may be marked while sweeping. For example, the sweep line would begin sweeping with a grid boundary on one side and place pin flags on the opposite side of the line as they sweep. This would provide a boundary for the return sweep and ensure 100% coverage.

3.2 SWEEP PROCEDURES

Sweep teams will consist of UXO technicians or a combination of non-UXO (General Laborers) and UXO personnel. Sweeps may be for surface (visible) or sub-surface (buried) MEC. Regardless of the type of clearance, MEC operations will only be performed by qualified UXO Technicians.

- MEC operations are defined as:
    - MEC identification
    - Access procedures such as excavation, either by hand or using heavy equipment
    - Handling of UXOs, explosives, or explosive items
    - Disposal, including movement, transportation, and final disposal of MEC

3.2.1 FLAGS AND MARKERS

USAE uses a system of colored flags/flagging and markers to identify MEC, scrap metal, sweep lanes, and site, zone, and grid boundaries. Table 1 lists the types of markers used.

Table 1: Marking Material

Type Marker	Flag/Flagging Color	Item/Area Marked
Stake	Black and Yellow	Site boundary
Stake	Red and Orange	Zone boundary
Stake	Orange	Grid boundary
Pin Flag	White	Temporary Boundary
Pin Flag	Red	MEC
Pin Flag	Yellow	Subsurface Anomaly
Pin Flag	Blue	MEC Scrap
Pin Flag	Green	Non-MEC Scrap

3.2.2 SURFACE SWEEP

The purpose of a surface sweep of a grid is two fold: first to locate, mark, and record the location of the surface MEC contamination contained in each grid; and second to consolidate the scrap metal contamination within each grid. The typical span of control for a UXO Technician is three to five sweepers. This ensures positive control and safety.

3.2.2.1 Sweep Team Structure

The sweep team will consist of either all UXO Technicians or a mix of UXO and Non-UXO personnel. The following is an example and composition of a typical Sweep Team:

- One UXO Technician III, who directs and supervises all team activities, confirms the identification of all MEC encountered, and maintains the sweep team journal.
- One UXO Technician II who assists the UXO Technician III, identifies all MEC encountered, and records the location of the items located.
- Five sweepers (either UXO Technicians or General Laborers) who visually search the area for MEC. These personnel perform their duties under the direction and supervision of the UXO Technician III.

3.2.2.2 Surface Sweep Team Procedures

All sweep operations will be performed under the direct supervision of a qualified UXO Technician III. The UXO Technician III will assemble the sweepers into a sweep line and direct their movement across the survey grid.

- Sweepers will be spaced approximately 5 feet apart and, at the direction of the UXO Technician III, move through the grid on line abreast.
    - When an item is encountered, the individual will call out "hold the line", and hold up his/her hand. The line will stop and the UXO Technician II will inspect the object to determine if it is MEC or scrap and mark the item with the appropriate colored Pin Flag. The line will not move again until directed by the UXO Technician III.
    - As the team moves forward the sweeper at the edge of the grid will use the grid stakes as one sweep lane boundary, the sweeper on the opposite end of the line will mark the limit of the sweep lane with White Pin Flags. These flags become the guide for the return sweep and define the limits of the previously cleared lane.

- This procedure is continued until the grid is completely swept.

- The UXO Technician III will follow behind the sweep line insuring that proper spacing is maintained, inspect and verify the identification of the flagged items, and record data on the type, nomenclature, and location of the contamination.

- Upon completion of the grid sweep the sweep team will recover and stockpile metal scrap at a central location. Under the direct supervision of the UXO Technician III, the scrap will be stockpiled in a central location in the grid. Items marked with Red Pin Flags will be left in place for the Disposal Team.

UNDER NO CIRCUMSTANCES WILL GENERAL LABORERS HANDLE OR MOVE MEC/UXO CONTAMINATION.

3.2.3 MAGNETOMETER ASSISTED SURFACE SWEEP

Magnetometer assisted surface sweep procedures are basically the same as surface sweeps. In addition to identifying surface contamination, magnetometers are used to locate buried MEC that may be concealed by brush or heavy grasses. Instructions on the use and calibration of magnetometers are in the USAE magnetometer SOP. The purpose of a magnetometer assisted-surface sweep of a grid is to first locate, mark, and record the location of the surface and buried MEC contamination contained in each grid; and second to consolidate the scrap metal contamination within each grid. The typical span of control for a UXO Technician is three to five magnetometer operators. This ensures positive control and safety.

3.2.3.1 Magnetometer Assisted Surface Sweep Team Structure

The sweep team will consist of either all UXO Technicians or a mix of UXO and Non-UXO personnel. The following is the structure and composition of a typical Sweep Team:

- One UXO Technician III, who directs and supervises all team activities, confirms the identification of all MEC encountered, and maintains the sweep team journal.

- Two UXO Technicians II who assist the UXO Technician III, identify all MEC encountered, excavate and identify buried contacts, and record the location of the items located/detected.

- Five Magnetometer Operators (either UXO Technicians or trained General Laborers) who visually and electronically search the area for MEC. These personnel perform their duties under the direction and supervision of the UXO Technician III.

3.2.3.2 Magnetometer Assisted Surface Sweep Team Procedures

All sweep operations will be performed under the direct supervision of a qualified UXO Technician III. The UXO Technician III will assemble the Magnetometer Operators into a sweep line and direct their movement across the survey grid. Procedures will be the same as detailed in Section 3.2.2.2 with the exception that the Magnetometer Operators will utilize the magnetometer to assist in searching in heavy brush and grass.

4.0 DISPOSAL OPERATIONS

Disposal operations consist of actions taken at the site to remove the scrap and dispose of the MEC/UXO and explosive contamination. Demolition and transportation of MEC and explosives will be in accordance with USAE's Demolition Operations and Explosive Transportation SOPs.

The use of standard Explosive Ordnance Disposal (EOD) procedures for detonating or disposing of MEC will constitute the principle control measure for ensuring safety during demolition operations. These

procedures, contained in EOD technical manuals, are designed to limit fragments and harmful blast to the immediate vicinity of the disposal operation. These procedures involve the use of controls such as pits, earth cover (tamping), barricades, sandbags, and/or blast mats, and are tailored to the type of munition, its orientation, and net explosive weight (NEW). In addition, the following measures will be taken:

- All MEC/UXO will be accounted for and identified by nomenclature, if possible. As a minimum, UXO identification will be by type, by function, and filler.

- Coordination will be made with the Federal Aviation Administration to ensure air space clearance prior to the start of operations.

- MEC/UXO that is safe to move may be consolidated at each site to reduce the number of demolition shots and conserve explosives.

- Munitions debris (e.g., inert ordnance, expended munitions, mortar fins) will be removed to the appropriate reutilization office. Should the reutilization office not be established for the receipt of scrap, the contractor will dispose of the scrap through a local scrap dealer at no cost to the Government. All material will be accounted for through appropriate documentation, as required by the Government and/or scrap dealer.

- Avenues of approach to each disposal site will be controlled to prevent unauthorized access.

- Prior to the start of disposal activities, the Senior UXO Supervisor (SUXOS) and UXOSO will verify that the area around the operating site is clear of all nonessential personnel and that other UXO Technicians III have been notified. Prior to priming of demolition charges, all avenues of ingress will be physically blocked by UXO personnel. Radio communications will be maintained among all concerned parties. Avenues of ingress will not be opened without the express permission of the SUXOS. A constant state of vigilance will be maintained by all personnel to detect any intrusion into the fragmentation zone.

Minimum distances of 1,250 feet (non-fragmenting), 2,500 feet (fragmenting), and 4,000 feet (bombs and projectiles greater than 5 inches in diameter) will be established and maintained around the operating site. Depending on the type of munition being destroyed, the fragmentation distance may be increased or decreased based on data obtained from Technical Manual 60A-1-1-4. Personnel remaining on site will be limited to those personnel needed to safely and efficiently prepare the item/s for destruction.

4.1.1 DISPOSAL TEAM STRUCTURE

The Disposal Team will consist of:

- One UXO Technician III will direct and supervise all team activities, maintain the Site Explosive Log Book, and inspect the scrap for hazardous material.

- Two UXO Technicians II will assist the UXO Technician III and perform disposal operations.

4.1.2 DISPOSAL TEAM PROCEDURES

The Disposal Team will remove the scrap from each survey grid and transport it to a designated central collection point. During this removal, the UXO Technician III will perform a through examination of the scrap to ensure that it is free of hazardous material. All MEC containing hazardous material will be disposed of in-situ whenever possible. The preferred method is detonation in place; however, items that are safe to be moved may be consolidated to reduce the number of shots. If MEC cannot be disposed in place or moved, the SUXOS will request EOD support.

5.0 REFERENCES

- DOD 4145.26-M, DOD Contractors' Safety Manual for Ammunition and Explosives
- DOD 4160.21-M, Defense Reutilization and Marketing Manual
- DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards
- DDESB Technical Paper 18, Minimum Qualifications for UXO Technicians and Personnel
- Department of the Navy Environmental Restoration Program Manual
- NAVSEA OP5, Volume 1, Ammunition and Explosives Safety Ashore, with Change 6
- OPNAVINST 8020.15/MCO 8020.13, Explosives Safety Review, Oversight, and Verification of Response Actions Involving Military Munitions
- USAE Corporate Safety and Health Program (CSHP)
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards
- OSHA, 29 CFR 1926, Construction Standards
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation
- USACE EM 385-1-1, Safety and Health Requirements Manual
- TM 9-1300-200, Ammunition General
- TM 9-1300-214, Military Explosives
- TM 60 Series Publications

STANDARD OPERATING PROCEDURE
GLOBAL POSITIONING SYSTEM

1.0 GENERAL

USA Environmental, Inc. (USAE) uses the Trimble Pathfinder Professional (CMT) for mapping, surveying and site data collection. The following instructions will enable personnel to set-up and use the CMT receiver.

1.1 CONFIGURATION

The Pathfinder Professional consists of a GPS Dome Antenna, the GPS Receiver, the external system battery, and the CMT MC-V. The CMT MC-V is basically a hand-held computer. It consists of a keypad and LCD display screen.

1.1.1 MC-V

1.1.1.1 Keypad

The alphabetic/non-alphabetic character keypad has color coded buttons that perform the same functions as the keyboard on a computer. To access the functions/characters in yellow on the keys push shift-2 (SH2) first. To access the functions in white, push the shift-1 (SH1) first. The functions/characters in black and the numeric buttons are used as marked.

1.1.1.2 Screen/Menus

The MC-V screen is a liquid crystal display (LCD). The LCD display screen responds to heat, exposure to full sunlight will blacken the entire screen. The display will return to normal when it is turned away from the direct light. Repeated exposure to direct sunlight will degrade the quality of the display.

All menus and sub-menus are accessed from the main menu. You may access the sub-menus by scrolling up or down using the arrow keys, or if you know the number or letter of the sub-menu pressing it, and then press <Enter>. If you become embedded in a sub menu and are unable to determine when you are in the program, push <F5> (exit) to the previous menu. If you keep pressing the <F5> you will eventually return to the main menu.

If the MC-V ever locks up and will not respond to keypad commands, restart (reboot) PATHLOG by holding down F3 and pressing <ON>. If this does solve the problem, perform a hard reset by inserting the tip of a ballpoint pen into the opening on the top panel labeled 'RST' then pressing <ON>, see attachment 1, page 14 for location.

2.0 FIELD OPERATIONS

The GPS will be used in a rover backpack configuration and a base station mode. Connections of the hardware are illustrated in attachment 1, page 12. Both the base station and the rovers will be configured to operate from the receiver power source. The base station will operate from AC power and the rovers from the lead-acid batteries. The rovers will be configured in backpacks with two fully charged batteries. The lead acid batteries will be recharged daily overnight at the end of the working day. To ensure uninterrupted service, the batteries will be changed at the lunch break each day.

2.1 BASE STATION SETUP AND OPERATION

The different sub-menus are accessed from the main menu by highlighting the sub-menu using either the arrow keys to scroll or entering the number or letter of the sub-menu. When the desired menu is **Highlighted** press <ENTER>. To exit the sub-menu back one level, press <F5> (exit).

2.1.1 BASE SET-UP OF THE CMT MC-V

2.1.1.1 CMT MC-V Settings

- Collection Mode: Manual 3-D.
- Elevation Angle: 100
- Signal Level: 6
- PDOP: 10
- Logging Mode: Base
- POS Intrvl: 5
- RAW INTRVL: 10
- Time Zone: GMT
- Dynamics Code: Land
- Beeper: ON
- External Power: ON

1. TURN ON THE MC-V: PRESS <ON>;

2. CHECK OR SET THE FOUR (4) CRITICAL PARAMETER MASKS:

a. from the main menu:

Highlight '8 System Options', press <ENTER>, you are now in Systems Options menu.

Highlight '1 Position Fix Mode', press <ENTER>, you are now in the Position Fix menu. ;

Highlight '2 Manual 3-D', press <ENTER>, you have selected Manual 3-D and are now back in the 'Systems Options Menu';

Highlight '6 GPS Parameters' press <ENTER>, you are now in the GPS parameters Menu;

Highlight '1 EL Angle Mask:', if the value is other than 10 press <ENTER> to clear, enter 10, press <ENTER>;

Highlight '2 Sig Lvl Mask:'. If the value is other than 6 press <ENTER> to clear the entry then press 6 then <ENTER>. Without exiting the GPS Parameters Menu .

Highlight '3 PDOP MASK'. If the value is other than 10 press<ENTER> to clear, enter 10 then press <ENTER>. Press <F5> (exit) twice to return to the Main menu.

3. SET THE BASE LOGGING PARAMETERS:

a. From the main menu :

Highlight '5 Data/Logging', press <ENTER>. This screen will show at the top 'Logging Mode: either Base or rover. The <F3> key is a toggle that changes the setting. Push <F3> until Base appears. Without exiting this menu:

Highlight '0 POS INTRVL', if the value is other than 5 press <ENTER> to clear and then enter 5 and press <ENTER>. Still in the same menu:

Highlight '1 RAW INTRVL', if the value is other than 10 press<ENTER> to clear, enter 10 then press <ENTER>. Press <F5> (exit) to return to the Main Menu.

4. SET (CHECK) NON-CRITICAL PARAMETERS:

a. From the Main Menu:

Highlight '8 Systems Options', press <ENTER>, you are now in the Systems Options Menu.

Highlight '5 Clock/Time Zone', press <ENTER>. The bottom of the screen will show GPS time which will be in GMT. To set the local time use the +/- keys to increase or decrease the time from GMT. I.E>, central time is minus 6 hours. Press <F5> (exit) to return to the Main Menu.

Highlight '6 GPS Parameters', press <ENTER>, you are now in the GPS Parameters Menu.

Highlight '0 Dynamics Code', press <ENTER>, you are now in the Dynamics Code Menu.

Highlight '0 Land', press <ENTER>, this selects Land and returns you back to the GPS Parameters Menu. Press <F5> (exit) to return to the Main Menu.

Highlight '8 Systems Options', press <ENTER>, you are now in the Systems Options Menu.

Highlight '7 Beeper On/Off', press <ENTER>, you are now in the Logging Pos Beeper Menu.

Highlight ' 1 Beep ON', press <ENTER>, this turns on the Beep and returns you to the Systems Options Menu. Press <F5> (exit) and return to the Main Menu.

Highlight ' B Battery Management', press <ENTER>, you are now in the Battery Management Menu. The Screen will show External Power: (either ON or OFF). F3 turns External Power ON and F4 turns it OFF. Turn External Power ON and press <F5> (exit) and return to the Main Menu.

2.1.2 DATA COLLECTION

The base station will be up and gathering data as long as the rovers are operating. Base station files will consist of the character "A" plus the date (mmddyy), i.e., A112194. Prior to gathering data you will delete previous files and name a new file. Daily you will:

- Delete Previous Data Files;
- Name a file;
- Start a file; and
- End a file.

1. TO DELETE PREVIOUS FILES:

a. From the Main Menu:

Highlight '9 Data File Mgt', press<ENTER>, you are now in the file management Menu.

Highlight '2 Delete all files', press <ENTER>. It will ask you "Delete All Files? Y or N". Answer "Y" (yes) and you are back in the File Management Menu. Press <F5> (exit) and return to the Main Menu.

2. TO NAME A FILE; START AND STOP LOGGING:

a. From the main Menu:

Highlight '5 Data Logging', press <ENTER>, you are now in the logging Mode Menu.

Highlight '2 FILE:', press <ENTER>. The screen will show 01..... New file. Press F4 (edit) and the screen will show Select LOG FILE: 01. Enter the file name-Ammddyy, i.e., A112194. Press <ENTER>, this returns you back to the Logging Mode Menu. Number 2 File: should show you file name and OK.

b. While still in the logging menu:

Highlight '3 Start Logging:', press <ENTER>, the screen will show "press enter to resume", press <ENTER> and 'Start Logging: shows ON'. To stop the file in the logging Mode Menu:

Highlight '4 STOP', press <ENTER>, and the "3 Start Logging:" will change to off.

2.2 ROVER SETUP AND OPERATION

2.2.1 SET-UP OF THE CMT MC-V

2.2.1.1 CMT MC-V Settings

- Collection Mode: Manual 3-D.
- Elevation Angle: 15^0
- Signal Level: 6
- PDOP: 8
- Logging Mode: Rover
- POS Intrvl: 9999
- RAW INTRVL: 0
- Time Zone: GMT
- Dynamics Code: Land
- Beeper: ON
- External Power: ON
- Log AR/LN 1 Sec: N
- Log POINT 1 SEC: Y

1. TURN ON THE MC-V: PRESS <ON>;

2. CHECK OR SET THE FOUR (4) CRITICAL PARAMETER MASKS:

a. from the main menu:

Highlight '8 System Options', press <ENTER>, you are now in Systems Options menu.

Highlight '1 Position Fix Mode', press <ENTER>, you are now in the Position Fix menu. ;

Highlight '2 Manual 3-D', press <ENTER>, you have selected Manual 3-D and are now back in the 'Systems Options Menu';

Highlight '6 GPS Parameters' press <ENTER>, you are now in the GPS parameters Menu;

Highlight '1 EL Angle Mask:', if the value is other than 15 press <ENTER> to clear, enter 15, press <ENTER>;

Highlight '2 Sig Lvl Mask:'. If the value is other than 6 press <ENTER> to clear the entry than press 6 then <ENTER>. Without exiting the GPS Parameters Menu:

Highlight '3 PDOP MASK'. If the value is other than 8 press<ENTER> to clear, enter 8 then press <ENTER>. Press <F5> (exit) twice to return to the Main menu.

3. SET THE ROVER LOGGING PARAMETERS:

a. From the main menu:

Highlight '5 Data/Logging', press <ENTER>. This screen will show at the top 'Logging Mode: either Base or Rover. The F3 key is a toggle that changes the setting. Push F3 until Rover appears. Without exiting this menu:

Highlight '0 POS INTRVL', if the value is other than 9999 press <ENTER> to clear and then enter 9999 and press <ENTER>. Still in the same menu:

Highlight '1 RAW INTRVL', if the value is other than 0 press <ENTER> to clear, enter 0 then press <ENTER>. Press <F5> (exit) to return to the Main Menu.

4. SET (CHECK) NON-CRITICAL PARAMETERS:

a. From the Main Menu:

Highlight '8 Systems Options', press <ENTER>, you are now in the Systems Options Menu.

Highlight '5 Clock/Time Zone', press <ENTER>. The bottom of the screen will show GPS time which will be in GMT. To set the local time use the +/- keys to increase or decrease the time from GMT. I.E>, Central Standard Time is minus 6 hours. Press <F5> (exit) to return to the Main Menu.

Highlight '6 GPS Parameters', press <ENTER>, you are now in the GPS Parameters Menu.

Highlight '0 Dynamics Code', press <ENTER>, you are now in the Dynamics Code Menu.

Highlight '0 Land', press <ENTER>, this selects Land and returns you back to the GPS Parameters Menu. Press <F5> (exit) to return to the Main Menu.

Highlight '8 Systems Options', press <ENTER>, you are now in the Systems Options Menu.

Highlight '7 Beeper On/Off', press <ENTER>, you are now in the Logging Pos Beeper Menu.

Highlight ' 1 Beep ON', press <ENTER>, this turns on the Beep and returns you to the Systems Options Menu. Press <F5> (exit) and return to the Main Menu.

Highlight ' B Battery Management', press <ENTER>, you are now in the Battery Management Menu. The Screen will show External Power: (either ON or OFF). F3 turns External Power ON and

F4 turns it OFF. Turn External Power ON and press <F5> (exit) and return to the Main Menu.

5. SET DIGITIZING PARAMETERS:

a. From the Main Menu:

Highlight 'D Digitize', press <ENTER>, the screen will show "0 Select Data Dict.", press <ENTER>. You are now in the Data Dictionary file Menu.

Highlight ' 01 0002.DDF' press <ENTER>, the screen will show the contents of the file, press <ENTER> and you return to the Digitize Menu.

Highlight '3 Digitize Setup', press <ENTER>, you are now in the Setup Menu.

Highlight '0 Log AR/LN 1 Sec:'. If the setting is not "N" the <ENTER> key toggles the setting to "N".

Highlight '1 Log POINT 1 Sec: ' and toggle <ENTER> until it shows "Y". Press <F5> twice and return to the main Menu.

2.2.2 DATA COLLECTION

Rovers will name files beginning with the prefix B for rover number 1 and the current date (mmddyy). Additional rovers will be C, D, ...,etc. At no time will rover files begin with an A as this is reserved for the base station. It is extremely important that different rovers have different prefixes to prevent the loss of data. Prior to gathering data you will delete previous files and name a new file. Daily you will:

- Delete Previous Data Files;
- Name a file and chose features;
- Start a file; and
- End a file.

1. TO DELETE PREVIOUS FILES:

a. From the Main Menu:

Highlight '9 Data File Mgt', press<ENTER>, you are now in the file management Menu.

Highlight '2 Delete all files', press <ENTER>. It will ask you "Delete All Files? Y or N". Answer "Y" (yes) and you are back in the File Management Menu. Press <F5> (exit) and return to the Main Menu.

2. TO NAME A FILE; START AND STOP LOGGING:

a. From the main Menu:

Highlight '5 Data Logging', press <ENTER>, you are now in the logging Mode Menu.

Highlight '2 FILE:', press <ENTER>. The screen will show 01..... New file. Press <F4> (edit) and the screen will show Select LOG FILE: 01. Enter the file name- Bmmddyy, (for rover # 1) i.e., B112194; C112194 (for rover # 2). Press <ENTER>, this returns you back to the Logging Mode Menu. Number ' 2 File:' should show you the file name you entered and OK.

Highlight '3 Start Logging:' press <ENTER>, and it will show Logging "ON". Press <ENTER> and return to the main menu. This file will continue logging once every 9999 seconds all day.

3. TO COLLECT POINT FEATURES.

a. From the main menu:

Highlight 'D Digitize', press <ENTER>, Highlight '1Select Feature' press <ENTER>, and select the appropriate features from the menu. When the features have been selected, press <ENTER> and collect at least 180 position fixes. To stop logging this point, press <F3> to stop the feature. At each point to be collected, again access '1 Select Feature' and select the desired features from the menu. Collect at least 180 position fixes at all locations. <F3> stops logging the selected feature.

4. TO END THE ALL DAY FILE.

a. From the main menu:

Highlight '5 Data/Logging ', press <ENTER> then:

Highlight '4 STOP ', press <ENTER>. The screen will show Logging OFF.

3.0 DIAGNOSING PROBLEMS

At times you may receive error responses on the screen. In attachment 1 there is a troubleshooting chart that should answer most problems.

a. The most common will be "No GPS response". This could be caused by several faults. To determine the cause, from the main menu:

Highlight '6 GPS Status' press <ENTER>. The screen will show several items of information to use in determining the fault.

1. At the top of the screen is the number of SV's (service vehicles or satellites). At least four are required to log data.

2. The PDOP may be too high. On the screen it is displayed as "DOP P: ". The PDOP must be less than 8 (for the rover) or 10 (for the Base).

b. The solution for either or both conditions is to try another location if possible or wait for the satellites to move. Moving your location even a couple of feet sometimes is enough.

c. The other most common faults are battery power and antenna connection.

1. Under the PDOP status on the screen will be BAT 99% (Internal battery), 9.5v (external lead acid receiver battery voltage). The internal battery must be more than 30% and the external 9 volts or more. If the Ext voltage is less than 9 change the battery.

2. The next status is ANT:4.8v. (antenna voltage). If it is 5v or higher there is a bad connection or faulty ANT cable.

3. More detailed troubleshooting is found in the operations manual.

STANDARD OPERATING PROCEDURE
MINELAB EXPLORER II

1.0 OPERATIONAL PROCEDURES

The following instructions are to be used for the Minelab Explorer II metal detector.

1. Assemble each Minelab Explorer II and put in freshly charged batteries.
2. Turn each unit ON in a clear area.
3. Perform the Noise Cancel function and wait still until the normal display returns (several seconds), then
4. Load the USER A settings by pushing the following:
   a. Menu –
   b. Settings –
   c. Load –
   d. Load USER A (left side) –
   e. OK hit Back to return to main display).
5. Check performance at geo-test-strip
6. Unit is ready

TABLE 1-1 USAE'S MINELAB EXPLORER II SOP

	User A	Changes	Date
Make sure to do the Noise Cancel First			
USER A Settings:			
Iron Mask (-16 for no Iron Mask)	-15		
Sensitivity	19		
Threshold (Higher if you prefer the Hum)	8		
Audio - Volume - Gain	8		
Audio - Volume - Max Limit	10		
Audio - Tone - Th. Tone	7		
Audio – Tone - Limits	8		
Audio - Tone - Variability	8		
Audio - Sounds	Const	Conduct	6/24/2005
Select	Clear		
Options - Noise	Default on 5		
Options - Response	Normal		
Options - Recovery	Neither Selected		

Evaluate and optimize these settings over a known geo-test-strip. Log any changes and save as USER A. Report any changes to USAE's project manager and project geophysicist.

A performance report will be issued documenting the instrument's ability to detect the GPO seed items, operator proficiency and ease of use in this environment, and sensitivity to the high magnetic background conditions.

STANDARD OPERATING PROCEDURE
VEGETATION REMOVAL OPERATIONS

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide USA Environmental, Inc. (USAE) employees and subcontractors with the minimum procedures and safety and health requirements applicable to perform vegetation removal operations on sites contaminated with unexploded ordnance (UXO) or munitions and explosives of concern (MEC).

2.0 SCOPE

This SOP applies to all USAE site personnel, including contractor and subcontractor personnel, involved in the conduct of vegetation removal operations on a site potentially contaminated with UXO/MEC. This SOP is not a stand-alone document and should be used together with Work Plans, other USAE SOPs, the Site Safety and Health Plan (SSHP), applicable Federal, State, local regulations, and contract restrictions and guidance. Consult the documents listed in Section 10.0 of this SOP for additional compliance issues.

3.0 SELECTION

Only those personnel that meet the requirements set forth by the Client and USAE will be utilized at the project site to facilitate safe and efficient vegetation removal operations.

4.0 TRAINING

All training on equipment will be either formal or on-the-job (OJT) training. This training will be documented by site personnel and subject to review for accuracy and completeness.

5.0 PERSONNEL PROTECTIVE EQUIPMENT

Level D personal protective equipment (PPE) is required for all personnel engaged in vegetation removal operations. Clothing includes, but is not limited to:

- Coveralls or work clothing as prescribed
- Work gloves, leather or canvas as appropriate
- Safety Glasses
- Hard Hats
- Hearing protection, noise attenuators or ear plugs
- Dust mask, as required by wind conditions and/or the presence of airborne particulate matter
- Other PPE as needed. (e.g., face shield, chainsaw chaps, etc.)

6.0 TEAM COMPOSITION

The Vegetation Removal Team will consist of three qualified personnel, as a minimum. These personnel may include any or all of the following:

- UXO Technician III
- UXO Technician II or I

- Laborers

6.1 UXO TECHNICIAN III

The UXO Technician III is UXO qualified and directs the operation and other team personnel within the context of removal requirements. In addition, the UXO Technician III must be familiar with the equipment being utilized.

6.2 OPERATOR

The operator(s) will be qualified and trained on the equipment being utilized (e.g., chainsaw, weed eater, etc.) and operate the equipment in a safe and efficient manner. The operator performs daily inspections and maintenance functions as recommended in the operator's manual. The operator will perform other duties as needed or directed.

7.0 SAFETY

Safety is paramount and all personnel will observe those safety precautions/warnings that apply or may apply to vegetation removal operations. The precautions listed below are general in nature and personnel will need to review applicable publications for more specific safety precautions/warnings. Distances listed are the minimum required.

- Maintain a 200 feet minimum distance from other teams.
- Maintain safe separation distance from UXO personnel engaged in intrusive work.
- Use equipment safety features.
- Safety precautions/warnings found in the operator's manual/manufacture's publications will be observed.
- Maintain 6 inches of ground clearance during removal operations.
- Communications will be maintained between the Team Leader and Operator(s) at all times.
- Maintain site control.
- Observe UXO safety precautions for items encountered or suspected.
- Ensure PPE is appropriate, serviceable, and worn/used in a proper manner.

8.0 OPERATIONAL PROCEDURES

Personnel will not enter within 10 feet of an operating piece of equipment. If at any time personnel enter closer than 10 feet, the Operator will immediately stop, return the engine to idle speed, and cease operations. Prior to operations commencing, a communications check with all team personnel will be conducted. Hand signals will be devised and used as a means of communication. All team personnel must know these hand signals prior to operations commencing. The hand signals will be documented on the tailgate safety-briefing sheet each morning of operations and at each change of team personnel.

The UXO Technician III will be responsible for the direction and manner in which the vegetation is to be removed. Prior to removal operations commencing, a visual search/survey is conducted to determine the hazards that may be encountered, which may include UXO, terrain slope, vegetation, wildlife, environmental concerns, and PPE requirements. The UXO Technician III will perform a visual search for UXO, ordnance scrap, surface debris, and any other obstruction/object that may pose a hazard to team

personnel. Hazardous items, impassable terrain, or vegetation that may affect operations will be marked and team personnel notified.

Team personnel are to ensure that a 6-inch ground clearance is maintained during removal operations. Those areas marked as hazards are to be avoided. The manner in which operations are accomplished will follow safe work practices and procedures. Areas of concern will be addressed to the Senior UXO Supervisor (SUXOS) and/or UXO Safety Officer (UXOSO) as needed. All MEC/UXO items encountered are marked and avoided. Notification of these items will be made to the appropriate personnel.

9.0 SUMMARY

USAE personnel will conduct vegetation removal operations in a safe, efficient, and productive manner and will use this SOP and references, which include changes and revisions.

10.0 REFERENCES

- USAE Corporate Safety and Health Program (CSHP)
- Site-Specific Safety and Health Plan (SSHP)
- Occupational Safety and Health Administration (OSHA) Regulations
- USACE, Engineer Manual 385-1-1
- Operator's Manual(s) and Manufacture's Publications

STANDARD OPERATING PROCEDURE
FIELD PROCEDURE DOCUMENT CHANGE PROTOCOL

1.0 PURPOSE

The purpose of this SOP is to ensure that all changes to field procedures are properly vetted by the proper personnel at USA Environmental, Inc. (USAE) and approved by the Contracting Officer prior to implementation. These procedures will ensure proper scoping, safety, and procedural integrity in the field environment. Changes to regulations, references, directives, policies, or contracts may require a change to or revision of the previously issued document. All documents will be reviewed by authorized appropriate personnel for review and approval prior to change and implementation.

2.0 SCOPE

This Field Procedure Document Change Protocol Standard Operating Procedure (SOP) applies to all site personnel, to include contractor and subcontractor personnel, and all operations involved on each individual project site.

3.0 RESPONSIBILITIES

3.1 FIELD PERSONNEL

Field personnel (to include site supervisors) are responsible for forwarding any request for change/revision to an existing document using the procedures outlined within this SOP. Under no circumstance (with the sole exception of immediate safety concerns) should a change/revision be incorporated until it has been reviewed and approved by authorized USAE personnel and the appropriate Contracting Officer or his/her representative as needed.

3.2 PROJECT QUALITY MANAGER

The Project Quality Manager (PQCM) is responsible for determining the validity of the change/revision recommendation and, if deemed valid, forwarding the recommendation expeditiously within the USAE organizational chain to those personnel responsible for review and approvals.

3.3 PROJECT MANAGER

The Project Manager (PM) is responsible for the overall project management of all operations at USAE project sites that the PM manages. The PM sets the tone for procedural integrity at each site. As such, the PM is responsible for ensuring that procedures specified by the Statement of Work (SOW), Work Plan (WP), and accepted SOPs and supporting documents are strictly adhered to throughout the project. However, projects are always dynamic processes and thus changes and/or revisions can and will be identified throughout its duration. It is the responsibility of the PM to ensure that any change/revision to an already agreed upon procedure is processed and authorized prior to implementation.

3.4 PROGRAM QUALITY MANAGER

The Program Quality Control Manager (PQM) is responsible for the continuous improvement of all processes within his/her program to include the management of specific projects. To accomplish this, the PQCM will be responsible for the following:

- Becoming thoroughly familiar with the procedures of all projects under his/her cognizance.
- Observing periodically project management on-site.

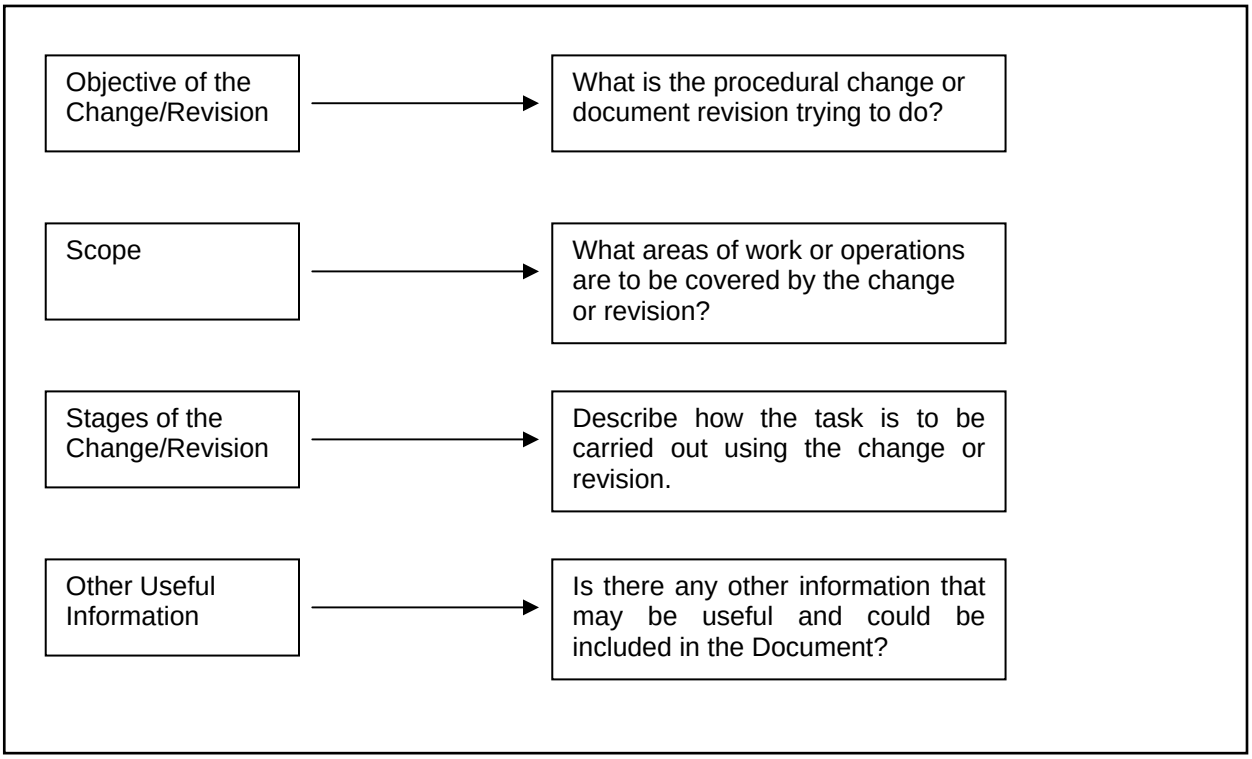
- Reviewing procedural change recommendations from field crews and/or project managers.
- Recommending authorization for specific changes/improvements to field operations to the Program Manager.

3.5 PROGRAM MANAGER

The Program Manager will be the final arbiter of the validity for the recommendation within the USAE organizational chain. If deemed valid, the PM will contact the Contracting Officer or his/her representative and request that the change be incorporated into field procedures. Documents generated by USAE will be drafted, reviewed, finalized, and approved for use by the appropriate sections to include Safety, QC, and Operations.

4.0 SUBMITTAL OF CHANGES OR REVISIONS

Personnel identifying a need for change or revision to an existing document will complete a Change/Revision Request Form and submit it to the management chain for processing. The following guidance is designed to assist in properly addressing the change/revision being sought.



Request for a change or revision to an existing document must be accompanied by a draft of the change or revision being sought. This draft must include the original text, the proposed text, references for the proposed change or revision (i.e., regulatory update, contract change, variation of equipment) to include page, paragraph, bullet, drawing, figure, section, or subsection of the reference material.

5.0 REVIEW AND APPROVAL PROCESS

Request for changes or revisions to an existing document will follow a review and approval process that incorporates the various sections or departments as needed to determine the validity of the request and

ensure that authorized, appropriate personnel have agreed to and signed the approval form for a change or revision to be completed. Personnel assigned to review the request will determine the following:

- Has the request been submitted for an existing document;
- Does the request document the change or revision needed;
- Has a draft, with reference material, been submitted;
- Have the various sections or departments affected by the request been notified.

Once the request has been entered into the review and approval process personnel assigned to the request will determine the following:

- Is the change or revision required by a regulatory or contractual document;
- Is the change or revision necessary due to variations in equipment, training, or personnel;
- Will the change or revision affect other document(s) and have they been identified;
- Will the change or revision impact safety, quality, or production in a positive or negative manner; and
- Does the proposed change or revision meet the needs of the requirement?

Once a change or revision has been accepted and implemented, outdated or obsolete documents will be removed from use and the change or revision disseminated and briefed to affected personnel, sections or departments. Those changes or revisions that affect other documents will be briefed as well to ensure continuity between the various documents.

Training required by a change or revision will be addressed by site management and have the necessary training scheduled as appropriate.

6.0 SUMMARY

This SOP is designed to assist those personnel requesting a change or revision to an existing document. This document is not to be considered all inclusive and is to be used in conjunction with existing policies, directives, regulations, and guidance. Personnel requesting, reviewing, approving, and implementing documents have an obligation to ensure that subject material, references, interpretations, or other input is accurate and its inclusion suited to the request for change or revision.

USAE

FIELD CHANGE/REVISION REQUEST FORM

Date:	**Department:**	**Name:**
Change or Revision:	**Plan/Procedure/SOP Name or #:**	
Site Location:		

Preliminary Information

Current Document	Check All That Apply	Supporting Documentation (List document, page, para., etc.)	Submitted By (Initials)	Reviewed By (Initials)
Change or Revision Due To:				
1. Regulatory Update				
2. Contract Requirement				
3. Equipment Change				
4. Newly Identified				
a) Safety Hazard				
b) QC Measure				
c) Operational Issue				
5. Other:				

Summary of Change or Revision: (Identify procedural, contractual, equipment, or operator and how this affects the current SOP)**:**

Change or Revision Requested: (Identify page, para, figure, table, etc. that is changed or revised)

Requestors Signature:	
Change or Revision: Accepted Rejected Reason for Rejection -	**Reviewers Signature:** **Safety/QC Signature:**
Corporate: Concurrence Non-Concurrence	**Corporate Approval Signature:**

APPENDIX D

D.0 USAE QUALITY CONTROL PLAN

This appendix contains the Quality Control Plan for the Waikane Valley Training Area:

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
BSI	Blind Seed Items
COTR	Contracting Officer's Technical Representative
DFW	Definable Feature of Work
DMM	Discarded Military Munitions
DoD	Department of Defense
DQO	Data Quality Objective
GIS	Geographic Information System
GPS	Global Positioning System
LLP	Lessons Learned Program
MC	Munitions Constituents
MCBH	Marine Corps Base Hawaii
MEC	Munitions and Explosives of Concern
MRS	Munitions Response Site
NAVFAC Pacific	Naval Facilities Engineering Command, Pacific
QA	Quality Assurance
QC	Quality Control
RPM	Remedial Project Manager
SI	Site Inspection
SUXOS	Senior Unexploded Ordnance Supervisor
USAE	USA Environmental, Incorporated
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
WVTA	Waikane Valley Training Area

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1.0 INTRODUCTION

This Quality Control (QC) Plan has been prepared by USA Environmental, Incorporated (USAE) for the Site Inspection (SI) on the Munitions Response Site (MRS), located at the Waikane Valley Training Area (WVTA), Kaneohe on the island of Oahu, Hawaii. This QC Plan was prepared in accordance with the Performance Work Statement provided by the Navy Facilities Engineering Command, Pacific (NAVFAC Pacific).

The USAE QC process starts with top management commitment and involvement. The process provides a permanent and workable system that allows each employee to understand the job performance expected. The USAE QC and improvement process ensures that the actions, procedures, and tools support every employee and provides training required to perform a job according to the requirements. Checklists have been developed to ensure that critical elements are addressed and that QC checks are documented. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

This QC Plan provides the procedures and methods that USAE will use for activities at WVTA. This plan addresses organization and responsibilities, Data Quality Objectives (DQOs), equipment testing and calibration, QC inspections and audits, and reporting procedures.

USAE will use the data collected during the munitions and explosives of concern (MEC) response for inclusion in the Final SI Report at the completion of the project. USAE will implement the following control measures to ensure the quality of the collected data.

2.0 QUALITY MANAGEMENT STRUCTURE

The following paragraphs describe the organizational structure of the USAE Quality Management Team during operations at the project site. Names and qualifications of site personnel will be provided prior to mobilization.

2.1 PROJECT QUALITY CONTROL MANAGER

The USAE Project QC Manager has responsibility for USAE's QC program. The Project QC Manager reports directly to the Vice President of USAE on matters of effectiveness, adequacy, and status of QC methods and procedures. The Project QC Manager maintains an alternate line of communication to the President of USAE and has the following responsibilities:

- Preparation of USAE QC policies and procedures;
- Ensuring timely submission of contract deliverables;
- Providing training and assistance to the Unexploded Ordnance Quality Control Specialist (UXOQCS) specific to this CTO;
- Review and assure quality, completeness and accuracy of data and records;
- Assure outcomes are fully supported by verified data;
- Reviewing employee qualification records to ensure accuracy; and
- Conducting periodic field audits of sites, programs, and projects to ensure QC compliance.

2.2 USAE PROJECT MANAGER

The USAE Project Manager is responsible for the overall performance during this project. The Project manager will develop and implement the site Work Plan and also has the following responsibilities:

- Primary point of contract with the Navy Contracting Officer's Technical Representative (COTR) and WTVA Remedial Project Manager (RPM)
- Monitoring project performance, cost, and schedule;
- Ensuring timely submission of contract deliverables; and
- Reporting directly to the USAE Program Manager.

2.3 UXO QUALITY CONTROL SPECIALIST

The UXOQCS is responsible for the enforcement of the site QC Plan. The UXOQCS coordinates with the Site Manager for daily operations and maintains a direct line of communication to the Project QC Manager and Project Manager. The UXOQCS reports directly to the Project QC Manager and has the following responsibilities:

- Reviewing, implementing, and enforcing the QC plan;
- Coordinating with the Navy Quality Assurance (QA) representative(s) to ensure QC objectives are appropriate for the task being performed;
- Coordinating with the Project QC Manager to ensure QC procedures are appropriate in demonstrating validity sufficient to meet QC objectives;
- Review and inspect the completeness, accuracy and quality of data and records;
- Conducting QC inspections of documents, work in progress, work performed, and monitoring. Recording and reporting the results to the appropriate personnel;
- Inspect outcomes (completed work) to ensure they are supported by verified data;
- Ensuring classification of any MEC related items is accurate and consistent in accordance with Table 6-1 in Section 6;
- Recommending to the Senior UXO Supervisor (SUXOS) any actions to be taken in the event of a QC failure;
- Advising the SUXOS and survey personnel on all QC related site matters;
- Reporting non-compliance with QC criteria to the project personnel and the Project QC Manager; and
- Has STOP WORK authority for issues regarding QC at the project site.

3.0 CONTRACT SUBMITTAL QUALITY CONTROL PROCESS

Documents required under this contract will be developed and maintained by a project team consisting of the USAE Project Manager, Project Engineer, SUXOS, Project Geophysicist, Geographic Information System (GIS) Manager, and the Project QC Manager. These team members will contribute their corporate knowledge and experience to the documents to ensure technical quality.

- The USAE Project Manager will take the lead in development of contract documents, and will schedule a peer review and a QC review in sufficient time to meet project milestones for delivery of submittals;

- The Project Engineer will provide technical writing support to develop the documents, and will review completed documents to ensure accuracy and completeness;
- The Project Geophysicist will ensure a technically sound approach to fieldwork, accuracy, and completeness of reporting on geophysical data;
- The GIS Manager will develop a digital database and maps, overlays of grid patterns and exclusion zones, and other spatial data. The GIS Manager will prepare all drawings or maps needed for submittals, and will perform Quality Control of civil survey data;
- The Project QC Manager will review all documents prior to submittal; and
- After the project team has performed a peer review of documents, the Project QC Manager will perform a QC review to ensure overall quality and completeness.

Comments on submitted documents will be directed by the Project Manager to the appropriate subject matter experts for resolution. The Project Manager will provide a written response for each comment to RPM NAVFAC PAC. In addition, the Project Manager will provide a copy of the comments and responses to the Project QC Manager and, if necessary, the Corporate Quality Manager for an assessment of the need for corrective action or lessons learned.

Changes to final work plans approved by the RPM NAVFAC PAC, will be submitted to the UXOQCS immediately upon approval. The UXOQCS will be responsible for ensuring that the changes are incorporated into the hard copy documents on file and that all field personnel are made aware of the changes.

4.0 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to the start of site work, the Project QC Manager shall meet with the Contracting Officer or designated site representative to discuss the QC program required by the site. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work; and coordination of the Contractor's management, production, and the QC Managers' duties with the Contracting Officer or designated site representative. As a minimum, the Contractor's personnel required to attend shall include the Project Manager, and Project QC Manager. Minutes of the meeting shall be prepared by the Project QC Manager and signed by both the Contractor and the Contracting Officer or designated site representative. This meeting may be held in conjunction with other meetings.

4.1 QUALITY CONTROL MEETINGS

After the start of site work, the UXOQCS shall conduct QC meetings as required by the Contracting Officer or designated site representative at the work site, with the SUXOS responsible for the upcoming work. Meetings conducted shall be recorded in the QC report. The Contracting Officer or designated representative may attend any of these meetings. These meetings may be held in conjunction with other meetings (e.g., tool box safety meetings). As a minimum, the following shall be accomplished at each meeting:

- Review the minutes of the previous meeting;
- Review the schedule;
    - Work or testing accomplished since last meeting
    - Rework items identified since last meeting
    - Rework items completed since last meeting

- Review the status of submittals;
  - Submittals reviewed and approved since last meeting
  - Submittals required in the near future
- Review the work to be accomplished in the next two weeks and documentation required;
  - Establish completion dates for rework items
  - Preparatory phases required
  - Initial phases required
  - Follow-up phases required
  - Testing required
  - Status of off-site work or testing
  - Documentation required
- Schedule the three phases of control and testing;
  - Preparatory
  - Initial
  - Follow-up
- Resolve QC and production problems; and
- Address items that may require revising the Project QC Plan.
  - Changes in procedures

4.2 THREE PHASES OF CONTROL

The Project QC Manager shall perform the three phases of control for each definable feature of work (DFW) to ensure that work complies with contract requirements. The three phases of control include the Preparatory Phase, Initial Phase, and Follow-up Phase, and shall adequately cover appropriate on-site and off-site work in addition to the requirements listed in the subsections below.

The DFWs for the activities to be conducted during this SI are listed in Table 4-1.

TABLE 4-1: DEFINABLE FEATURES OF WORK FOR PROJECT ACTIVITIES

Task	Field Activities
1	Pre-mobilization
2	Mobilization of equipment, supplies, and personnel to Waikane
3	Preparation of the work areas and staging areas
4	Setup of grids and/or transects
5	Setup of the Instrument Test Strip
6	Site Investigation
7	Collect Soil Samples, package and ship to laboratory for analysis
8	Perform Quality Control checks on all site activities

Task	Field Activities
9	Site restoration and Demobilization
10	Reporting at project closure

4.2.1 PREPARATORY PHASE

The Project Manager will notify the Contracting Officer or designated site representative at least two working days in advance of each preparatory phase. The Project QC Manager will conduct the preparatory phase with the SUXOS for the definable feature of work. The Project QC Manager will document the results of the preparatory phase actions in the daily Contractor Quality Control Report. The following will be performed prior to beginning work on each definable feature of work:

- Review each paragraph of the applicable specification sections;
- Review the contract drawings;
- Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;
- Review the testing plan and ensure that provisions have been made to provide the required QC testing;
- Examine the work area to ensure that the required preliminary work has been completed;
- Examine the required materials and equipment, and sample work to ensure that materials and equipment are on hand and conform to the approved work plans. In addition, ensure that all equipment critical to execution of project has been operationally tested as required by work plans;
- Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required material safety data sheets are available; and
- Discuss construction methods.

4.2.2 INITIAL PHASE

The Project Manager will notify the Contracting Officer or designated site representative when crews are ready to start work on a definable feature of work. The Project QC Manager will observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements and document the results of the initial phase in the Daily Contractor Quality Control Report. The Project QC Manager and/or UXOQCS will ensure that work crews repeat the initial phase when acceptable levels of specified quality are not being met. Finally, the Project QC Manager will perform the following for each definable feature of work:

- Establish the quality of workmanship required;
- Resolve conflicts;
- Review the safety plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met; and
- Ensure that testing is performed.

4.2.3 FOLLOW-UP PHASE

The Project QC Manager will perform the following actions on a daily or as required basis and will document these activities in the Daily Contractor Quality Control Report:

- Ensure the work is in compliance with contract requirements;
- Maintain the quality of workmanship required;
- Ensure that testing is performed; and
- Ensure that rework items are being corrected.

4.2.4 NOTIFICATION OF THREE PHASES OF CONTROL FOR OFF-SITE WORK

The Project Manager will notify the Contracting Officer or designated site representative at least two weeks prior to the start of the three phases of control process.

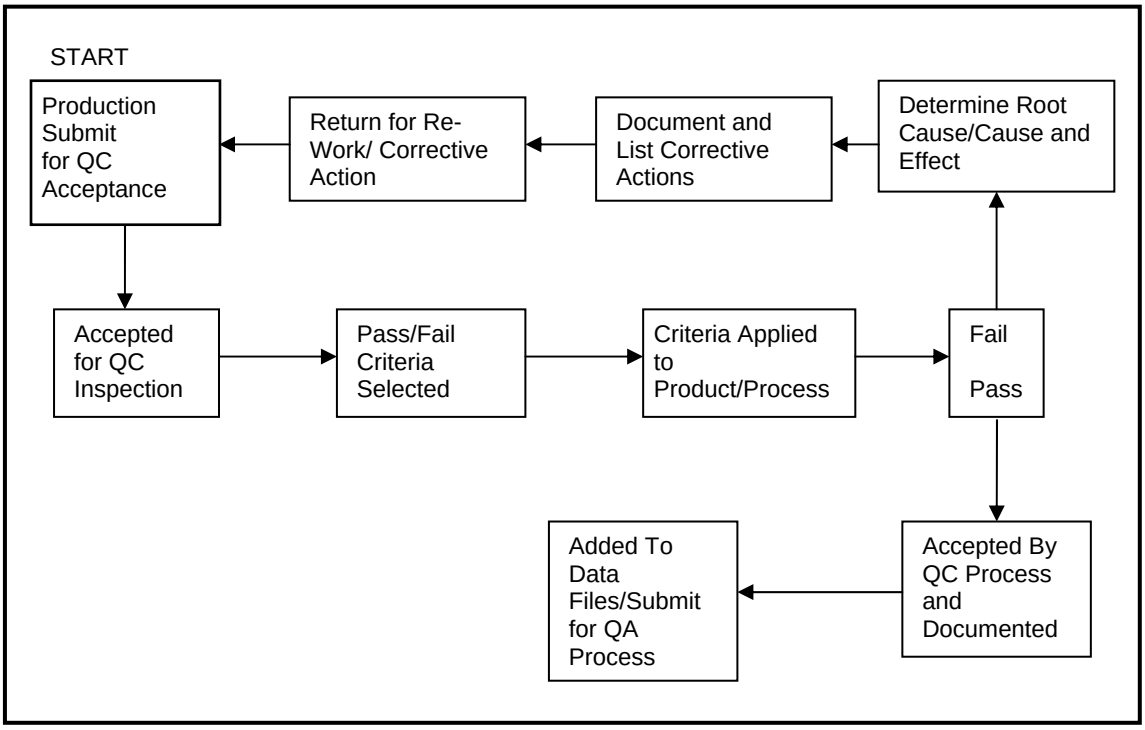
5.0 TESTING LABORATORY REQUIREMENTS

Wil Chee Planning, Inc. will collect soil samples and ship the samples to a predetermined laboratory for analysis. Laboratories performing work in connection with construction testing shall be certified to the methods specified by each contract task order. The Contracting Officer or designated site representative will be furnished a copy of the certificate of accreditation, scope of accreditation, and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required. Any deviation from the above requirements must be approved in writing by the Contracting Officer or designated site representative.

6.0 FIELD QUALITY CONTROL INSPECTIONS, AUDITS, AND REPORTS

The UXOQCS is responsible for the accomplishment of operational checks of instruments and equipment by site personnel. The appropriate log entries will be made. In addition to the implementation of the three phases of control process, inspections will be performed at random, with unscheduled checks of the site to ensure personnel accomplish all work as specified in the Work Plan. The UXOQCS will utilize the process outlined in Figure 6-1 (Quality Control Process), to ensure all field tasks meet quality standards prior to submittal for the Quality Assurance process. The UXOQCS will submit a report to the Project QC Manager detailing the results of these checks. Any audits will be performed by the Project Quality Control Manager.

FIGURE 6-1: QUALITY CONTROL PROCESS



6.1 QUALITY CONTROL CERTIFICATIONS

The Project QC Manager will prepare a Quality Control Report, Invoice Certification, and Completion Certification as necessary. These documents are submitted to the Project Manager for distribution to the appropriate personnel. The QC Report will include:

- The periodic assessment of work performed;
- Significant QA/QC problems and corrective actions taken;
- Work progress;
- Lessons learned, and change recommendations; and
- Signature of the Project QC Manager.
- Note: The QC Report will contain the following statement: "On behalf of the contractor, I certify that this report is complete and correct, and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report."
- Invoice Certification is submitted to the Contracting Officer or designated representative with each payment request, signed by the Project QC Manager, attesting that as-built drawings are current and attesting that the work, for which payment is requested, including stored material, is in compliance with contract requirements.
- Completion Certification is issued upon completion of work under a CTO, the Project QC Manager will furnish a certificate to the Contracting Officer or designated representative attesting that "the work has been completed, inspected, and tested, and is in compliance with the contract."

6.2 LOGS AND RECORDS

Activity Logs will be maintained daily as applicable, and all entries will be made in ink. Logbooks will be bound and pages consecutively numbered. Logbooks and records may be supplemented by the use of preprinted forms (e.g., safety inspection forms, tailgate safety briefings). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Daily operation forms are located in Appendix B of the Work Plan and QC forms are included in Attachment 1 of this QC Plan. The following logbooks and records will be maintained on site and are subject to inspection.

6.2.1 DAILY JOURNAL

The Daily Journal will be maintained by the SUXOS, and provides a summary of all operations conducted on site to include:

- Date and recorder of information;
- Start and end time of work activities, including lunch, breaks, and down time;
- Work stoppage;
- Visitors and escorts;
- Weather conditions;
- Changes to the work plan, Site Health and Safety Plan, policies or procedures;
- Injuries and /or illnesses;
- Safety briefings;
- MEC/UXO encountered;
- Relevant events and training; and
- Signature of the SUXOS.

6.2.2 FIELD LOG BOOKS

The Field Logbooks are maintained by the Supervisory Personnel. These logbooks are used to record site activities and field data. Logbooks are maintained in a neat and legible manner and provide a historical record of site activities, to include:

- Date and team location;
- Personnel and work performed;
- Equipment and instrument checks;
- Injuries and/or illnesses;
- Changes to work instructions;
- Work stoppage;
- Visitors;
- Other relevant events; and
- Signature of the SUXOS.

6.2.3 SAFETY LOG BOOK

The site Unexploded Ordnance Safety Officer (UXOSO) will maintain the Safety Logbook. This logbook is used to record all safety matters associated with the project site, including:

- Safety briefings and/or meetings;
- Training;
- Safety inspections and audits performed;
- Work stoppage due to safety issues;
- Visitors and escorts;
- Accidents, incidents, and near misses with corrective action taken;
- Site control measures;
- Other relevant events;
- Date and teams checked; and
- Signature of the UXOSO.

6.2.4 QUALITY CONTROL LOGBOOK

The Quality Control Logbook will be maintained by the UXOQCS. This logbook is used to record all QC matters associated with the project site, including:

- Equipment testing and results;
- QC inspections and audits performed;
- Work stoppage due to QC issues;
- Equipment monitoring results;
- Non-conformance reporting;
- Other relevant events;
- Date and teams checked; and
- Signature of UXOQCS.

6.2.5 TRAINING RECORDS

Training records will be maintained by the SUXOS. These records contain any license, certificates, or other qualifying data, to include:

- Date and nature of training;
- Personnel attending and instructor(s);
- Visitor training and briefings; and
- Signature of the instructor and SUXOS.

6.2.6 UXO AND ANOMALY RECORDS

The UXO and anomaly records are individually prepared records for each operating team. These records are prepared by the team supervisor, and are used to record data on anomalies and UXO encountered. These records also include:

- Date and target identifier;
- Identification of item(s) located;
- Classification;
- Distance from marked target location and depth encountered;
- Type, condition, depth, and location of any UXO encountered;
- Other relevant data; and
- Signature of the SUXOS.

6.2.7 PHOTOGRAPHIC LOGBOOK

The Photographic Logbook will be maintained by the SUXOS. This logbook is used to record all photographs taken on the project site. These photographs are used to document MEC/UXO encountered, as well as site conditions before, during, and after operations. Photographs will include:

- Date and time taken;
- Unique identifying number(s) relating to the Photographic Logbook;
- Location photograph was taken from and direction looking;
- Global Positioning System (GPS) location of all MEC encountered; and
- Brief description of the subject matter.

6.3 DAILY REVIEW OF FIELD DATA

During daily field activities or at least once daily, the UXOQCS will review field data to ensure accurate classification and documentation of recovered MEC-related items. This review will allow for reconstruction of an item and whether or not its classification is correct.

6.3.1 CLASSIFICATION OF MEC RELATED ITEMS

To ensure accurate classification of MEC-related items (with respect to their explosive hazard), as the information is used to make decisions about the response action, USAE will inspect suspect MEC and classify these items in accordance with Table 6-1. The list is not all inclusive, but reflects the types of MEC-related material that may be encountered at the project site. It is important to read the footnotes as they provide additional information of importance to understanding and classification of the MEC items.

TABLE 6-1: CLASSIFICATION OF MEC RELATED ITEMS

Type of Material	Classification Following Inspection:					
	Presents Explosive Hazard (MEC)			Does Not Present Explosive Hazard		
	UXO	DMM (1)	MC (2)	MC (3)	Munitions Debris	Other
Used military munitions, on a range, fired	X				X	
Unused military munitions, on a range, apparently discarded		X			X	
Used military munitions, in a burial pit, on a former range	X(4)				X	
Unused military munitions, in a burial pit on a former range		X(4)			X	
Explosives in the soil			X(5)	X		
Target from a range (other than small arms range)	X(6)	X(6)	X(6)			X(7)
Remnants of munitions from a former range	X(8)	X(8)	X(8)		X(9)	

Footnotes:

1. Discarded Military Munitions (DMM): Munitions generally considered as DMM include: buried munitions; un-recovered kick outs from open detonations; munitions left behind or discarded accidentally during munitions-related activities; munitions intentionally disposed of without authorization during munitions-related activities. Munitions removed from storage for the purpose of disposal that are awaiting disposal are not DMM.
2. Munitions Constituents (MC): Constituents that are both (a) an explosive; and (b) present in sufficient concentrations to present explosive hazards.
3. MC that is either (a) not an explosive (e.g., lead, beryllium, and cadmium); or (b) an explosive not present in sufficient concentrations to present explosive hazards.
4. Although military munitions in a burial pit will normally be DMM, some may be UXO. For explosives safety reasons, munitions in a burial pit should be approached as UXO until assessed by technically qualified personnel (e.g., EOD personnel and/or UXO-qualified personnel) and determined that they are not UXO or that they do not present explosive hazards similar to UXO.
5. Explosive soil is typically found in sumps and settling lagoons for explosives-laden wastewater, and in and around drainage ditches and pipes that carry the wastewater to such sumps and lagoons.
6. A target is a type of range-related debris. Although a target is not MEC, it may contain UXO, DMM, or MC. Prior to its release from Department of Defense (DoD) control, its explosives safety status must be documented.
7. A target's explosive safety status must be documented and any demilitarization required to remove its military characteristics must be performed prior to its release from DoD control.

8. UXO, DMM, or MC may be found on operational ranges and on former ranges (previously referred to as closed, transferring or transferred ranges). An inspection of the material will determine into which category this material falls. For example, if a projectile breaks apart on impact, one could find (a) a sheared-off fuze, which would be UXO or (b) explosive filler, which would be MC that broke away from the projectile's open body. If during an open detonation of an unserviceable munitions that is conducted on an operational range, the donor charge detonates, but the munitions being destroyed breaks up, but does not detonate, the remnants of the munitions would be DMM or, if explosive residue (e.g., clumps of TNT), MC.
9. Fragments, while munitions debris, may be evidence of high explosive (HE) usage at the site. For such fragments, USAE will indicate evidence of HE in its classification. After determination of its explosives safety status, scrap metal from used munitions on a range that is documented as safe would, after any demilitarization required to remove its military characteristics, be available for release from DoD control. In additions to these DoD requirements, other regulatory criteria may apply.

7.0 EMPLOYEE QUALIFICATIONS AND TRAINING

The Project QC Manager will maintain personnel files on each employee at the project site. These files include copies of necessary licenses, training records, certificates of qualifications, and résumés that support the employee's placement and position. Prior to an employee's initial assignment or before any change in duties or assignment the Project QC Manager will review the each employee's file to ensure necessary qualifications are met. Site personnel must meet the qualifications as outlined in Department of Defense Explosive Safety Board Technical Paper-18, dated 20 December 2004.

USAE ensures that only qualified and trained personnel are assigned to project sites. Prior to mobilization of personnel, USAE ensures that training required by USAE and Occupational Safety and Health Administration 29 CFR 1910.120 has been completed for all personnel assigned to the project. In addition, prior to the start of operations all personnel will receive the following:

- Familiarization with the Work Plan, and its policies and procedures;
- Accident Prevention Plan orientation and Personal Protective Equipment training;
- Review of applicable Activity Hazard Analysis (AHAs);
- Environmental considerations peculiar to the operations on the project site;
- Instruction and training on equipment usage and safe work practices; and
- Daily safety training outlining the day's activities.

Training is conducted by the SUXOS, UXOQCS, or UXOSO (as applicable) and records of attendance are maintained on site. Certificates of Training are issued when applicable.

8.0 EQUIPMENT TESTS, FUNCTIONAL CHECKS, CALIBRATION, AND MAINTENANCE

Instruments and equipment, such as geophysical/navigational, and data analysis and transfer systems, used to gather and generate site characterization data will be tested with sufficient frequency and in such a manner as to ensure that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Instruments or equipment failing to meet the standard will be repaired, recalibrated, or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service.

Items such as cellular telephones and radios will be tested for serviceability at the start of each workday. Results of these tests will be recorded in the Daily Journal. Items failing these tests will be repaired or replaced prior to operations commencing.

8.1 REAL-TIME KINEMATIC GLOBAL POSITIONING SYSTEM TESTS

The Real-Time Kinematic GPS will be tested above a control monument with known coordinates each workday prior to beginning field activities. A variance of 1 foot is acceptable. If deviations are greater than 1 foot, the GPS planning software results will be re-examined using a current satellite ephemeris file and a project-specific coordinate.

8.2 DETECTOR EQUIPMENT TESTS

USAE proposes to use the Minelab Explorer II for this project. The user/operator's manual for both instruments will be provided on site.

8.2.1 MINELAB EXPLORER II

The following instructions are to be used for the Minelab Explorer II metal detector.

1. Assemble each Minelab Explorer II and put in freshly charged batteries.
2. Turn each unit ON in a clear area.
3. Perform the Noise Cancel function and wait still until the normal display returns (several seconds), then
4. Load the USER A settings by pushing the following (see Table 8-1):

    a. Menu –
    b. Settings –
    c. Load –
    d. Load USER A (left side) –
    e. OK hit Back to return to main display).

5. Check performance at instrument-test-strip
6. Unit is ready

TABLE 8-1: USAE'S MINELAB EXPLORER II SETTINGS

	User A	Changes	Date
Make sure to do the Noise Cancel First			
USER A Settings:			
Iron Mask (-16 for no Iron Mask)	-15		
Sensitivity	19		
Threshold (Higher if you prefer the Hum)	8		
Audio - Volume - Gain	8		
Audio - Volume - Max Limit	10		
Audio - Tone - Th. Tone	7		
Audio – Tone - Limits	8		
Audio - Tone - Variability	8		
Audio - Sounds	Const	Conduct	
Select	Clear		
Options - Noise	Default on 5		
Options - Response	Normal		
Options - Recovery	Neither Selected		

Evaluate and optimize these settings over the Instrument Test Strip. Log any changes and save as USER A. Report any changes to the Project QC Manager/UXOQCS who will document the changes and notify the SUXOS.

8.3 INSTRUMENT TEST STRIP

USAE will establish an Instrument Test Strip using appropriate inert seed items or simulants, and will conduct an analog test on the Minelab Explorer II prior to the start of the clearance operations.

8.3.1 INSTRUMENT TEST STRIP SETUP

USAE will use Minelab Explorer II hand-held analog detection for all MEC reconnaissance. An instrument test area for the detection instruments will be established at each MRS using appropriate inert items or simulants. The test area will serve as a validation for the detector equipment and will be used as a daily detector function check area.

The test area will be located in a convenient location that permits efficient daily use. The selected location will be checked with each instrument type for background anomalies prior to any blind seed item (BSI) placement. If necessary, the test area will be relocated to avoid background anomalies. The ground surface of the test area will be seeded with inert MEC items (or equivalent simulants) collectively referred to as BSI at various orientations. The test area will be seeded with the following inert BSI: Mk II hand grenade, 40mm grenade, 37mm projectile, 3.5 inch rocket and 75mm projectile.

Performance of the Minelab Explorer II will then be evaluated at the Test Area. Minelab Explorer II settings will be optimized to detect the seed items and reject the high Basalt geology. Optimum settings will be stored in each Minelab Explorer II unit for use on this project. Any change to the established settings, needed to maximize the test strip detection results while minimizing background responses, will be documented and reported.

USAE will use each test strip to evaluate the instrument settings that have demonstrated successful operation at other project sites. The user/operator's manual for the Minelab Explorer II will be used to power-up the instrument, load the proper settings and compensate for the local soil conditions. These settings will be evaluated and optimized, if necessary, during the initial test strip evaluations. Any change to the established settings, needed to maximize the test strip detection results while minimizing background responses, will be documented and reported.

The objective of the test strip is to define and allow for documentation of operator and instrument capabilities.

8.3.2 TEST DOCUMENTATION

The UXOQCS will document the results instrument test on the USAE QC Instrument Test Form (see Attachment 1); documenting each instrument's ability to detect the Instrument Test Strip seed items, operator proficiency and ease of use in this environment, and sensitivity to the background conditions.

The UXOQCS will check to ensure that instruments and equipment are calibrated or recalibrated in accordance with the manufacturer's recommendation or owner's manual prior to use in the Test Strip or the field environment itself. Calibrations will be completed on a prescribed schedule and the calibration results recorded in the daily field logbook.

The UXOQCS will check field logbooks to ensure that maintenance of vehicles and equipment are performed on a regular schedule and in accordance with the manufacturer's recommendation or owner's manual for equipment requiring regular upkeep.

USAE will coordinate scheduled maintenance of the following equipment in accordance with manufacturer recommendations or the owner's manual.

- Vehicles;
- Personal Protective Equipment;
- Communications Equipment;
- Geophysical, Navigational Equipment, and Personal Data Assistant;
- Handheld all-metals locators; and
- Emergency Equipment.

Replacement equipment will meet the same specifications for accuracy and sensitivity as the equipment removed from service. The detectors will be checked on the test strip daily and after any repairs. They will be required to demonstrate a consistent detection rate for all seed items and any identified background anomalies. Repair or replacement of parts will meet the manufacturer specifications and recommendations. The Project QC Manager will document and maintain records pertaining to the testing, repair, and/or replacement of equipment on site.

Repair or replacement parts will meet the manufacturer's requirements and be installed by personnel authorized to replace parts or make repairs. Records pertaining to the testing, repair, or replacement of instruments and equipment will be maintained on site by the Project QC Manager. Spare instruments of each type will also be mobilized to the site.

8.4 ACCURACY

Control monument locations, boundaries of construction areas scheduled for clearance, and boundaries of cleared areas will be verified and certified by the Project QC Manager or the UXOQCS. The UXOQCS will additionally perform daily reviews of the MEC data to ensure accurate categorization of munitions-related items encountered and to ensure that all MEC items are accounted for.

GIS coverage will be evaluated by the Project QC Manager and UXOQCS to determine if the geographic features are correct. Errors found will be corrected and noted in the operations field logbook. The accuracy of grid corners will be to the closest 1.0 foot. A detected error will result in the data being examined and the correct location and place points will then be determined in the project GIS data set to represent identifiable elements of the feature (e.g., corners or intersections).

9.0 DATA QUALITY OBJECTIVES

Data obtained during MEC operations must support the decision-making process. Consequently, data must be of a sufficient quantity and quality to make defensible decisions to provide an acceptable level of certainty for the decision maker(s).

9.1 DQO PROCESS

The DQO process is iterative and is normally applied to operations requiring the application of data gathered as a result of the conduct of analytic sampling. The output from one step may lead to the reconsideration of prior steps. This iteration leads to more efficient design of data collection operations. Data users, relevant technical experts and members of the QC staff will participate in the DQO process planning to ensure that their specific needs are included prior to the data collection.

DQOs provide the objective basis for quantitative definition of project requirements. DQOs shall be developed and used to ensure that the amount, type, and quality of data obtained during a field sampling project are adequate to support project decisions with a known level of confidence.

9.2 SPECIFIC ANALYTICAL OR STATISTICAL DQOS

For DQOs applicable to this SI, see the Quality Assurance Project Plan portion of this Work Plan.

10.0 QUALITY CONTROL METHODS AND PROCEDURES

This section discusses QC methods and procedures used during project operations.

10.1 INSPECTIONS

USAE will conduct inspections as a part of the Three-Phase Control Process to verify whether quality-related activities comply with this QC Plan. External inspections will address activities performed by project subcontractors, laboratories, and equipment and material suppliers.

The inspection program is established to provide the following:

- An objective and independent evaluation of compliance with established policies and procedures (Work Plan, AHAs, etc.); and
- A mechanism for verifying the implementation of corrective actions recommended as the result of inspections.

The UXO QC personnel performing inspections will be knowledgeable about, and receive training in, QC techniques, this QC Plan, and applicable regulations, and will be technically knowledgeable related to the process being inspected. Inspections will be performed in accordance with written procedures or checklists. Personnel performing the inspections will not have direct responsibilities in the areas they are assessing.

System and performance inspections will be undertaken. System inspections will evaluate the components of the QC system including evaluating items such as approach and adequacy of the preparation step, inspection of the schedules and plan delivery dates, and tracking systems for QC activities. Performance inspections evaluate actual QC activities such as design control, on-site data gathering, M&TE calibration and control, inspection and testing activities, and documentation.

Inspecting personnel will document inspection results, which will be reviewed by the Project Manager. When unsatisfactory or nonconforming conditions or items are found, the responsible organization will implement corrective actions in a timely manner. Previously unsatisfactory areas will be re-inspected to ensure that satisfactory corrective actions have been completed. The results of the inspections will be shared with the team with regard to needed rework and lessons learned.

Records of all inspections will be maintained and controlled as QC records.

TABLE 10-1: INSPECTIONS

Definable Feature of Work	Inspection
1. Pre-mobilization	• Ensure that the work to be performed is coordinated with Navy requirements and that a Notice to Proceed has been obtained from the Navy prior to the beginning of field activities. • Verify that personnel required for the work activities have been identified, are available, and meet the requirements/qualifications for the positions or waivers from the Navy have been obtained. • Confirm that personnel are properly trained and certified to operate equipment and machinery. • Verify that all field personnel have reviewed the Site Inspection Work Plan, this QC Plan, and the Site Health and Safety Plan. • Ensure that all personnel have signed the Employee Signoff Forms for the Site Health and Safety Plan, and that all Activity Hazard Analyses have been completed. • Confirm that the appropriate Material Safety Data Sheets have been identified and included with the Health and Safety Plan. • Confirm that required equipment has been identified and is available, on-hand, functional, properly calibrated, and appropriate for the work activities. • Verify that materials and supplies are on-hand and meet contract specifications. • Verify that all submittals have been approved by the proper authorities.

Definable Feature of Work	Inspection
2. Mobilization of Equipment, Supplies, and Personnel to WVTA	• Verify that personnel are properly trained and certified to operate equipment and machinery. • Ensure that personnel have proper personal protective equipment. • Provide sufficient spare parts and equipment. • Coordinate with personnel at WVTA.
3. Preparation of the Work Areas and Staging Areas	• Review support facilities. • Verify that work zones have been properly established. • Ensure that MEC surface screening is conducted in all work areas. • Inspect the break and rest area. • Inspect up staging areas for equipment and materials. • Inspect vegetation clearance for adequacy. • Inspect engineered barriers.
4. Setup of Grids/Transects	• Verify the correct operation of differential global positioning system (DGPS) equipment. • Check markings of 100 ft by 100 ft grid corners. • Ensure with of transects adequate. • Verify that DGPS readings are recorded.
5. Metal Detector Operations	• Inspect the setup of the Instrument Test Site and applicability of items including burial depth and orientation. • Confirm the process employed for daily testing of metal detectors. • Confirm successful Instrument Test Strip detection capability for each operator and sensor. • Inspect the certification and calibration procedures for metal detectors. • Observe the reacquisition of items in the Instrument Test Strip area as well as in the remainder of the site. • Observe and check records and data recording forms for completeness.
6. Surface Grid/Transect Surveys	• Verify team safe separation distances. • Ensure that site security features and Exclusion Zones are maintained. • Ensure that all health and safety equipment and supplies have been mobilized to the operations area. • Verify that proper equipment is used.
7. Site Restoration and	• Confirm that all temporary site features and equipment and debris

Definable Feature of Work	Inspection
Demobilization	have been removed. • Ensure that a final site walk-through with Navy personnel is scheduled and conducted. • Ensure that punch-listed items from the final site walk-through are implemented. • Ensure that all documentation is signed by responsible parties. • Ensure the coordination of equipment demobilization
9. Reporting at Project Closure	• Ensure that the After Action Report is prepared, reviewed, and submitted.

10.2 EQUIPMENT AND INSTRUMENT CHECKS

The UXOQCS or Team Leaders will initially and daily inspect the team equipment and instruments at the test strip, and observe the equipment pre-operation procedures and document results in the daily log. The UXOQCS or Team Leaders will monitor performance through the daily test strip of each UXO team member and record the results on the USAE QC Instrument Test Form (see Attachment 1). Should deficiencies occur (e.g., equipment, operator proficiency), the UXOQCS will identify the cause(s) and initiate corrective actions. Should deficiencies occur that cannot initially be attributable to the operator or the equipment, USAE will conduct the air-test technique on the instrument to further isolate the cause of the deficiency. The air-test technique, when utilized, will provide an additional level of confidence in the depths of detection. Equipment will be tagged and removed from service if daily equipment field checks indicate equipment malfunction and field repairs cannot be made. The UXOQCS will notify the Project QC Manager and the SUXOS of defective equipment and request expedited replacement. To minimize cost impacts due to faulty equipment, USAE will maintain backup equipment at the project site.

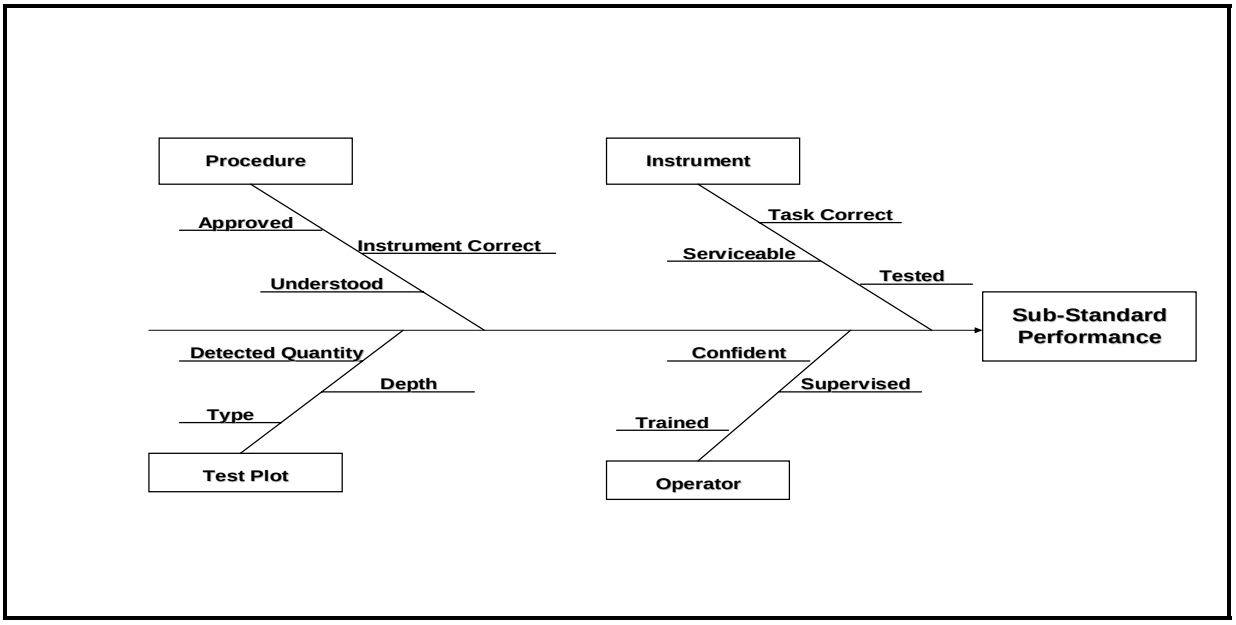
10.3 QUALITY CONTROL METHODS

The UXOQCS will select areas of grids/transects from the collected data to verify the accuracy of the collected data. The UXOQCS will verify the correct nomenclature, quantity and GPS coordinates of reported MEC. Should the UXOQCS find an MEC not reported by the survey team, this will trigger a Root Cause Analysis to determine the reason the survey team did not record the item. All others aspects of the SI will be inspected in accordance with Table 10-1 above.

The Project QC Manager will conduct a Root Cause Analysis to determine if the failure is the result of the process, procedures, equipment and/or personnel. The Project QC Manager will provide his findings to the SUXOS and Project Manager with suggested corrective actions per the Continuous Improvement Program (Section 11.0). Once approved by management, the UXO Teams will implement the corrective actions. The Root Cause Analysis and corrective actions will be attached to the weekly report.

Figure 10-1 illustrates the flow of the root cause and effect process the Project QC Manager and the UXOQCS will use to determine failure causes.

FIGURE 10-1: CAUSE AND EFFECT PROCESS



11.0 CONTINUOUS IMPROVEMENT PROGRAM

A Continuous Improvement Program will be maintained on site. It will include the following actions:

- The UXOQCS will solicit on a weekly basis the lessons learned from on-site personnel;
- The Project Quality Manager, UXOQCS, and SUXOS will review lessons learned for appropriateness;
- Recommendations for improvements to the work process will be forwarded to the Program Manager; and
- Upon review and approval by the Program Manager, recommendations for improvement will be forwarded to the COTR for consideration.

12.0 LESSONS LEARNED PROGRAM

A Lessons Learned Program (LLP) will be developed by USAE to provide for the exchange of information regarding problems that may occur during the activities at the WVTA project site.

12.1 LESSONS LEARNED OBJECTIVE

The objective of the LLP is to capture and share experience or recognized potential problems or better business practices to:

- Prevent the recurrence of repetitive design/execution deficiency;
- Clarify interpretation of regulations or standards;
- Reduce the potential for mistakes in high risk/probability areas of concern;
- Pass on information specific to an installation or project;

- Promote a good work practice that should be ingrained for repeat application; and
- To promote efficient and cost effective business practice.

12.2 TEAM RESPONSIBILITIES

USAE project team will be responsible for identifying and submitting lessons learned for review and approval. Throughout this MEC response activity, USAE project team members will consider how their experiences might be appropriate for the LLP.

End of Document

APPENDIX D - ATTACHMENT D-1: USAE FORMS

D-1.0 USAE Quality Control Forms

This attachment contains the following USAE Quality Control forms:

- Contractor Quality Control Report Continuation Sheet
- Corrective Action Request
- Corrective Action Request Log
- Daily QC Report and Contractor Production Report
- Definable Features of Work Matrix
- Non-Conformance Report
- Non-Conformance Report Tracking Log
- Daily QC Report
- Rework Items List
- Stop Work Order
- Stop Work Order Log
- Submittal Register (Part A)
- Submittal Register (Part B)
- Grid/Area Completion Form
- QC Grid/Area Completion Form
- Operator/Instrument Test Form
- Performance Evaluation Rating Form

This space intentionally left blank.

Contractor Quality Control Report Continuation Sheet

(Attach additional sheets if necessary)

Page ___of ___

Contractor: **USA Environmental, Inc.** Report No.

Contract No. N62742-05-D-1868 C.T.O. No. Project No.

PREPARATORY PHASE INSPECTION

Y - Yes; N - No; N/A - Not Applicable	
Plans and Specs have been reviewed	
Submittals have been approved	
Materials comply with approved submittals	
Preliminary work was done correctly	
Testing Plan has been reviewed	
Work method and schedule discussed	

Identify Definable Feature of Work and Location, and List Personnel Present

QC Manager **Date**

Contractor Quality Control Report Continuation Sheet

(Attach additional sheets if necessary)

Page _____of _____

Contractor: **USA Environmental, Inc.**

Contract No. N62742-05-D-1868 C.T.O. No.

Report No.

Project No. _____

INITIAL PHASE INSPECTION

Y - Yes; N - No; N/A - Not Applicable	
Preliminary work was done correctly	
Sample was prepared and approved	
Workmanship is satisfactory	
Test results are acceptable	
Work is in compliance with the contract	

Identify Definable Feature of Work, Location, and Personnel Present

Testing Performed & **Who Performed Test (including number of samples and tests taken)**

QC Manager

(Attach additional sheets if necessary)

Page _____of _____

Date: _____

Contractor: **USA Environmental, Inc.** Report No.

Contract No. N62742-05-D-1868 C.T.O. No. _____ Project No.

FOLLOW-UP PHASE INSPECTION

Y - Yes; N - No; N/A - Not Applicable

Work is in compliance with the contract: ____

Identify Definable Feature of Work, Location, and Personnel Present

Testing Performed & Who Performed Test (including number of samples and tests taken)

_____

QC Manager **Date**

CORRECTIVE ACTION REQUEST

MEC Response at **(Project / Task Order Number)**

<table>
<tr><td>Adverse Trend:

Yes

No</td><td colspan="2">CAR Number:</td><td>Date:</td></tr>
<tr><td colspan="2">Organization/Project/Department:</td><td colspan="2">Person Contacted:</td></tr>
<tr><td colspan="4">Discrepancy (include specific requirements violated):</td></tr>
<tr><td colspan="2">Originator:</td><td colspan="2">Response Due Date:</td></tr>
<tr><td colspan="4">Corrective Action Taken/Proposed to Correct Discrepancy:</td></tr>
<tr><td colspan="4">Corrective Action Taken to Prevent Recurrence (the cause of the discrepancy must also be included here):</td></tr>
<tr><td colspan="2">Corrective Action Taken by (signature and date):</td><td colspan="2">Date When Corrective Action Completed:</td></tr>
<tr><td colspan="2">Corrective Action Evaluated:</td><td colspan="2">Verification of Implementation:</td></tr>
<tr><td>Evaluated by:</td><td>Date:</td><td>Verified by:</td><td>Date:</td></tr>
</table>

CORRECTIVE ACTION REQUEST LOG

MEC Response at **(Project / Task Order Number)**

Contract No. N62742-05-D-1868

CAR No.	Orig. Date	Initiated By	Description	Responsible Party	C/A Due	Status	
Project No.	Close Date	Closed By				C/A Recommended & Approved	Re-inspection Results

Control Phase _____

DAILY QUALITY CONTROL REPORT
AND CONTRACTOR PRODUCTION REPORT

Daily Report No. MEC - _____ Date: _____

Contract No. N62742-05-D-1868 CTO No. _____

Project Title and Location:

Weather AM: ___ Rainfall in. ____ Temp. _____Min._____ Max. _____

Weather PM: ___ _ Rainfall in. __ Temp. _____Min._____ Max. _____

1. Personnel On-Site

NAME	LOCAL	USAE	SUB	EMPLOYEE	TYPE OF WORK	HRS

2. Job Safety Actions/Safety Inspections Conducted

Was the Job Safety Meeting Held? Yes __ No _____ (Attach. Minutes)

Were there lost time accidents?_____ Yes ____ No (Attach. OSHA Report)

Trenching/scaffold/high voltage_____ Yes ____ No (Attach. Statement)

Haz. Mat. released into environment? Yes No _____ (Desc. of Incident)

3. UXO Actions Taken

4. List of Construction Equipment on Work Site and Hours Used

5. Instructions Received from the Contracting Officer on Deficiencies or Work Required

6. Quality Control Inspections Conducted

7. Submittal Action

8. Remarks

(Work Progress and Delays)

(Safety Hazards Encountered)

(Instructions Given and Corrective Actions Taken)

Date: _____

9. Record of Visitors to the Work Site

10. Definable Feature of Work

11. Remarks: Rework:

12. **Attachments:**

13. **Certifications:** I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Prime Contractor and each subcontractor, and have determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.

MEC RESPONSE AT

PROJECT LOCATION

N62742-05-D-1868 CONTRACT TASK ORDER No.

DEFINABLE FEATURES OF WORK MATRIX

Spec. Section	Para. No.	Feature of Work	Prep		Initial		Follow up	Remarks
			Req	Date	Req	Date	Req	

NONCONFORMANCE REPORT

Contract No. N62742-05-D-1868 Contract Task Order No.

NCR Number:	Project Name and Number: MEC Response at:	Date:	Page 1 of

Nonconformance Description (include specific requirement violated):

Identified by:_____ Date: _____

Root Cause of Nonconforming Action:

Corrective Action(s) to be Taken (include date when action(s) will be complete):

To Be Performed By: _____ Date: _____

Action(s) to be Taken to Preclude Recurrence:

To Be Performed By: _____ Date: _____

Acceptance by:

Project Manager: _____ Date: _____ CQC Manager_____ Date:

Corrective Action(s) Completed by and Date:	Verification Completed by and Date:

CONTRACT NO. N62742-05-D-1868			**NONCONFORMANCE REPORT** **TRACKING LOG**			Page _____ Of _____	
CONTRACTTASK ORDER NO.							
NCR NO.	ORIG. DATE	INITIATED BY	NONCONFORMANCE DESCRIPTION			STATUS	
PROJECT NO.	CLOSE DATE	CLOSED BY		RESPONSIBLE PARTY	C/A DUE	C/A RECOMMENDED AND APPROVED	REINSPECTION RESULTS

USA Environmental, Inc.

DAILY QUALITY CONTROL REPORT

Date: ____/____/____ Contract #: _____ Task Order #: _____

Site/Location : _____

Weather: _____ Temperature: _____ Rainfall: _____

1. Preparatory Inspection: _____

_____

_____

Results: _____

2. QC Audits Performed

a. Operations: _____

_____

_____

Results: _____

b. Safety: _____

_____

_____

Results: _____

c. Administrative: _____

_____

_____

Results: _____

d. Equipment: _____

_____

_____

_____

Results: _____

_____

Daily Quality Control Report Con't:

3. QC Performed (Grids)

Number of Grids QC'd: _____ Results: _____ # Pass _____ # Fail

Comments: _____
_____
_____
_____

4. Follow Up Inspections and Results

Section(s): _____
_____
_____

Results: _____

5. Instructions Received: _____
_____
_____
_____
_____

Remarks: _____
_____
_____
_____

QC Signature: _____ **Date:** ____/____/____

Printed Name: _____

REWORK ITEMS LIST

MEC Response at **(Project / Contract Task Order No.)**

Contract No. N62742-05-D-1868

Item	Date Identified	Date Corrected
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
20.		
21.		
22.		
23.		
24.		
25.		

STOP WORK ORDER

Project Name/Location: _____ Project No. _____ Page 1 ____of ____

S.W.O. No. _____

Contract No. N62742-05-D-1868 C.T.O. No.: _____

1. Written Notice Issued to: Name: Title: Org.:	2. P.O. # or Activity: 3. Location: 4. Issued by (name): Issued by (title):		
5. Verbal Notice Issued to: Name: Title:	Date:		Time:
6. Associated NCR No.:	7.	Associated CAR No.	
8. Stop Work Order Condition Description:			Attachment
9. Remedial Action Required: By Whom: Required Remedial Action Determined by: Project Manager: CQC Manager:		By When:	Attachment Date: Date:
10. Follow-up of Remedial Action Taken: Verbal Notice to Resume Operations Given to: Title: Stop Work Order Cancellation Authorized by: Program CQC Manager:	Date:		Attachment Time: Date:

STOP WORK ORDER LOG

MEC Response at:

C.T.O No. _____
Contract No. N62742-05-D-1868

SWO No.	Action Party/Organization	Subject	Date Issued	Date Closed

SUBMITTAL REGISTER (PART A)

Contract Number: Project Title:

SPEC SECTION NO.	SD NO. & TYPE OF SUBMITTAL - MAIL OR PRODUCT	SPEC PARA NO.	CLASSIFI APPR BY CO *	GOVT OR A/E REVR	TRANS CONTL NO.	PLANNED SUBMITTAL DATE
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1)	2. Internal Draft Planning Documents					
2)	3. Draft Planning Documents					
3)	4. Draft Final Planning Documents					
4)	5. Final Planning Documents					
5)	7. CD ROM of Final Planning Documents					
6)	8. RAB Fact Sheets/ Slide Show Presentations					
7)	9. Contract Management Plan					
8)	10. Corporate Health and Safety Plan					
9)	11. QC Program Plan					
10)	12. Internal Draft RI Report					
11)	13. Draft RI Report					
12)	14. Draft Final RI Report					
13)	15. Final RI Report	.				
14)	34. Draft Treatability Model Report					
15)	35. Draft Final Treatability Model Report					
16)	36. Final Treatability Model Report					
17)						
18)						

* Navy Notes:	* NASA Notes:	* Army Notes:
Approved by:	Approved by:	Classification: GA: Gov't Approval FIO: For Info ONLY

SUBMITTAL REGISTER (PART B)

Location: Contractor:

Contract Number: Project Title:

ACT CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/DATE RECD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RECD FROM 0TH REVIEWER	ACT. CODE	DATE OF ACTION	MAILED TO CONTR/RECD FROM APR AUTH	REMARKS
(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)
								1)
								2)
								3)
								4)
								5)
								6)
								7)
								8)
								9)
								10)
								11)
								12)
								13)
								14)
								15)
								16)
								17)
								18)

ACTION CODES: NR: Not Reviewed AN: Approved as Noted A: Approved
RR: Disapproved; Revised and Resubmit (Others may be prescribed by the Transmittal Form)

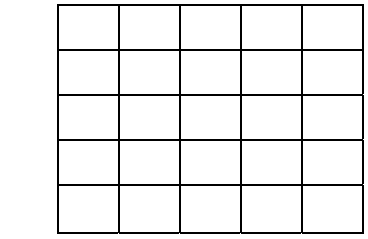
USAE
Grid / Area Completion Form

DATE START / STOP:	TIME START / STOP:	GRID #:
TEAM #:		
TYPE OF OPERATION: ☐ **Surface** ☐ **Sub-Surface** ☐ **Construction Support** ☐ **Backhoe** ☐ **Other**		
SUPERVISOR'S NAME:		
AREAS INSPECTED: (List by grid numbers, coordinates, name, or other identifier)		

WORK CHECKS

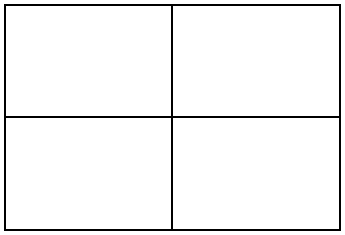
Item Description		Item Description	
1. Personnel compliant with the Work Plan	Y / N	4. Correct Instrument Setting Selected / Used	Y / N
2. Know and Understand the Task Requirements	Y / N	5. QC / QA Criteria Understood	Y / N
3. Correct Instrument / Equipment Selected	Y / N	6. Grid / Area Completed	Y / N

MEC / UXO ITEMS NOTED (Include type, nomenclature, #, depth, and location (map) within grid as necessary):



SW Corner

Grid



Area

WORK COMMENTS:

SIGNATURE: _____
Supervisor

SIGNATURE: _____
Sr. UXO Supervisor / Site Manager

Note: Grid / Area Completion Forms are used to document operations conducted by the team prior to submission for QC. This form will also be used to document the present status of the grids / areas being worked by various teams (UXO, backhoe, sweep, etc.).

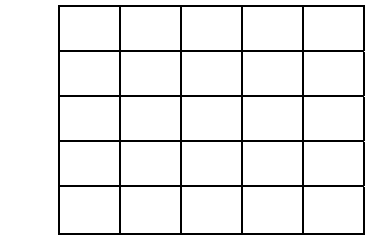
USAE
Quality Control Grid / Area Inspection Form

INSPECTION DATE:	**TIME:**	**GRID #:**
CONTRACT and TO #:		
SITE NAME AND LOCATION:		
INSPECTED BY:		
AREAS INSPECTED: (List by grid number, coordinates, name, or other identifier)		

INSPECTION RESULTS

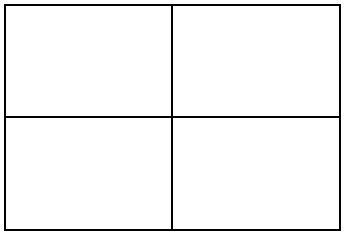
Item Description	Pass	Item Description	Pass
1. Work Performed IAW the Work Plan	Y / N	4. Correct Instrument Setting Used	Y / N
2. Compliance with QC Requirements	Y / N	5. QC Criteria Understood	Y / N
3. Correct Instrument Used	Y / N	6. GRID / AREA RESULTS	Y / N

FAILING DEFICIENCIES NOTED (Include type, #, depth, and location within grid as necessary):



SW Corner

Grid



Area

CORRECTIVE ACTIONS REQUIRED / RECOMMENDED:

REINSPECTION RESULTS: (If required)

SIGNATURES:

I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary)

_____ UXOQCS

_____ Sr. UXO Supervisor / Project Manager

Note: QC Grid / Area Inspections are to be conducted prior to submission for QA and documented on this form. This form will also be used to document the present status of the grids / areas submitted for QC, and will also be used to note the current status of deficiencies noted during inspections. Any inspection where deficiencies have been noted will be forwarded to the Site Manager / SUXOS and a CC to the USAE QC Manager.

USAE

Operator/Instrument Test Form

FOR MEC OPERATIONS

DATE:	**TIME:**	**OPERATOR:**
TEAM #:	**INSTRUMENT/SERIAL #:**	
SITE NAME AND LOCATION:		
WEATHER CONDITIONS:		
TEST AREA (List by grid number, lane, marker number, or other identifier)**:** **TEST ITEM(S)** (List test item by type, depth, and quantity)**:** **BLIND SEED ITEM(S)** (List type, depth, and quantity)**:**		

TEST RESULTS

Item Description	Pass	Item Description	Pass
1. Instrument Checked for Broken/Missing Components	Y / N	9. Operator Familiar with W.P. Procedures	Y / N
2. Instrument Serviceability Check Performed	Y / N	10. Instrument Trained Operator	Y / N
3. Correct Settings Selected for the Instrument	Y / N	11. Instrument Passed Test Area	Y / N
4. Correct Survey/Sweep Techniques Employed	Y / N	12. Operator Passed Test Area	Y / N
5. Instrument Responsive to Test Item(s)	Y / N		
6. Operator Responsive to Instrument Signal/Sound	Y / N	Was a Blind Seed Item (BSI) Employed	Y / N
7. Operator Locates Point of Origin for Test Item(s)	Y / N	Did the Instrument Locate the BSI	Y / N
8 Operator Familiar with Pass/Fail Criteria	Y / N	Did the Operator Locate the BSI Origin	Y / N

SUMMARY OF DEFICIENCIES NOTED (Identify if procedural, process, instrument, or operator)**:**

CORRECTIVE ACTIONS RECOMMENDED (As required)**:**

Instruments failing the test will be tagged and removed from service until repaired or replaced.

Individuals will be corrected on deficient procedures, processes, techniques, and/or re-trained to acceptable standards.

SIGNATURES:

I acknowledge that I have been briefed on the results of this test and will take corrective actions as identified by the QC Section.

_____ UXOQCS

_____ INSTRUMENT OPERATOR

Note: QC test are to be conducted for the instrument and operator each day and documented on this form. This form will also be used to document the current status of deficiencies noted during daily tests. Any daily test forms where deficiencies have been noted will be forwarded to the Project Manager and to the USAE Program QC Manager.

USA Environmental, Inc.

PERFORMANCE EVALUATION RATING FORM

NAME: _____ IDENTIFICATION NUMBER: _____

Labor Category: _____

Project Location: _____

Reason for Rating: ☐ Quarterly ☐ Annual ☐ Contract Complete

☐ Transfer ☐ Termination ☐ Other

Period Covered: From _____ To _____

Noting employees work related performance, knowledge, skills and ability, would you work with this person again? ☐ Yes ☐ No

Safety: _____

Rating: 5 - Excellent 4 - Above Average 3 - Average 2 - Marginal 1 - Poor

Quality: _____

Rating: 5 - Excellent 4 - Above Average 3 - Average 2 - Marginal 1 - Poor

Productivity: _____

Rating: 5 - Excellent 4 - Above Average 3 - Average 2 - Marginal 1 - Poor

Knowledge: _____

Rating: 5 - Excellent 4 - Above Average 3 - Average 2 - Marginal 1 - Poor

Reliability: _____

Rating: 5 - Excellent 4 - Above Average 3 - Average 2 - Marginal 1 - Poor

Other: _____

Rating Supervisor: _____ Date _____

EMPLOYEE SECTION

I ☐ do ☐ do not have a statement to make (attach statement, if applicable)

Employee's Signature: _____ Date _____

MANAGEMENT REVIEW

I have reviewed this evaluation and I: ☐ Agree ☐ Disagree

Manager's Signature: _____ Date _____

Ratings of 5 or 1will require an explanation.

Comments attached if applicable.

APPENDIX D - ATTACHMENT D-2: QUALITY CONTROL STANDARD OPERATING PROCEDURES

D-2.0 QUALITY CONTROL SURVEILLANCE STANDARD OPERATING PROCEDURES

This attachment contains the Quality Control Surveillance standard operating procedures.

This space intentionally left blank.

STANDARD OPERATING PROCEDURE – QCP-01
QUALITY CONTROL SURVEILLANCE

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide USA Environmental, Inc. (USAE) personnel the Quality Control (QC) requirements and procedures applicable to the conduct of operations on project sites. The applicability of QC plans and procedures is to ensure a standard is used when appropriate to assess conformance of goods and services to be provided.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel involved in operations, which produce or is a component of a contract deliverable. This SOP is not intended to contain all requirements needed to ensure compliance. Consult the documents listed in Section 5.0 of this SOP for additional compliance issues.

3.0 RESPONSIBILITIES

3.1 PROGRAM QC MANAGER

The Program QC Manager (PQCM) is responsible for ensuring the availability of the QC resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where this SOP is to be implemented. The PQCM is responsible for the development, execution, and maintenance of the QC Program and the direct supervision of assigned QC personnel. The PQCM reports directly to the Vice President of USAE.

3.2 PROJECT QC MANAGER

The Project QC Manager (QCM) will ensure that this SOP is implemented in all operations involving the use of QC standards, inspections, and audits. The QCM will also ensure that relevant sections of this SOP are discussed in briefings, and that information related to its daily implementation is documented in the Site QC Log. The QCM is responsible for the direct supervision of project QC personnel, monitoring, and approving the quality of submittals, materials, and other work to ensure the compliance with specifications, workmanship, standards, and the requirements of the project contract. The QCM reports directly to the PQCM.

3.3 UXO QC SPECIALIST

The Unexploded Ordnance QC Specialist (UXOQCS) shall be responsible for the field implementation of this SOP, and for developing and implementing specific munitions and explosives of concern (MEC) sections of the Project QC Plan. The UXOQCS is responsible for the direct supervision of MEC QC personnel, as well as directing and approving the correction of any and all non-conforming or unsafe MEC work performed. The UXOQCS has ***STOP WORK AUTHORITY*** for matters relating to the assigned project. The UXOQCS reports directly to the QCM.

3.4 PROJECT PERSONNEL

Project personnel are responsible for ensuring that work performed adheres to the requirements identified by the Work Plan, Site Safety and Health Plan, and QC Plan. Supervisors will also be responsible for daily inspections of site operations and conditions to ensure their initial and continued compliance with this SOP and other guidelines are maintained. Supervisory personnel responsible for the submission of work products for QC inspection, or review, will strive to submit only those items, or material, which meet acceptance criteria.

4.0 PROCEDURE

All personnel, including contractor and subcontractor personnel, performing operations involving the use of QC standards shall be familiar with the QC requirements associated with the task, or operation being performed, and with the work practices and control techniques in order to understand and comply with pass/fail criteria to be applied by QC personnel to ensure compliance with standards, procedures, practices, and contractual obligations. Project specific QC plans contain those items identified as being applicable to the task assigned. This includes:

- Field Quality Control Inspections, Audits, and Reports
- The Quality Control Process
- Quality Control Certifications
- Definable Features of Work (DFW)
- Inspections required by each DFW
- A Cause and Effect Process

The three phases of control for each definable feature of work (DFW) are used to ensure that work complies with contract requirements. The three phases of control include the Preparatory Phase, Initial Phase, and Follow-up Phase, and shall adequately cover appropriate on-site and off-site work in addition to the requirements listed in the subsections below. Examples of DFWs for the field activities are listed in Table 1.

TABLE 1: EXAMPLES OF DFWS FOR PROJECT ACTIVITIES

Task	Field Activities
1	Pre-mobilization
2	Mobilization of equipment, supplies, and personnel to the project site
3	Preparation of the work areas and staging areas
4	Setup of excavation grids and survey monuments
5	Magnetometer operations, including setup of the Instrument Test Strip
6	Intrusive grid operations
7	MEC disposal operations
8	Site restoration and demobilization
9	Reporting at project closure

4.1 QUALITY CONTROL CRITERIA

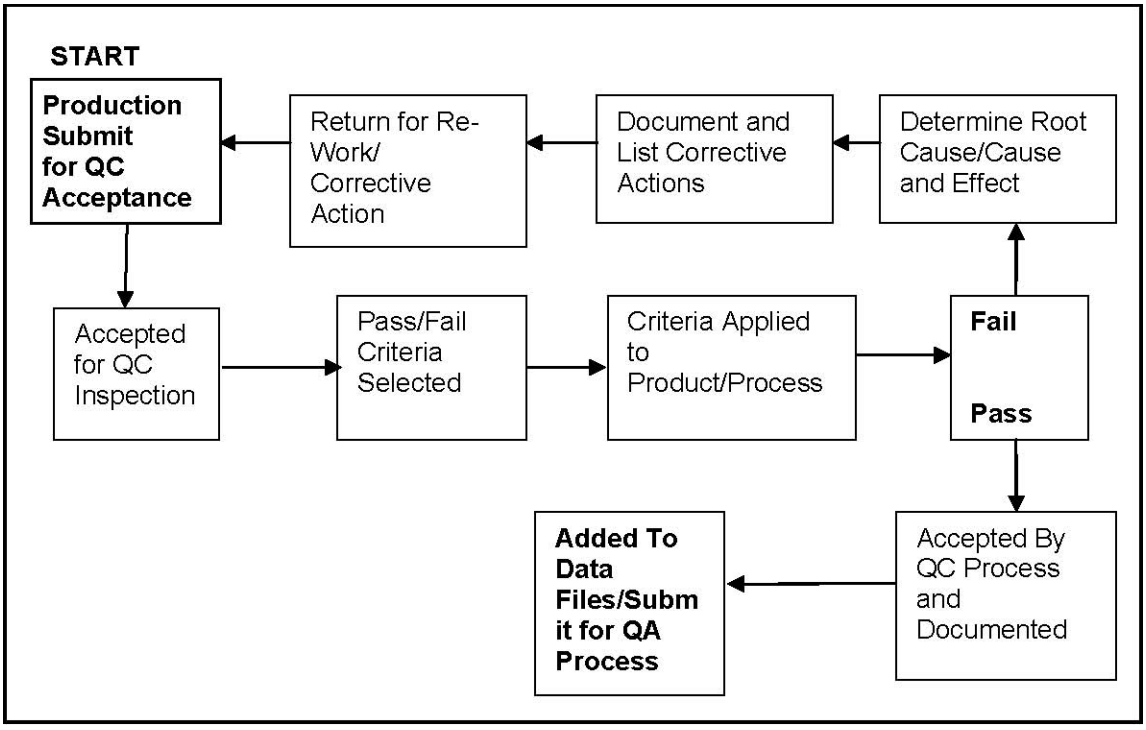
4.1.1 INSPECTION CRITERIA

Inspection criteria for a given task or operation is derived from the requirements found in the Scope/Statement of Work (SOW), Performance Work Statement (PWS), Task Order Requirements, or Contract. Inspection criteria is identified for the various components of the task or operation and applied during the three phases of control.

QC personnel will review, identify, and apply the pass/fail criteria for each submitted work product. Inspections will be recorded on an approved QC inspection form and will contain the following at a minimum:

- Work product information
- Person or team submitting work product
- Pass/Fail Results
- Corrective requirements and references as necessary
- Signature of QC individual

FIGURE 1: QC PROCESS



4.1.2 ACCEPTANCE CRITERIA

The requirements for acceptance of the work product are determined by the Government for the services rendered as partial or complete performance having been met. The authorized Government Representative will accept or reject the product in accordance with established criteria and issue the appropriate document(s) based on the various functions, including inspection, to determine whether the contractor has fulfilled the requirements pertaining to quality, quantity, and contractual obligations.

Documents required as deliverables (e.g., work plans, draft and final reports, certification or verification documents, etc.) under contract will be developed and reviewed by a project team consisting of the USAE Project Manager, Project Engineer, SUXOS, Project Geophysicist, Geographic Information System Manager, and PQCM. These team members will contribute their corporate knowledge and experience to the documents to ensure technical quality.

4.1.3 DEFICIENCY MANAGEMENT

Work product that is deficient in nature (non-conforming, incomplete, or sub-standard) will have the attribute identified and the appropriate notifications made within the QC and production sections. Documents will include all pertinent information and a deficiency number assigned to allow for tracking on the Deficiency Tracking Log from initial identification to correction and submittal. Deficiencies will be addressed in an expeditious manner and documents will contain the signatures of responsible personnel. Deficiency Tracking Logs will be included in the weekly QC Report and copies attached for supporting documentation.

4.1.4 NON-CONFORMANCE

Items or material identified for non-conformance will be documented on a Non-Conformance Form and assigned one of the following categories:

- **Critical Non-Conformance** - a unit of product that fails to conform to specified requirements for one or more critical characteristics.
- **Major Non-Conformance** - a unit of product that fails to conform to specified requirements for one or more major characteristics but conforms to all critical characteristics.
- **Minor Non-Conformance** - a unit of product that fails to conform to specified requirements for one or more minor characteristics but conforms to all critical and major characteristics.

Non-Conformance issues will be addressed in a timely manner by the responsible individual, section, or department. All non-conformance information will be included in the weekly QC Report and copies attached for supporting documentation.

4.1.5 GRID INSPECTION PROCEDURES

Grids may be inspected in a number of ways that allow for a redundancy in checks for determining the acceptability of the process performed by the clearance team. These include the use of various methods of grid area selection for QC inspection and the use of blind seed items (BSI) placed within the grid as preliminary inspection/evaluation by the QC section. Below are two grid inspection methods and BSI that may be used by the QC inspection team.

Example "A" Grid Inspection Method

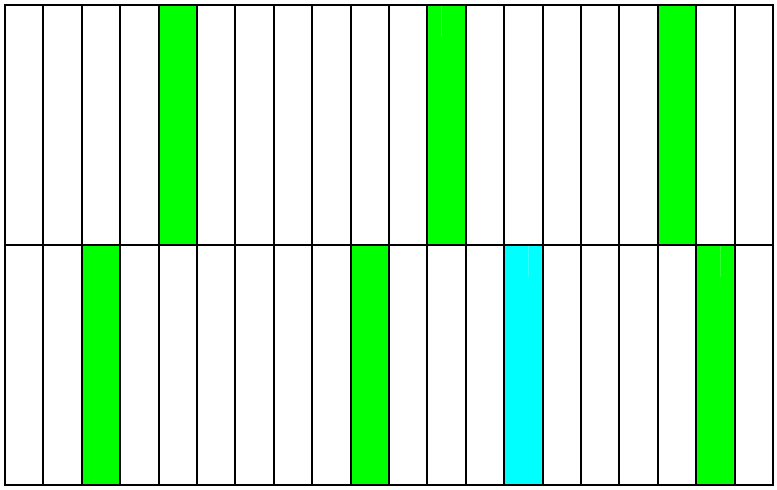
200									
180									
160									
140									
120									
100									
80									
60									
40									
20	40	60	80	100	120	140	160	180	200

1 Grid of 200 feet (ft) x 200 ft

1 Grid is divided into 100 each 20 ft x 20 ft "units"

QC % of Grid: 15% = 15 each units randomly selected = 6,000 square feet (sq ft) QC'd
20% = 20 each units randomly selected = 8,000 sq ft QC'd
25% = 25 each units randomly selected = 10,000 sq ft QC'd

Example "B" Grid Inspection Method



1 Grid of 100 ft x 100 ft

1 Grid is divided into 40 each 5 ft x 50 ft "units"

QC % of Grid: 15% = 6 each units randomly selected = 1,500 ft QC'd
20% = 8 each units randomly selected = 2,000 ft QC'd
25% = 10 each units randomly selected = 2,500 ft QC'd

Unit size within the grid may be determined by SOW, PWS, contract, company submittal, or directive from the QA/Acceptance Authority. The normal percentage to be inspected by the QC process is typically 10%. This 10% is the minimum, to better determine if the procedures, personnel, and equipment are performing to an acceptable standard, performing a higher percentage (15% or greater) at inspection, adding BSIs, and increasing the percentage for re-worked areas will help to ensure the entire process and the results are consistent in applicability and in compliance or non-compliance of customer, client, regulatory, contractual, or company requirements.

4.1.5.1 Percentage Acceptance Sampling

The correct percentage (15, 20, 25) to be QC'd is determined, following that selection, use the random number generator program (example based on 100 units for Sample "A" or 40 units for Sample "B") to select which units are to be inspected. Green highlighted units are an example of that selection.

The BSI placed within the grid is an additional QC check. BSI are typically employed at the rate of 2 per acre. Blue highlighted unit is the example. BSI are also placed within the instrument test strip at the rate of 1 to 3 per day.

Pass / Fail Criteria: The criteria for area acceptance or failure are found within the QC Plan and define the size, type, construction, and depth that must be removed. Should any of the randomly selected units (green) fail, the entire grid must be re-worked and re-submitted for QC inspection. The BSI must be found during the team's clearance of the grid, failure to locate the BSI during this period constitutes a QC failure. Upon re-submittal of the re-worked grid (see 4.2.4) the additional QC inspection percentage measures will be implemented (e.g., 20%).

4.2 SUBMITTALS

4.2.1 GENERAL

Project specific submittals (e.g., product or administrative) will be completed, reviewed for accuracy, and signed by the appropriate personnel. Submittals will be made in an acceptable form, formatted with required supporting documentation, and be sent to the receiving agency, section, department, or individual in a manner consistent with delivery dates and/or times identified in the SOW, PWS, Contract, or approved schedule. Submittals will be recorded in a Submittal Register.

4.2.2 DATA

Data generated on the project site will be inspected or reviewed by the appropriate QC personnel to ensure it conforms to program/project specific requirements. Inspections or reviews will be documented and the results maintained in the QC Log, Inspection Form, or by other approved and applicable means.

Projects, sections, or personnel submitting data for inspection or review will ensure the submitted data is in the approved format and contains all required information in accordance with the SOW, PWS, Task Order Requirements, or Contract.

4.2.3 EQUIPMENT

Equipment utilized on project sites will be checked or inspected by assigned project personnel for serviceability, functionality, and task appropriateness. Equipment checks or inspections will be documented on preprinted forms and should contain the following as a minimum:

- Equipment name and model number
- Date of check or inspection
- Maintenance or service due date (when applicable)
- Load capability and test date (when applicable)
- Operational or non-operational
- Non-operational – Remove from Service Tag # (when applicable)
- Description of deficiency, or needed repair
- Name and signature of individual performing check or inspection

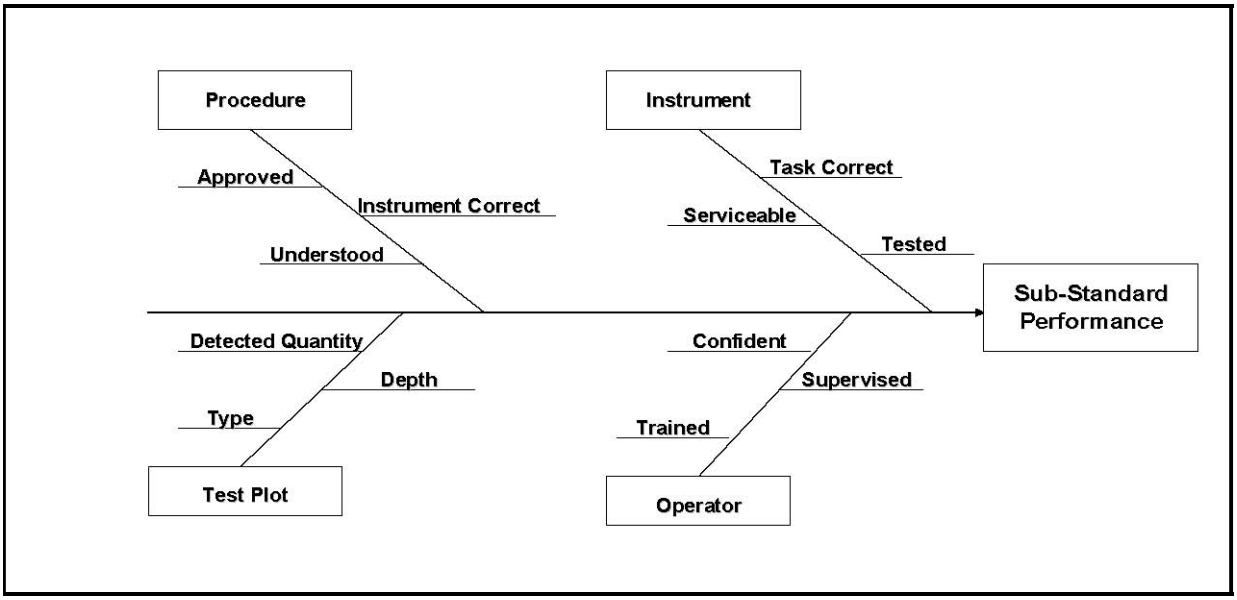
Equipment that generates data as part of the check or inspection (e.g., DGM equipment) will have that data reviewed by the appropriate personnel to determine an operational or non-operational status.

4.2.4 RE-WORK

Product or material that is determined to be deficient in nature, non-compliant, incomplete, or not acceptable will be returned for re-work to the submitting project, section, or individual. Product or material requiring re-work will have a cause and effect analysis (see Figure 2) performed by the QC section to determine the extent of deficient procedures or material. Re-work products will not be submitted for quality assurance (QA) inspection or delivered to the client or customer.

Grids that fail the QC process will be re-worked in their entirety before re-submittal for the QC process. Once accepted for QC inspection, the percentage of area (units) will be increased by 5% over the last inspection percentage. The total percentage (e.g., 20%) will not include any area (units) previously QC inspected. The re-work percentage must be new units within the grid plus the unit that caused the initial failure.

FIGURE 2: CAUSE AND EFFECT PROCESS



Product or material returned for re-work will be accompanied by a report, inspection form, or other acceptable means detailing the reason for re-work and the acceptable standard by reference, suggested or required corrective action, and notifications made to appropriate personnel within the operational, production, or quality management structure.

4.2.5 TESTING AND LABORATORY REQUIREMENTS

When required, an independent analytical laboratory qualified to perform sampling and analysis will be utilized. Laboratories performing work in connection with construction testing shall be certified to the methods specified by each contract task order. The designated site representative will be furnished a copy of the certificate of accreditation, scope of accreditation, and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required. Any deviation from the above requirements must be approved in writing by the site representative. On-site chemical analysis by mobile laboratory must be performed by laboratories certified by the appropriate agency.

4.2.6 ENVIRONMENTAL PROJECTS

Laboratories performing Installation Restoration Program work funded by Environmental Restoration, Navy (ER, N) (formerly Defense Environmental Restoration Account) or Base Realignment and Closure (BRAC) (ER, N eligible in the absence of BRAC funding) must successfully complete the Navy Laboratory Evaluation Program as detailed in the Navy Installation Restoration Chemical Data Quality Manual (IR CDQM), September 1999. Unless otherwise specified, field sampling and data validation should be performed in accordance with the Project Procedures Manuals and analytical testing shall be performed using current U.S. Environmental Protection Agency procedures and quality control. Any deviation from the above requirements must be approved in writing by the site representative.

4.3 FORMS AND REPORTS

4.3.1 QC INSPECTION

Assigned QC personnel will perform inspections on the various tasks or operations being perform at the project site. The number and type of inspections will generally be guided by requirements contained within approved work plans. The USAE Corporate QC Program, MIL-STD-1916 or other designated reference document may also contain the frequency of inspections, type of inspections, percentage of product or material to be inspected, and the inspection standards to be met. QC Inspections will be properly documented, contain supporting information as applicable, and be signed by the responsible QC individual.

4.3.2 INSPECTION FORMS

Inspection forms used on projects will be approved for use and contain blocks or areas for required information. Examples of forms are:

- Site Inspection
- Area Inspection
- Grid Inspection
- Equipment Inspection
- Vehicle Inspection
- DGM Inspection
- Other site-specific operations

4.3.3 NON-CONFORMANCE TRACKING LOG

The Non-conformance Tracking Log is used by QC personnel to track products or material that does not meet acceptable standards. This tracking log will be used on each project site to assist QC personnel in maintaining a systematic approach in identifying products or material of a non-conformance description, its current status, and the responsible individual(s) to include re-inspection and closeout.

4.3.4 EQUIPMENT INSPECTION SHEET

Project equipment will be inspected on a regular basis. These inspections will be documented by the individual performing the inspection. Equipment that must generate a known response (e.g., + or – 1 foot), a recordable reading, or uses a calibration checklist, will have that response recorded on the inspection form. Equipment not meeting the required response or not producing a consistent response will be repaired or replaced with an acceptable item. Equipment removed from service for repair will be tagged and the information placed on the Equipment Deficiency Log.

4.3.5 NON-CONFORMANCE REPORT

The Non-conformance Report (NCR) is used for the documentation, resolution, and control of non-conforming products, material, services, or activities that are adverse to acceptable quality standards.

Non-conformance reporting requires that upon the identification of a non-conforming item or condition, notifications be made to the appropriate personnel. These include but are not limited to, the immediate supervisor, SUXOS, UXOQCS, QCM, Site Manager, and Project Manager. The QCM will initiate the non-conformance report and assign the appropriate personnel the task of investigating the non-conformance condition or item. The investigation will include the following:

- Identification and location of non-conformance condition or item

- Extent of non-conformance
- Review of the acceptable standards for the condition or item
- Review of information or supporting documentation
- Root Cause Analysis and adverse impact
- Evaluation of determination, corrective measures, and implementing authority
- Re-inspection of corrected conditions or items
- Close out of NCR

4.3.6 QC LOG

The QC Log will be maintained by the UXOQCS. This log is used to record all QC matters associated with the project site, including:

- Equipment testing and results
- QC inspections performed
- Work stoppage due to QC issues
- Equipment monitoring results
- Non-conformance reporting
- Other relevant events
- Date and teams checked
- Signature of UXOQCS

4.3.7 EQUIPMENT DEFICIENCY LOG

The equipment deficiency log is used by QC personnel to track equipment, which does not meet acceptable standards for serviceability, safety, or maintenance. This deficiency log will be used on each project site to assist QC personnel in maintaining a systematic approach in identifying equipment of a non-conformance description by placing a “Remove from Service” tag on the item, which includes its current status of repair or replacement and the responsible individual(s) for replacement, repair, or maintenance of the equipment.

4.3.8 WEEKLY QC REPORT

The UXOQCS will prepare a weekly QC Report. This report is submitted to the QCM for distribution to the appropriate personnel. This report will include:

- The periodic assessment of work performed
- Significant QA/QC problems and corrective actions taken
- Work progress
- Lessons learned and change recommendations
- Signature of the UXOQCS

4.3.9 PHOTOGRAPHIC LOG

The Photographic Log will be maintained by the SUXOS or UXOQCS. This log is used to record all photographs taken on the project site for documentation purposes. These photographs are used to document MEC/UXO encountered, and before, during, and after work and/or site conditions used in the preparation of reports and documents generated by the production or quality sections of the project. Photographs will include:

- Date and time taken
- Unique identifying number(s) relating to the Photographic Logbook

- Location photograph was taken
- Brief description of the subject matter

4.4 PROJECT AUDITS

Projects are subject to internal and external audits. These audits are used as standardizing tools to ensure the entire process and its results are consistent in applicability and are compliant with contractual obligations. Audits performed are used to determine the following:

- Conformity or non-conformity of products, material, data, or elements of each meeting specified requirements
- Effectiveness of implemented procedures, processes, or systems
- Compliance or non-compliance of customer, client, regulatory, contractual, or company requirements

Audits are performed by selected individuals or a combination of personnel as determined by Quality Management. Reports of findings are prepared and made available to the appropriate personnel, parties, or agencies.

4.5 EQUIPMENT REQUIREMENTS

Equipment assigned to projects will be appropriate for tasks being performed, meet performance requirements and standards, and have regular checks and inspections performed. Equipment will only be operated in a manner consistent with:

- Safety requirements
- Operator's manuals
- Owner's manuals
- Approved procedures
- Be operated by trained personnel

Equipment considered unsafe, non-operational, needing maintenance or repair will be removed from service, tagged, and placed in an area where the equipment cannot be accidentally placed back into service. Checks and inspections of equipment will be documented on approved forms.

4.6 SUMMARY

This SOP is not all inclusive and is intended to be used with approved work plans, safety plans, activity hazards analysis, and additional SOPs. Site-specific QC criteria is derived from the SOW, PWS, and contracts. Site-specific QC requirements will be included in site-specific documents.

5.0 REFERENCES

The following references directly apply to the conduct of operations associated with this SOP. In the event that additional standards or requirements are identified, consultation with Program Quality Control personnel and other references may be needed:

- USAE Corporate Management Program
- USAE Corporate QC Program
- Project QC Plan
- ANSI/ASQC
- MIL-Std-1916

APPENDIX E

E.0 SITE-WIDE ACCIDENT PREVENTION PLAN/SITE HEALTH AND SAFETY PLAN

This appendix contains the Site-Wide Accident Prevention Plan/Site Health and Safety Plan for the Waikane Valley Training Area.

1.0 SIGNATURE SHEET

ACCIDENT PREVENTION PLAN
MUNITIONS RESPONSE SITES
WAIKANE VALLEY TRAINING AREA, HAWAII

Plan approval: _____ Date: May 14, 2008
Jonathan Chionchio
President
USA Environmental, Inc.
(813) 343-6350

Plan concurrence: _____ Date: 5/14/08
Robert Crownover
Program Health and Safety Manager
USA Environmental, Inc.
(813) 343-6364

Plan prepared by: _____ Date: 5/14/08
Cheryl M. Riordan, CSP
Program Occupational Safety Manager
USA Environmental, Inc.
(813) 426-2112

BCSP
CHERYL M. RIORDAN
17377
CERTIFIED
SAFETY PROFESSIONAL

APPENDIX E: SITE-WIDE ACCIDENT PREVENTION PLAN/ SITE HEALTH AND SAFETY PLAN

ACKNOWLEDGEMENT SHEET

Accident Prevention Plan/Site Health and Safety Plan Acknowledgement			
I have read, understand, and agree to abide by the provisions as detailed in this Accident Prevention Plan and Site Health and Safety Plan prepared by USA Environmental, Inc. Failure to comply with these provisions may lead to disciplinary action and/or my dismissal from the work site.			
Printed Name	**Company**	**Signature**	**Date**

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
°F	Degrees Fahrenheit
DoD	Department of Defense
EM	Engineer Manual
EOD	Explosive Ordnance Disposal
EZ	Exclusion Zone
GPO	Geophysical Prove-Out
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PPE	Personal Protective Equipment
RG-01	Rifle Grenade Range - 01
RMSF	Rocky Mountain Spotted Fever
SOW	Statement of Work
SUXOS	Senior Unexploded Ordnance Supervisor
USAE	USA Environmental, Incorporated
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

1.0 SIGNATURE SHEET

2.0 BACKGROUND INFORMATION

This Accident Prevention Plan (APP) has been prepared by USA Environmental Inc. (USAE) for the Site Inspection (SI) of the Waikane Valley Training Area, Kaneohe, Hawaii.

2.1 PURPOSE

The purpose of this APP is to establish site-specific safety and health procedures, practices, and equipment to be implemented and used to protect affected personnel from the potential hazards associated with the field activities to be performed at the project site. The APP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted during the Removal Action process. The APP will interface with the USAE Corporate Safety and Health Program.

2.2 PROJECT DETAILS

Contractor
USA Environmental, Inc.
720 Brooker Creek Boulevard, Suite 204
Oldsmar, FL 34677

Contract Number
N62742-05-D-1868

Task Order Number
CTO: 0004

Project Name
Site Inspection of Waikane Valley Training Area, Kaneohe, Hawaii

2.3 PROJECT DESCRIPTION

See Section 1.1 “Site Description” of the Site Health and Safety Plan (SHSP) and Table 2-1.

This space is intentionally left blank.

Table 2-1: Site Description

Site Location	Approximate Size (Acres)
Waikane Valley Training Area, Kaneohe	187 acre site. SI approximately 20 acres.
Topography	**Present Usage**
X Forested ☐ Tillage ☒ River/Creeks Grassland Flat land Open Terrain ☒ Wetland ☐ Arid X Other: Ridges, valleys, and volcanic craters. Rain forest and steep terrain	☐ Rural ☐ Commercial ☐ Urban ☐ Government ☐ Industrial ☐ Farming ☐ Ranching ☐ Residential ☐ Recreational ☒ Military ☐ Other

2.4 DESCRIPTION OF WORK

Work on this project involves a non-intrusive Site Investigation of The Waikane Valley Training Area on the Marine Corps Base Hawaii on Kaneohe Bay, located on the windward side of Oahu. The Marine Base Hawaii includes approximately 3,000 acres of land with four volcanic craters, with elevations ranging from 0 – 850 feet msl. The area includes heavy vegetation and rain forest with steep terrain. The total site is 187 acres, with approximately 20 acres for the detector-assisted Site Investigation of the area in order to make an appropriate characterization of the types and extent of MEC contamination. This is a non-intrusive investigation, which means that MEC that is encountered will be marked to identify it's location, and photographed to identify it's type, but will not be destroyed. Due to the thick vegetation present that makes some areas impassable, some vegetation clearance will be required. In order to perform a characterization of MEC constituents in the soil, approximately 240 soil samples will be taken from 0-18 inches in depth. UXO avoidance will be practiced, and samples will be taken only after a magnetometer survey of the area has determined that no UXO will be disturbed during the sampling process. A report will be issues based on the findings of the Site Investigation for each of the ranges involved.

2.5 CONTRACTOR ACCIDENT EXPERIENCE

USAE's Experience Modification Rate for the last six years is shown in Table 2-2. A copy of the latest Occupational Safety and Health Administration (OSHA) Form 300 and OSHA Form 300A is provided in Attachment 1.

Table 2-2: Experience Modification Rate

Report Period	Interstate	Intrastate
2006/07	*0.80*	N/A
2005/06	*0.82*	N/A
2004/05	*0.69*	N/A
2003/04	*0.73*	N/A
2002/03	*0.72*	N/A

2.6 PHASES OF WORK REQUIRING ACTIVITY HAZARD ANALYSIS

The following phases of work on this project require an Activity Hazard Analysis:

- Geophysical Prove Out Test Strip
- Location Surveying and Mapping
- Detector Aided Non-Intrusive Survey
- Quality Control
- Vegetation Removal
- Soil Sampling

The Activity Hazard Analyses forms are located in Attachment 2 of this APP.

Table 2-3: Hazards Table

HAZARDS*	ACTION LEVELS**
Safety: include falling (rocks, inclines, slippery surfaces); climbing (uneven terrain); walking (uneven terrain, surface indentations); hand and power tool operations (hammers, machetes chainsaws, weed eaters) eye and face hazards (vegetation removal operations); and MEC.	None/Awareness/Avoidance
Chemical: Lubricants and fuels for equipment.	Per Material Safety Data Sheets
Physical: include heat injuries, and noise.	Per Monitoring Requirements
Radiological: none anticipated.	Not Applicable
Biological Hazards: may be present; include biting and stinging insects, hazardous plants and wildlife.	None/Awareness/Avoidance
MEC: may be present on site, use approved measures.	Observe Safety Procedures

Notes to Hazards Table

***HAZARDS**
Safety:
Falling: (e.g. Open pits; wells; shafts; rocks crevices; steep inclines; slippery surfaces; etc.)
Climbing: (e.g. Falls from structures > 4 feet high; deteriorated ladders or missing rungs; etc.)
Walking or Debris: (e.g. Uneven terrain; animal burrows; surface indentations; exposed nails; broken timbers; sharp protruding objects; broken glass; metal fragments; etc.)
Confined Space (e.g. Excavations > 4 feet deep; surface/underground utility vaults; open surface tanks/cisterns/septic tank; underground/above ground storage tanks; etc.)(DO NOT ENTER)
Water: (e.g. Moving waterways (Flash Floods); drowning/near drowning conditions or environments)
Eye Hazards: (e.g. Airborne dust/windy conditions; liquid splashes; etc.)
MEC/Other: (e.g. Explosives; combustible or flammable materials; etc.)
Chemical: Evaluate the chemical hazards that may be encountered during site activities for each task. For activities utilizing this plan, encounters with chemicals above the PEL, or TLV are not expected. THIS PLAN SHALL NOT BE USED IF OVEREXPOSURES OR IDLH CONDITIONS ARE EXPECTED. (List the chemical TLV/PEL/REL; OSHA/NIOSH IDLH; odor threshold/warning levels; warning signs/symptoms of overexposure; concentrations expected on site.)
Physical: Evaluate the potential for injury from physical agents such as noise, electricity, moving parts/machinery, heat and cold stress that may be present (e.g. loud machinery; overhead or underground power lines; personal protective clothing, etc.)
Radiological: Evaluate the risk to human health caused by radioactive materials in the area where

work is to be performed.
Biological: Evaluate the potential for illness of injury due to biological agents (e.g. poisonous plants, animals, insects, microorganisms, etc.)
MEC: Evaluate exposure; minimize people, time, and amount of hazardous material. Age or condition of UXO DOES NOT decrease hazard. UXO exposed to fire is EXTREMELY hazardous: EVACUATE IMMEDIATELY.
**ACTION LEVELS: Action Levels shall typically be defined as requiring site evacuation only, if significant hazards are encountered. Note: The activities for which this SHSP is designed, will not typically encounter chemical contaminant or radioactive exposures above background. In the event that chemical or radioactive exposures, which are judged to be significant, are encountered (reasonable potential to exceed permissible exposure limits or encounter IDLH conditions) this plan requires work stoppage of the site, reevaluation, and development of procedures designed by Safety Management that will address the potential exposure. Chemical exposures (releases) requiring evacuation shall always be in an upwind direction to a safe distance. PPE per hazard assessment will be worn.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

In recognition of the responsibilities of USAE and the need for management to establish a policy with regard to the prevention of on-the-job injuries, this APP has been developed. Through application of these safety policies and procedures, it is USAE's primary goal to reduce to a minimum the human suffering by employees resulting from occupational injuries. Not only can injuries have a serious physical and emotional impact on the employees themselves, but can also have a negative effect on family members and co-workers.

In addition, we must recognize the deterrent and eroding effect injuries have on the potential profit. Insurance costs combined with the indirect costs of injuries are a matter of serious concern and it is USAE's intention that they be reduced. This desired reduction could take place, over a long term, if the frequency of injuries is kept to a minimum. As it affects USAE, the elimination of on-the-job injuries is an important responsibility of management. This responsibility must be assumed and treated in the same manner as our business philosophies relating to services rendered.

For USAE's Corporate Safety and Health Program to become effective, it will be necessary for each employee to take a serious interest in the prevention of injuries. Management fully intends to provide, in administration of the program, the leadership and direction to which supervisory personnel and employees will respond. It is USAE's earnest request that all concerned devote their serious attention toward making this Safety and Health Program an integral part of the day to day business operations. Always remember that no job is so important and no service is so urgent that we cannot take the time to perform our work safely.

All site operations will be performed in accordance with applicable federal, state, and local regulations and procedures, OSHA requirements, client requirements, and USAE's Corporate Safety and Health Program and this Accident Prevention Plan. All USAE employees will comply with the requirements of this plan.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITY

All personnel are responsible for continuous adherence to this APP and safety and health procedures during the performance of their work.

4.1 PERSONNEL RESPONSIBILITIES

No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in these procedures. After due warnings, USAE will dismiss from the site any person who violates safety procedures. USAE employees are subject to progressive discipline and may be terminated for continued violations. All on-site personnel will be trained in accordance with this document.

4.1.1 USAE PROGRAM MANAGER- GEORGE SPENCER

Responsibilities include:

- Ensures conformance with USAE corporate, Navy and USACE policies and procedures;
- Coordinates project with the Navy personnel;
- Ensures the project has the necessary resources to operate safely;
- Ensures that the project personnel satisfy USAE, Navy and USACE Safety & Health requirements;

4.1.2 USAE PROJECT MANAGER – ROBERT NORE

Responsibilities include:

- Coordinates with USAE Program Manager and Navy personnel;
- Provides management of all aspects of project work;
- Sets the tone for safety on the job site;
- Assures personnel have the equipment, training and resources to perform the job safely;
- Ensures that the project personnel implement the project APP; and
- Ensures that the project personnel have the appropriate regard for safe job performance.

4.1.3 USAE PROGRAM SAFETY AND HEALTH MANAGER- ROBERT CROWNOVER

Responsibilities for the Program Safety and Health Manager (PSHM) include:

- Oversight in developing and coordinating the APP as required;
- Make changes to the APP if warranted by changed conditions;
- General Health and Safety Program administration and enforcement;
- Determine the level of personnel protection required;
- Investigate significant accidents and illnesses and implement corrective action plans;
- Establish air-monitoring parameters based on expected contaminants;
- Establish employee exposure monitoring notification programs;
- Develop site specific employee/community emergency response plans based on expected hazards;
- Stop any operation that threatens the health or safety of the team or surrounding population; and
- Upgrade or downgrade levels of protection based on site observations or monitoring results.

4.1.4 USAE PROJECT ENGINEER – DAVID SYNAKORN, P.E.

The Project Engineer provides technical, analytical, and report writing support to ensure the technical quality of deliverables to the Navy.

4.1.5 USAE PROGRAM OCCUPATIONAL SAFETY MANAGER – CHERYL RIORDAN, CSP

Responsibilities for the Program Occupational Safety Manager (POSM) include:

- Develop and coordinates the APP as required;
- Recommend changes to the APP if warranted by changed conditions;
- General Safety and Health Program administration;
- Determine the level of personnel protection required;
- Confirm each USAE team member's suitability for work based on physician's recommendation;
- Conduct field safety and health audits to ensure Safety and Health Plan conformance and USAE policy compliance;
- Investigate significant accidents and illnesses and implement corrective action plans;
- Certify that all workers have proper training as per 29 CFR 1910.120(e);
- Update equipment or procedures based on information obtained during site operations;
- Investigate significant accidents and illnesses and implement corrective action plans;
- Establish air-monitoring parameters based on expected contaminants;
- Establish employee exposure monitoring notification programs;
- Develop site specific employee/community emergency response plans based on expected hazards;
- Stop any operation that threatens the health or safety of the team or surrounding population; and
- Upgrade or downgrade levels of protection based on site observations or monitoring results.

4.1.6 SITE MANAGER- (TBD)

All site activities will be conducted under the supervision of the USAE Site Manager. The Site Manager will oversee normal and emergency work and will perform any emergency notification. He is also responsible for:

- Supervising all USAE site activities;
- Implementing the field APP;
- Coordinating with the UXO Safety Officer (UXOSO) on safety related matters;
- Determining evacuation routes;
- Presenting daily safety meetings;
- Maintaining logs and records in the field; and
- Implementing changes to APP as directed by the PSHM, POSM, or UXOSO.

4.1.7 UXO SAFETY OFFICER- (TBD)

Site activities will be conducted under the supervision of the USAE UXOSO for safety on an as needed basis. The UXOSO will act as safety oversight for normal and emergency work and will perform any emergency notification as the On-Scene-Incident-Commander. He is also responsible for:

- Implementing the field APP;
- Enforcing all provisions of the APP;
- Establish emergency communications with all potential emergency responders and verifying all emergency telephone numbers prior to the start of site work;
- Working with EMT and First Responders to assure injured personnel are decontaminated to the extent possible prior to sending them to a hospital in an ambulance, and if complete decontamination is not possible, for wrapping the patient in a blanket to prevent the spread of contamination and advising the ambulance staff of the hazards;
- Determining evacuation routes;
- Presenting daily safety meetings;
- Presenting training requirements for site personnel and visitors;
- Maintaining safety logs and records in the field;
- Implementing changes to APP as directed by the PSHM or POSM;
- General Health and Safety Program administration and enforcement;
- Enforcing the level of personnel protection required;
- Investigating work related accidents and illnesses and implementing corrective action plans;
- Establishing air-monitoring parameters based on expected contaminants;
- Establishing employee exposure monitoring notification programs;
- Stopping any operation that threatens the health or safety of the team or surrounding population; and
- Upgrading levels of protection based on site observations or monitoring results.

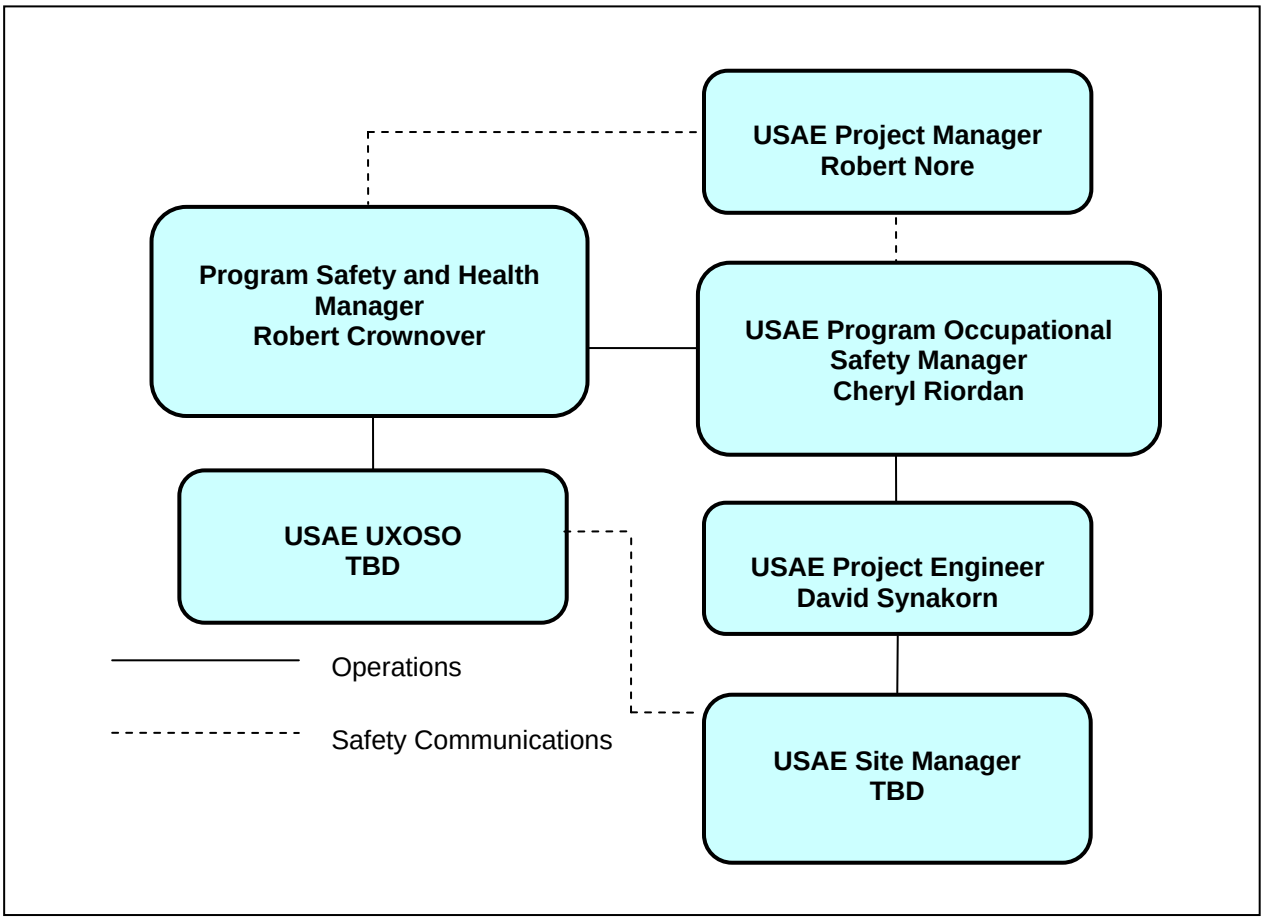
4.2 LINES OF AUTHORITY

Table 4-1 lists contact information for project personnel and Figure 4-1 contains the USAE project personnel, their involvement on the project, and the organization these individuals represent.

Table 4-1: Project Contacts

Name	Organization	Telephone	Cell number	E-mail
Richard Hosokawa	Navy Remedial Project Manager	808-472-1423		Richard.hosokawa@navy.mil
Steve Oshiro	Navy Contracting Officer's Technical Representative	808-472-1440		Steve.oshior@navy.mil
George Spencer	USAE Program Manager	813-343-6358	813-997-2105	gspencer@usatampa.com
Robert Nore	USAE Project Manager	256-830-4249	813-343-6420	rnore@usatampa.com
Robert Crownover	Corporate Safety and Health Manager	813-343-6364	813-748-1642	rcrownover@usatampa.com
Cheryl Riordan	Program Safety and Health Manager	757-486-8567	813-426-2112	criordan@usatampa.com
TBD	Site Manager	813-343-6336		
TBD	UXO Safety Officer	813-343-6336		
TBD	EMT			

Figure 4-1: Lines of Authority for USAE Corporate and Site Activities



5.0 SUBCONTRACTORS AND SUPPLIERS

The only USAE subcontractors to be used on this site are CH2MHILL and Wil Chee Planning and Environmental, Inc.

5.1 MEASURES OF CONTROLLING AND COORDINATING SUBCONTRACTORS

Before work is performed by the subcontractors, USAE will negotiate and prepare an agreement that will detail all necessary and appropriate terms and conditions, including the Scope of Work. Once executed, USAE will perform periodic reviews to ensure that requirements are met. These reviews will cover technical requirements, safety and health requirements, and cost and schedule status. USAE technical staff will review data generated by subcontractors as part of the deliverables.

5.2 SAFETY RESPONSIBILITIES OF SUBCONTRACTORS

All subcontractor personnel will receive training on ordnance recognition and UXO safety precautions prior to commencing activities on the Waikane Valley Training Area project site. All personnel will be given a daily safety briefing and will be escorted by a UXO Technician at all times while on site. All personnel will acknowledge that they have read, understood, and will abide by the Accident Prevention Plan and Site Specific Health and Safety Plan for this project, by signing the acknowledgement page. In

addition, personnel must abide by the guidance given by the SUXOS and UXO escort accompanying them at all times. Any deviations from the site plans could be used as the basis for termination of the subcontract agreement. Each subcontractor will also have to submit an AHA for each activity that they will be performing on the site for review and approval prior to starting work on the site.

6.0 TRAINING

Prior to commencement of site activities, the POSM and the UXOSO will ensure that all USAE employees engaged in hazardous waste operations are informed of the nature and degree of exposure to chemical and physical hazards that are likely to result from participation in site operations. USAE will accomplish this by ensuring that all personnel entering the site have received the appropriate OSHA and site-specific training, prior to participation in site activities. OSHA-required training will be conducted prior to site mobilization. Site-specific training will be held at the time of site mobilization and will be reinforced during the daily safety briefings, to which all site workers will be required to attend.

6.1 SUBJECTS TO BE DISCUSSED WITH EMPLOYEES DURING SAFETY INDOCTRINATION

The UXOSO will conduct the three-day OJT. This training will include classroom type instruction covering the topics specified for site-specific training, and on-site participation in the following:

- Scope of Work;
- Details of the Site Specific Health and Safety Plan;
- Employee rights and responsibilities;
- Sequence of work events;
- Identification of safety issues for the site;
- Identify Safety staff and lines of authority;
- Safe work practices;
- Proper lifting techniques;
- Recognition of potential MEC and hazards associated with MEC;
- Nature and extent of anticipated chemical, physical, and biological hazards;
- Measures and procedures for controlling site hazards;
- Emergency Response and Contingency Plan;
- Location of medical services;
- Site communication;
- Evacuation routes;
- Rules and regulations for vehicle use;
- Safe use of field equipment;
- Handling, storage, and transportation of hazardous materials;
- Use, care, and limitations of PPE;
- Hazard communication per OSHA 29 CFR 1910.1200.

6.2 MANDATORY TRAINING AND CERTIFICATIONS THAT ARE APPLICABLE TO THIS PROJECT

6.2.1 GENERAL TRAINING

All USAE employees and subcontractor personnel involved in hazardous waste site activities receive 40 hours of OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR 1910.120 and 29 CFR 1926.65. If it has been more than a year since any worker has received the 40 Hour OSHA HAZWOPER training, he or she must also have a current HAZWOPER 8-Hour Refresher Training in accordance with 29 CFR 1910.120 and 29 CFR 1926.65 prior to working on the site. All workers will also receive three days (24 hours) of site-specific on-the-job training (OJT) under the direct supervision of a trained/experienced supervisor when they mobilize at the site. Any visitor entering the exclusion zone (EZ) during hazardous waste operations will also be required to have current HAZWOPER training. The EZ, during hazardous waste activities would include the project footprint and an area around the footprint of 200 feet, which is the required separation distance between operations. As this project involves UXO avoidance, the separation distance rather than the fragmentation distance is being used.

All current certifications and training tables for USAE and subcontractor personnel will be maintained on site for the duration of the project. Individuals without proper training records will not be permitted to work on site.

6.2.2 SUPERVISORY TRAINING

On-site managers and supervisors, who are responsible for directing others, will receive the same training as the general site workers for whom they are responsible. They will also receive an additional 8 hours of OSHA-required supervisory training in accordance with 29 CFR 1910.120 and 29 CFR 1926.65 to enhance their ability to provide guidance and make informed decisions. This additional training includes the following:

- Review of the USAE Corporate Safety and Health Program;
- Regulatory requirements;
- Management of hazardous waste site cleanup operations;
- Management of site work zones;
- How to communicate with the media and the public;
- Personal Protective Equipment (PPE) selection and limitations;
- Spill containment; and
- Monitoring site hazards.

The UXOSO, with specific responsibilities for safety and health guidance on site, will receive the training provided to general site workers and their supervisors. He also will receive advanced training in safety and health issues, policies and techniques. The UXOSO will also receive the 10-hour OSHA Construction Safety class in accordance with Engineer Manual (EM) 385-1-1, 01.A.17.

6.3 REQUIREMENTS FOR EMERGENCY RESPONSE TRAINING

Prior to commencement of the project, all USAE site personnel will review and discuss the posted emergency telephone numbers, location of spill kit materials as applicable, directions to the nearest hospital, the location of all site fire extinguishers, proper use of fire extinguishers, identify the location of first aid kits and blood-borne pathogens kits, and review the emergency procedures. Prior to start of operations a drill will be performed on emergency procedures in order to familiarize personnel. After the

drill and after any actual emergency, the site managers will critique the drill or actual emergency response to determine if procedures are working properly or whether changes need to be made to make the procedures more effective.

6.3.1 FIRE PREVENTION

Smoking and lighters are prohibited in the EZ or work zone. A cigarette butt receptacle will be provided in the support zone. No cigarette butts are to be discarded on the ground. No smoking is allowed except in an approved designated location with fire extinguisher. Procedures will be reviewed with all site personnel.

6.3.2 MEC TRAINING

All USAE employees performing work involving the handling and destruction of MEC must be graduates of the U.S. Naval Explosive Ordnance Disposal School (at a minimum Phase I, chemical; and Phase II, surface) or equivalent recognized training. A copy of their certificate of graduation will be kept on file at corporate headquarters. UXO qualified personnel shall have knowledge and experience in military ordnance, ordnance components, and explosives location, identification, render safe, recovery/removal, transportation, and disposal safety precautions. UXO personnel shall have the knowledge and experience to affect safe handling and transportation of ordnance items found. Copies of certificates of this training will be kept on the project site for the duration of site operations.

6.3.3 HAZARD COMMUNICATION

All USAE employees who will be performing work involving the handling of hazardous materials will receive Hazard Communication training detailing the hazards of the product, appropriate protective measures to prevent exposure to the product, as well as safe procedures for storage and handling of the product, and response to emergencies. Personnel may request a Material Safety Data Sheet (MSDS) for any hazardous material on the site at any time. USAE personnel will be informed that the location of the MSDSs for this site will be in an MSDS binder in the UXOSO site vehicle. This training will occur as part of the initial mobilization training at the site.

6.4 REQUIREMENTS FOR SUPERVISORY AND EMPLOYEE SAFETY MEETINGS

6.4.1 TAILGATE SAFETY BRIEFING

Tailgate Safety Briefings consist of providing short training sessions in various subjects that give the site worker knowledge and confidence in performing duties in a potentially hazardous environment. The Tailgate Safety Briefing will be given prior to commencing work each day and will include such items as:

- Expected weather conditions;
- General site hazards;
- Biological hazards on site;
- MEC hazards;
- PPE required at each site;
- Emergency evacuation procedures;
- Activity Hazard Analyses for site operations;
- Heat stress precautions;
- Buddy system procedures;
- A review of any safety violations from the previous day; and

- Any other significant events involving safety.

Additional briefings will be provided as needed concerning the use of safety equipment, emergency medical procedures, emergency assistance notification procedures, accident prevention, the work plan, and site orientation to ensure that accomplishment of the project can be carried out in a safe and effective manner. All site workers are required to attend the tailgate safety briefing daily.

6.4.2 DAILY DEBRIEFING

At the conclusion of each workday, a debriefing for all employees will be held if appropriate, and the day's work will be discussed to determine if changes are warranted before commencing activities the following day.

6.4.3 PERIODIC SITE TRAINING

On the first workday of each work week/period or more frequently if needed, a pertinent topic will be selected and elaborated upon by the UXOSO during the Tailgate Safety Briefing. These safety meetings will help ensure the safety and health of site personnel in the performance of regular work activities and in emergency situations. Safety meetings will be documented in the appropriate log and the Documentation of Training Form will be completed. Potential topics for discussion are as follows:

- Names and titles of key personnel responsible for site safety and health, and other hazards present at the site;
- Components of the Site Safety and Health Program;
- General site safety;
- Hazards and symptoms of contaminant exposure (chemical) as applicable;
- Routes of exposure from on-site contaminants (as applicable);
- Physical hazards (fall protection, noise, heat stress, etc.);
- Biological hazards;
- Location and availability of written hazard communication program;
- Site and activity PPE (including purpose, donning, doffing and proper use);
- Activity Hazard Analyses for site operations.
- Work practices by which employees can minimize risks for hazards;
- Safe use of engineering controls and equipment use;
- Site control measures;
- MEC suspected on-site;
- MEC/UXO hazards and precautions;
- Reporting requirements for UXO, spills, and emergencies;
- Personnel decontamination procedures (as applicable);
- Contingency plans (communications, phone numbers, emergency exits, assembly points, etc.);
- Worker Right to Know/ Hazard Communication;
- Emergency equipment locations and use (fire extinguishers, spill kits, first aid kits, etc.); and
- Equipment safety.

6.4.4 VISITORS

All visitors to the site, even if escorted, must receive as a minimum, a briefing of on-site conditions, hazards, and emergency response procedures. The UXOSO will generally be the one providing the visitor briefing. All visitors to the EZ will be escorted at all times. When visitors who are not UXO qualified enter the EZ, all MEC operations will cease, and will resume again after the visitor has left the area. Visitors will not be permitted in the restricted work areas unless they have the appropriate level of OSHA training, and are medically approved as part of a company sponsored medical surveillance program. Visitors not complying with the above requirements will not enter the restricted work areas; however, they may observe site conditions from a safe distance in the support zone. All visitors will sign the Visitor's Log prior to entering the site.

6.4.5 TRAINING DOCUMENTATION

A training record will be kept in each employee's individual file to confirm that adequate training for assigned tasks is provided and that training is current. In addition, Documentation of Training Forms will be completed and kept on file at the work site for the duration of site activities, and made available for inspection upon request.

7.0 SAFETY AND HEALTH INSPECTIONS

General safety and health inspections are described throughout this APP. USAE site personnel will conduct safety inspections on a daily basis, or more frequently if conditions warrant. The UXOSO will be responsible for daily safety inspections of the project. During periods when the UXOSO is not present, the Senior UXO Technician who is present will ensure that site personnel follow safety requirements and policy. The Safety Inspection Form will be used to record, track and provide follow up to ensure that safety deficiencies are corrected after they have been identified. A record of the safety inspection checklist will be maintained in the project file. Deficiencies will be identified, posted, and dated when the deficiencies are rectified.

7.1 EXTERNAL INSPECTIONS

External inspections are expected for this project. The Navy Project Manager assigned to the project is responsible for conducting external inspections.

7.2 DAILY SITE INSPECTIONS

The UXOSO will be responsible for daily inspections of the project when present. The POSM or the PSHM may make random inspections as warranted.

8.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAM, AND COMPLIANCE
8.1 GOALS AND OBJECTIVES

The goal for USAE on this project is zero accidents. All managers and supervisors are responsible for implementing the provisions of this APP and attached SHSP and for answering team member questions about accident prevention. Management is responsible for ensuring that all safety and health policies and procedures are clearly communicated and understood by all team members. Managers and supervisors are expected to enforce the rules fairly and uniformly. This will be accomplished by:

- Informing team members of the provisions of the Safety and Health Program;
- Evaluating the safety performance of all team members;

- Recognizing team members who perform safe and healthful work practices;
- Providing training to team members whose safety performance is deficient; and
- Disciplining team members for failure to comply with safe and healthful work practices.

All team members are responsible for using safe work practices, for following all directives, policies and procedures, and for assisting in maintaining a safe work environment. USAE recognizes that open, two-way communication between management and all team members on health and safety issues are essential to an injury-free, productive workplace. To facilitate a continuous flow of safety and health information between all team members, the following will be accomplished:

- Training all new team members, during the site-specific training, on the site safety and health polices and procedures, which will include this APP and attached SHSP;
- Training all new team members on the hazards associated with the job site;
- Conducting daily tailgate safety meeting for all team members;
- Conducting quarterly refresher type training;
- Posting and, if applicable, distributing safety information; and
- Encouraging open communications.

8.2 USAE'S CORPORATE SAFETY PROGRAM

USAE's corporate safety program is designed to provide the safety training and tools required to ensure that USAE is providing the safest work environment for its employees, other project personnel, and the general population in areas adjacent to our project sites.

The USAE PSHM and POSM have reviewed the scope of the project and based on this review, have developed this APP designed to protect health and safety during the project.

As part of the job requirements employees are required to:

- Read and follow the APP and attached SHSP; and
- Attend health and safety meetings, courses and seminars, when available, to make them more informed and aware of potential hazards that exist at the site.

8.3 USAE'S SAFETY INCENTIVE PROGRAM

USAE builds an information database for each project it undertakes, which includes the rate/occurrence of accidents and injuries. Safety data, including injury and accident occurrence, are noted and incentives such as monetary bonuses and additional training courses are provided as rewards for superior employee performance for compliance with the project APP, SHSP, and corporate safety and health policies.

8.4 SAFETY PROGRAM NONCOMPLIANCE POLICIES AND PROCEDURES

USAE management takes seriously employee noncompliance with safety requirements. Personnel not following procedures are warned and counseled in the proper safety procedures, and if the problem persists are again counseled with notations made in their permanent record. Continued noncompliance will lead to termination. On USAE job sites, visitors are briefed about site safety requirements and are provided with the appropriate level of PPE. If visitors refuse to follow these procedures, they will be escorted from the site.

8.5 USAE'S WRITTEN PROCEDURES FOR HOLDING MANAGERS AND SUPERVISORS ACCOUNTABLE FOR SAFETY

USAE's commitment to safety and health is documented and required from the time an offer is made to a job applicant. Managers and supervisors are made responsible for enforcing safety and health as part of their job descriptions. They are ultimately responsible for protecting the welfare of the employees as well as minimizing the potential liability associated with on the job accidents.

9.0 ACCIDENT REPORTING

This section provides the requirements for implementing the accident reporting provisions of EM 385-1-1. This APP requirement applies to all work performed by USAE for each project.

USAE Project Manager and the USAE POSM will be notified immediately by telephone of any accidents, and will follow-up with USAE's Accident Report Form (see Attachment 7). USAE's site manager will notify the Navy technical representative immediately and fill out and submit the Contractor Significant Incident Report form (CSIR-1) to the Contracting Officer or designated representative for review within one working day after the event. USAE will thoroughly investigate all accidents.

Person(s) who become ill or injured during work activities must immediately inform the SUXOS or UXOSO, regardless of the severity of the illness or injury. The victim(s) will be decontaminated if the injury occurred in containment areas. In the event that the medical emergency is severe enough, the SUXOS or UXOSO will order a cessation of work and notify off-site emergency personnel. All personnel at the work site will use the buddy system, staying within sight of their partner. If a partner becomes incapacitated or severely ill, an ambulance will be called. In the event that a cessation of work is ordered, all personnel should:

- Assist the UXOSO, if required, in decontaminating the victim and/or administering first aid;
- Leave the contaminated area and undergo decontamination prior to entering the worker rest area; and
- Assist emergency response personnel when requested.

In the event of an accident that results in a lost workday or $2,000 or more in property damage, an accident report will be completed and submitted within five workdays, and a copy will be provided to the client contact.

All workers receiving medical treatment, other than first aid, by a medical professional will obtain a medical release on the date of treatment stating one of the following: (1) the employee is not fit for duty; (2) the employee is fit for restricted duty; or (3) the employee is fit for duty. A copy of the release will be attached to the accident report and submitted to the client Project Officer.

9.1 EXPOSURE DATA

All work related incidents occurring to USAE employees should be reported for statistical purposes. All recordable incidents count against USAE's recordable incident experience when they occur, to either an employee or a subcontractor working under the direct supervision of USAE's site manager. Personnel man-hours will be defined as hours worked by all persons assigned to the project including subcontractor employees under direct supervision of USAE's site manager. These man-hours will be annotated on the Daily Operations Summary and/or the Weekly Operations Summary forms (see Appendix B of this Work Plan for forms) and transmitted to the Project Manager. The USAE UXOSO will document and review with the POSM and PSHM the potential exposure data versus the man-hours worked per day to evaluate the

association to site accidents or injury. The most current OSHA 300 form will be posted on site and is presented in Attachment 1 of this APP.

9.2 ACCIDENT INVESTIGATIONS, REPORTS, AND LOGS

Investigation and documentation of emergency responses shall be initiated by the UXOSO. This is important in all cases, but especially so when the incident has resulted in personal injury, property damage, or environmental impact. The documentation will be a written report and will be inclusive of the following:

- Accurate, concise and objectively recorded information;
- Authentic Information: Each person making an entry must sign and date that entry. Nothing is to be removed or erased. If details are changed or revised, the person making the change should strike out the old material with a single line and initial and date the change;
- Titles and names of personnel involved;
- Actions taken, decisions made, orders given, to whom, by whom, when, what, where, and how, as appropriate;
- Summary of data available;
- Possible exposure of personnel; and
- Copies of the Employer's Report of Occupational Injury or Illness (OSHA 300) or the USAE Accident Report, as appropriate will be completed and forwarded to the POSM.

All accidents will be investigated and immediate steps will be taken to prevent recurrence. The client will be notified of any accidents occurring on this project site. Should an accident occur on the site, all reports and records will be documented. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the USAE Corporate Office.

9.3 IMMEDIATE NOTIFICATION OF ACCIDENTS

An accident that appears to have any of the consequences listed below shall be immediately reported to the Navy Remedial Project Manager in person, telephonically, or by email. Should we be unable to get through to the Navy Project Manager immediately, USAE will continue to try to reach him until we receive an acknowledgement that he has received the message. The reporting requirement of submitting an incident report still applies.

- A fatal injury
- Permanent total disabling injury
- Permanent partial disabling injury
- Three or more persons admitted to a hospital
- Property damage in the amount of $100,000 or more.

10.0 MEDICAL SUPPORT

USAE will have an Emergency Medical Technician (EMT) and two persons assigned to the site who are certified in first aid and CPR. They will also have current blood-borne pathogen training and will be on site for the duration of site activities. These will be the first responders to a site accident. Other site workers may be asked to assist these workers as necessary. If a worker has a potentially serious injury or illness, the UXOSO in consultation with the EMT will make the decision to call in professional medical assistance. An ambulance will be called in to transport the victim to the nearest hospital. For less

serious injuries, a co-worker may take a victim for medical treatment to the nearest hospital emergency room. For serious injuries, the medical treatment facility for use at this project site will be the Castle Medical Center in Kailua, HI. The medical clinic is approximately 8 miles away from the site.

The USAE Occupational Physician will be available to provide patient specific information in case medical treatment is needed. Dr. James Vawter of Tierney-Vawter Medical Group can be reached at telephone number (831) 647-8700.

The EMT and the UXOSO will maintain a first aid kit and blood-borne pathogens kit in their transport vehicles on the site. Personnel with first-aid type injuries will also report to the UXOSO, who will instruct the first responders to provide first aid treatment of their injuries. The UXOSO will be advised of any first aid treatment provided, so that he may investigate to the root cause of the injury and take preventive action on the site.

11.0 PERSONAL PROTECTIVE EQUIPMENT

When feasible, engineering controls and work practices, or a combination thereof, shall be utilized to protect site workers from safety and health hazards and to maintain personal exposures to hazardous substances below established exposure limits. The exposure limits used by USAE will be the lower of the OSHA Permissible Exposure Limits (PEL) found in 29 CFR 1910 Subpart G and 29 CFR 1910.1000, or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV). Other recognized published exposure levels, such as those found on MSDSs, will be used if the substance is not listed by OSHA or the ACGIH. USAE will not utilize a system of employee rotation as a means of complying with the PPE, PEL, TLV or other published limits.

11.1 TYPES OF PPE

Requirements for task and activity-specific levels of protective clothing are presented on the Activity Hazards Analyses located in the SHSP of this APP. Personnel performing site tasks shall use the appropriate level and type of PPE specified in this plan for each individual task. This APP makes provisions for use of the following levels of PPE, in accordance with the hazards and contamination level anticipated for each task or operation: Level A, Level B, Level C, and Level D. The following sections describe the PPE requirements for activities and locations on the site.

11.1.1 LEVEL A PROTECTION

Level A Protection is not required.

11.1.2 LEVEL B PROTECTION

Level B Protection is not required.

11.1.3 LEVEL C PROTECTION

Level C Protection is not required.

11.1.4 LEVEL D PROTECTION

The minimal level of protection that will be required of USAE personnel and visitors at the site will be Level D. The UXOSO may increase the level of protection due to changing requirements but may not

decrease the level of protection without approval of corporate safety management. The following equipment will be used for Level D protection:

- Hard hat, in the vicinity of vegetation clearance operations
- Face shield, in the vicinity of vegetation clearance operations
- Leather gloves
- Safety glasses with side shields or safety goggles, in the vicinity of vegetation clearance operations
- Hearing protection, where required by high noise levels, in the vicinity of vegetation clearance operations
- Leather work boots with ankle support and non-slip soles. No steel toe shoes in the vicinity of magnetometer operations
- Cotton work clothes or coveralls
- Back supports (optional)
- Leg chaps – when working around vegetation removal equipment
- High-visibility reflective safety vest (meeting the requirements of ANSI/ISEA 107-1999 or later).

11.1.4.1 Eye Protection

All personnel shall use appropriate eye protection when exposed to eye hazards from flying particles, liquid chemicals, or other eye hazards. All personnel shall use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable.

- All personnel who wear prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.
- Eye protection shall be distinctly marked to facilitate identification of the manufacturer.

Protective eye equipment purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, “American National Standard Practice for Occupational and Educational Eye and Face Protection,” which is incorporated by reference as specified in Section 1910.6.

11.1.4.2 Head Protection

When working in the vicinity of vegetation clearance equipment, hard hats will be worn.

11.1.4.3 Leg Protection

Leg chaps will be worn during vegetation clearance operations.

11.1.4.4 Foot Protection

Due to the uneven working surfaces and potential for tripping hazards, all USAE personnel shall wear sturdy leather work boots with ankle support and non-slip soles. Personnel using magnetometers for the detection of buried MEC will not wear steel-toe safety shoes, as they will affect the readings of the equipment.

11.1.4.5 Hand Protection

USAE selects and requires employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; thermal burns; and harmful temperature extremes. For most operations on this site, leather gloves will provide adequate protection against minor cuts, which are a hazard in most site operations. Chemical gloves will be required in fueling operations.

11.1.4.6 Hearing Protection

USAE shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater. Hearing protectors shall be replaced as necessary. Hearing protection will be required for all personnel working in and around any operations likely to produce high noise levels, such as during the use of chain saws and weed-eaters during vegetation clearance operations.

11.2 PROPER PPE SELECTION

Each task outlined in the Statement of Work has been assessed to determine the risk of personnel exposure to safety and health hazards, which may be encountered during its conduct. The hazard assessment is based on available information pertaining to the historical use of the site, site contaminant characterization data and the anticipated operational hazards. This information has been provided by the client, or collected by USAE site personnel. The PPE assigned as a result of the hazard assessment represents the minimum PPE to be used during initial site activities. Since hazard/risk assessment is a continuing process, changes in the initial types and levels of PPE will be made in accordance with information obtained from the actual implementation of site operations and data derived from the site monitoring. As a general rule, the levels of PPE will need to be reassessed if any of the following occur:

- Commencement of a new work phase, such as the start of drum sampling or work that begins on a different portion of the site
- Change in job tasks during a work phase
- Change of season/weather
- When temperature extremes or individual medical considerations limit the effectiveness of PPE
- Contaminants other than those previously identified are encountered
- Change in ambient levels of contaminants
- Change in work scope, which affects the degree of contact with contaminants

During the selection of PPE, the POSM and UXOSO will also take into consideration the following factors:

- Limitations of the equipment
- Work mission duration
- Temperature extremes
- Material flexibility
- Durability/Integrity of the equipment

11.3 UPGRADING/DOWNGRADING PPE

If work tasks are added or amended after completion and approval of the APP/SHSP, the UXOSO will conduct the task hazard assessment and consult with the POSM and/or the PSHM. The level and type of PPE to be used will be identified. The UXOSO can increase the level of PPE when the situation

warrants, due to an increase in hazardous exposure. Any decreases in the level of PPE must be approved by the POSM and/or PSHM, only after review of documentation demonstrating that the conditions and/or potential for hazardous exposure are reduced enough to justify the downgrade.

11.4 GENERAL REQUIREMENTS

All personal protective equipment shall be provided, used, and maintained in a sanitary and reliable condition where it is necessary. PPE is required due to hazards of processes or environment, chemical hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact. All PPE will be used in the manner for which it was designed. The assignment of PPE will be based upon hazard analysis, and the equipment will be selected based on its protection factor against site hazards.

11.5 INSPECTIONS

Each piece of PPE will be inspected daily prior to use. Defective or damaged personal protective equipment shall not be used. It shall be removed from service and turned in for repair, or removed from the site for disposal and replaced with new PPE. During the work task, buddy teams should periodically inspect each other's PPE for evidence of chemical attack, such as discoloration, swelling, stiffening, or softening.

11.6 CLEANING AND DECONTAMINATION

The UXOSO will be responsible for ensuring that PPE is in good, clean, working order prior to issuing the PPE the first time. Once issued, site personnel will ensure that re-usable articles of PPE are maintained in a clean and sanitary fashion. For items used inside an EZ, site personnel will follow the requirements of the Site Specific Decontamination Plan and ensure that the PPE is properly decontaminated before removing the item from the EZ or Contaminant Reduction Zone.

11.7 MAINTENANCE

Maintenance of PPE can vary greatly, based upon the complexity of the PPE and the intricacy of the repair involved. The UXOSO will become familiar with the manufacturer's recommended maintenance and when possible repair defective PPE. If unable or unauthorized to conduct the repair, the UXOSO will return the item to the manufacturer for repair, or procure a replacement.

11.8 STORAGE

PPE will be stored in a location, which is protected from the harmful effects of sunlight, damaging chemicals, moisture, extreme temperatures, impact, or crushing. If needed, the UXOSO will designate a specified area for the storage of PPE.

11.9 PPE PROGRAM EFFECTIVENESS

Based on the inhalation hazard and potential chemical exposures on this site, Level D PPE is considered adequate for the work that is to be accomplished at the site. If work tasks are added to the SOW after approval of this APP, the SUXOS and/or UXOSO (as applicable) shall identify and assess the task hazards and relay that information to the POSM and PSHM. The POSM will prepare an amendment to the APP and submit the amendment for approval from the Navy. The amendment will be added to the APP upon Navy approval.

The UXOSO will ensure PPE use complies with all applicable OSHA, USACE, and USAE requirements. It is the responsibility of each employee to report to work wearing proper attire and to assemble the necessary PPE prior to initiating donning procedures.

11.10 TRAINING

USAE shall provide training to each employee who is required by this section to use PPE. Each affected employee shall demonstrate an understanding of the training, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE. Each such employee shall be trained to know at least the following:

- The decisions and justifications used to select each piece of PPE;
- The nature of the hazards and the consequences of not using PPE;
- What PPE will be required for the conduct of each task;
- When PPE will be required during the performance of each task;
- How to properly don, doff, adjust, and wear each piece of PPE;
- The proper inspection, cleaning, decontaminating, maintenance, and storage of each PPE item used; and
- The limitations of the PPE.

All personnel receiving PPE training will be required to demonstrate an understanding of the training topics and the ability to correctly use the PPE. This will be accomplished through the UXOSO supervising and visually inspecting each individual's ability to properly don and use the PPE during initial use of the PPE.

When the UXOSO has reason to believe that any affected employee who has already been trained does not have the understanding and skill required he should retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete;
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

Upon completion of the training and after each employee has successfully demonstrated the requisite understanding, the UXOSO will complete the Training form (see Table 11-1). This identifies: the employees who attended the training course and successfully demonstrated the required knowledge; the date(s) of the training and demonstration session(s); and the PPE covered by the training session.

This space is intentionally left blank.

Table 11-1: USAE Certification of PPE Training

SITE INFORMATION			
Site Name:			
Location:		Instructor(s):	
Date of Classroom Instruction:		Date of Demonstration:	
PPE TRAINING COURSE ATTENDANTS			
The following personnel have attended the site PPE training course, and demonstrated, through use, an understanding of the donning/doffing procedures, inspection, cleaning, maintenance, storage, limitations, and proper disposal of the PPE listed on this certificate. These personnel are now qualified to use the site- and task-specific PPE, as required by the SHSP.			
Name	Organization	Name	Organization
TYPES AND LEVELS OF PPE ADDRESSED DURING TRAINING			
Trainer's Initials	Personal Protective Equipment Reviewed	Trainer's Initials	Personal Protective Equipment Reviewed
CERTIFICATION			
I the undersigned do hereby certify that the above listed personnel have received the requisite training and successfully demonstrated their ability to use the PPE listed above, in accordance with the USAE Personal Protective Equipment Program.			
Name (printed):	Signature:	Date:	

12.0 PLANS, PROGRAMS, AND PROCEDURES

The following subsections describe the plans, programs, and procedures that will be used during site operations.

12.1 LAYOUT PLANS

Layout plans are not applicable for this Project, as temporary structures will not be constructed.

12.2 EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES

The UXOSO will perform pre-emergency planning before starting field activities and during the mobilization and site-specific training phase of the project, and will coordinate emergency response with police/fire/rescue personnel and the nearest hospital. Pre-emergency planning meetings shall be used to inform local authorities of the nature of site activities that will be performed under the SOW and the potential hazards that activities may pose to site workers, the environment, and the public. All emergency response telephone numbers will be verified prior to the start of site activities. See Table 12-1 for fire, medical and other emergency support agency telephone numbers.

12.2.1 PROCEDURES AND TESTS

An agreement will be established between USAE and emergency response personnel and the hospital regarding responsibilities of each party in responding to a project site emergency. The UXOSO will verify all on-site emergency services information, to include procedures for requesting services. It shall be the UXOSO's responsibility to post these procedures and contact information in accordance with the requirements of this APP/SHSP. Pre-emergency planning tasks include:

- Post emergency instructions and call numbers at accessible telephone locations;
- Inspect all emergency equipment and supplies to ensure they are in proper working order;
- Provide a site map marked with planned evacuation routes, assembly points, and emergency equipment and supplies;
- Provide a map with the route to the hospital marked and highlighted, with copies of this map posted in all site vehicles;
- Conduct an emergency response drill to test the effectiveness of the Emergency Response Plan and Contingency Procedures (ERCP);
- Review and revise the ERCP in the event of a failure of the plan in an actual or staged emergency, or when changes in site conditions or scope of work affect the ERCP;
- Before normal activities are resumed, onsite personnel must be prepared and equipped to handle another emergency. These follow-up activities should be completed;
- The POSM will notify appropriate government agencies as required (Reminder: OSHA must be notified if there have been any fatalities or three or more hospitalizations);
- All equipment and supplies restocked, serviced and inspected; and
- Review and revise all aspects of the SHSP as necessary to address and prevent future emergencies of this type.

As part of mobilization training, prior to start of project, all personnel will review the points of contact list and where it is posted as well as location of the nearest hospital. A meeting place off site will be identified in case of emergency evacuation and the responsibilities of all persons on site.

- All personnel will review the locations of fire extinguishers and be competent to use one properly; and
- All emergency telephone numbers will be posted next to the directions to the hospital map on site.

12.2.2 POTENTIAL SITE EMERGENCIES

There are several emergencies, which could reasonably be anticipated during project activities, including:

- Thermal stress;
- Worker injuries, slips, trips or falls, and/or illness; and
- Fires and explosions.

12.2.3 PERSONNEL AND LINES OF AUTHORITY

In the event of an emergency, the UXOSO will be designated as the On-Scene Incident Commander and will have the overall responsibility for implementation of the ERCP and coordination with responding off site emergency services. In the event of a medical emergency, the UXOSO will call in the EMT and in consultation with the UXOSO will determine if professional medical assistance is required and will summon emergency response personnel as required.

Specific responsibilities of the UXOSO include, but are not limited to, the following:

- Notifying local police, fire department, and other off-site emergency units, as required;
- Notifying the Navy PM and providing updates as conditions change;
- Directing offsite emergency response personnel to the scene and providing assistance;
- Site control;
- Completing any follow-up reports;
- Rescuing personnel;
- Accounting for all site personnel and visitors;
- Providing for emergency first aid;
- Preventing further injury of personnel;
- Providing current status of the incident to the USAE POSM and/or PSHM;
- Ensuring that on-site emergency response personnel don the proper PPE if needed;
- Assisting on-site emergency response personnel with treatment and transport of sick/injured;
- Providing medical background information of the sick/injured and applicable site health and safety information to the off-site emergency medical responders; and
- Accompanying sick/injured personnel to hospital.

If the emergency involves employee injury, UXOSO will complete the USAE Accident Report. The Program Safety and Health Manager will be responsible for notifying applicable Federal, state and local authorities/agencies. Once the emergency has been resolved, the UXOSO, Program Manager and Program Safety and Health Manager will conduct a follow-up investigation and critique. Actions will be taken to prevent recurrence.

All USAE personnel and visitors will be responsible for:

- Reporting any site emergencies to the SUXOS or UXOSO;
- Knowing the exit location and evacuation route within the EZ;
- Knowing the pre-planned evacuation assembly point and going there in the event of an emergency; and
- Assisting emergency response personnel as requested.

12.2.4 EMERGENCY RECOGNITION AND PREVENTION

An emergency is an unplanned event that threatens the safety of any personnel. Compliance with this APP can assist in the prevention of anticipated site emergencies. These emergency situations can easily be recognized by visual observations, worker complaints, or monitoring instruments.

Prevention of emergencies will be aided by the effective implementation of this APP and Site Specific Health and Safety Plan, personnel awareness, contingency planning, and on site safety meetings. Anticipated emergencies may include physical injury, illness, fire, explosion, chemical spill or release, inclement weather, and natural disasters. The UXOSO will use the site-specific briefing and/or the Tailgate Safety Briefings to inform site workers of the recognition, prevention, and response procedures for each anticipated emergency.

In the event of an emergency, site personnel will be notified by either an alarm or verbal communication. Personnel will be notified to:

- Stop work activities;
- Evacuate to the designated assembly point at the support zone;
- Begin emergency procedures; and
- Notify off-site emergency response organizations.

After evacuation, the UXOSO will account for all personnel, ascertain information about the emergency and advise responding onsite personnel. The UXOSO will contact, advise and coordinate with responding off-site emergency personnel if deemed necessary by the situation.

In all situations that require evacuation, personnel shall not re-enter the work area until:

- The conditions causing the emergency have been corrected;
- The hazard has been reassessed;
- The Site Specific Health and Safety Plan has been revised and reviewed with onsite personnel, if needed; and
- Instructions have been given for authorized re-entry by the UXOSO.
- At the conclusion of any site emergency procedures drill, or an actual site emergency, the site managers will critique the situation to assure that the procedures in place were effective and make change in areas that may be ineffective.

12.2.5 SAFE DISTANCES AND PLACES OF REFUGE

The UXOSO will determine safe distances and places of refuge. Prior to the start of each workday, the UXOSO or SUXOS (as applicable) will hold a safety meeting with all personnel and discuss the following:

- Times when the gate to ranges may be locked;

- Who has the gate key or combination on site;
- Evacuation routes from work areas;
- The assembly point to be used in the event of an emergency;
- Locations of the nearest fire extinguishers and spill containment equipment; and
- Discussion on specific health and safety concerns of personnel.

12.2.6 EVACUATION PROCEDURES

The UXOSO will establish evacuation routes. Evacuation notification will be one long blast on an air horn, vehicle horn, or direct verbal communication. If evacuation is necessary, all personnel are to:

- Gather equipment to the extent safely possible; and
- Evacuate to the vehicle(s) location and prepare to move out.

12.2.7 MEDICAL EMERGENCY PROCEDURES

Any person(s) who become ill or injured during work activities must immediately inform the UXOSO regardless of the severity of the illness or injury. The UXOSO will alert the EMT to assist the victim. If the injury or illness requires more advanced medical attention, the UXOSO will summon emergency medical assistance and the ambulance will transport the victim to the hospital. All personnel at the work site will use the buddy system. All personnel using the buddy system will stay within sight of their partner. If a partner becomes incapacitated or severely ill, the UXOSO will be called. In the event that a cessation of work is ordered, all personnel should:

- Assist the EMT if required, in administering first aid; and
- Leave the area if the hazard warrants such action.

If the medical emergency is not severe (requiring only first aid), the victim will be treated on site by the EMT, with additional treatment at the hospital if required. If the medical emergency is serious, the victim would be brought to the hospital via ambulance, where the victim would be stabilized and treated. The UXOSO will provide the ambulance and hospital personnel with the victim's medical background information and information on how the injury or illness occurred.

It is not anticipated that hazardous waste decontamination shall be required during any activities under the SOW. This determination has been made based upon archival documentation and past activities conducted at the site. Basic cleaning and disinfection is all that will be required prior to most types of treatment. If a worker is accidentally injured using chemicals brought onto the site, the first aid procedures described in the MSDS would be followed by the EMT to clean as much of the chemical off as possible before treatment.

12.2.8 BLOOD-BORNE PATHOGENS PROGRAM

The strategy of "Universal Precautions" was developed by the Centers for Disease Control to address concerns regarding transmission of Human Immunodeficiency Virus (HIV). This concept stresses that all sources should be assumed to be infectious for HIV, hepatitis B virus, and other blood-borne pathogens. The philosophy of universal precautions shall be applied whenever USAE employees render first aid involving potential contact with blood, body fluids, or other potentially infectious materials. All blood and body fluids will be treated as if they are infectious. PPE and clean-up procedures will be implemented accordingly. The EMT and a minimum of two personnel certified in First Aid/CPR will also have current blood-borne pathogens training and will be on site for the duration of site activities.

12.2.8.1 Engineering Controls

Engineering controls will be used whenever possible to eliminate or reduce the potential for employee exposure, and will be periodically examined, maintained or replaced to ensure their effectiveness. USAE employees shall observe "universal precautions," and treat all body fluids as potentially infectious materials. USAE shall provide hand-washing facilities readily accessible to employees. Where the installation of hand washing facilities is not feasible, appropriate antiseptic cleanser and clean paper or cloth towels shall be provided. USAE employees shall wash their hands and any other potentially exposed skin with soap and running water as soon as possible:

- After removing gloves or other personal protective equipment.
- After contact with potentially infectious materials.
- Even after washing with antiseptic as described.
- USAE employees shall flush eyes or other mucous membranes with copious amounts of water as soon as possible after contact of these areas with potentially infectious materials.

For emergency first aid situations involving multiple victims, equipment shall not be used on different victims unless it has been properly decontaminated or if the victim's medical condition would be seriously affected by a delay in treatment.

12.2.8.2 Safe Work Practices

Safe work practices will be implemented whenever possible to eliminate or reduce the potential for employee exposure. Employees shall wash their hands immediately or as soon as feasible after removal of gloves or other PPE. Employees shall wash hands and any other skin with soap and water, or flush mucous membranes with water immediately following contact with blood or potentially infectious materials.

If potentially contaminated sharps are encountered, the item shall immediately be disposed of in an appropriate puncture-proof container or decontaminated.

Eating, drinking, smoking, applying cosmetics or lip balm, handling of contact lenses, any hand-to-face activities, or storage/handling of food is prohibited in all areas where potentially infectious materials are present.

Equipment that has become contaminated will be decontaminated prior to servicing or storage, unless decontamination is not feasible, in which case the equipment will be disposed of properly in appropriately labeled and color-coded containers.

12.2.8.3 Personal Protective Equipment

When occupational exposures remain after the implementation of engineering and work practice controls, appropriate PPE will be utilized to control employee exposures.

USAE shall provide appropriate personal protective equipment including gloves, face masks, eye protection, mouthpieces, etc., for protection against potentially infectious materials.

Personal protective equipment shall not allow potentially infectious materials to pass through or reach an employee's clothes, skin, eyes, mouth, or other mucous membranes during normal use for the expected duration of time for which the PPE will be used.

Employees shall use the appropriate personal protective equipment unless, in unusual circumstances, the employee believes that using the protective equipment will prevent the administering of first aid or would pose an increased risk. Any incident where the use of protective equipment is declined shall be investigated and documented by the UXOSO and be approved by the Program Occupational Safety Manager.

Single use protective equipment, such as surgical gloves, shall be disposed of after each use, or as soon as possible after the equipment has become damaged.

Multi-use protective equipment, such as coveralls or utility gloves, shall be cleaned and decontaminated after each use or when they become contaminated in order to maintain its effectiveness.

Multi-use protective equipment shall be removed, then disposed of or repaired as soon as possible after becoming damaged.

When PPE is removed, it will be placed in an appropriately designated area or container for storage, washing, decontamination or disposal. PPE shall be removed and disposed or decontaminated before leaving the area.

Gloves will be worn when it can be reasonably anticipated that the employee may have hand contact with potentially infectious materials.

Disposable (single use) gloves will not be washed for reuse and will be disposed of after each use or if their ability to function as a barrier is compromised.

Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they exhibit signs of deterioration or when their ability to function as a barrier is compromised.

Masks in combination with eye protection devices, such as safety glasses, goggles or face shields, will be worn whenever blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

12.2.8.4 Decontamination Procedures

All equipment, working surfaces and non-working surfaces shall be decontaminated after contact with potentially infectious materials. A solution of ten parts water to one part bleach or equally effective material shall be used to clean contaminated areas.

Contaminated sharp objects shall be cleaned up using mechanical means, such as a brush and dustpan. Sharp objects shall not be picked up directly with the hands.

Two pairs of gloves, inner surgical gloves and outer utility gloves shall be worn for cleaning contaminated surfaces. A smock or apron and eye protection shall also be worn.

Only those employees directly involved with the decontamination efforts shall be allowed in the work area while cleaning is taking place.

All cleaning equipment shall be disinfected or disposed of in accordance with this Program.

For minor injuries where the employee is able to return to work, the injured employee shall clean up their own blood or other potentially infectious materials.

While this section deals primarily with decontamination of blood-borne pathogens, it is important to note that any injured employee who has been exposed to any type of chemical contamination will undergo as much decontamination as practical before being turned over to the ambulance crew. If contamination is remaining, the patient will be wrapped in a blanket to prevent the spread of contamination and the ambulance crew will be advised of the potential hazards.

12.2.8.5 Housekeeping and Waste Disposal

The work site will be maintained in a clean and sanitary condition to prevent the spread of contamination to other areas of the facility. All equipment and working surfaces will be cleaned and decontaminated after contact with blood or other potentially infectious materials. Contaminated work surfaces and equipment shall be decontaminated with an appropriate disinfectant immediately after they become contaminated in accordance with the decontamination section of this program. Regulated waste, other than contaminated sharps, shall be placed in containers which are: closable, constructed to contain all contents and prevent leakage, properly labeled or color-coded, and closed prior to removal or replacement. Labels or color-coding shall be fluorescent orange or orange-red, and display the biohazard symbol in a contrasting color.

Regulated waste containing contaminated sharps will be placed in containers which are: closable, puncture resistant and leak proof on sides and bottom, properly labeled or color-coded, and closed prior to removal or replacement. Contaminated clothing, equipment and other materials shall be handled as little as possible and with minimum agitation. Bags containing contaminated materials shall not be carried or handled from the bottom. All regulated waste will be disposed of in accordance with applicable federal, state, and local regulations.

12.2.9 EMERGENCY MEDICAL FACILITIES

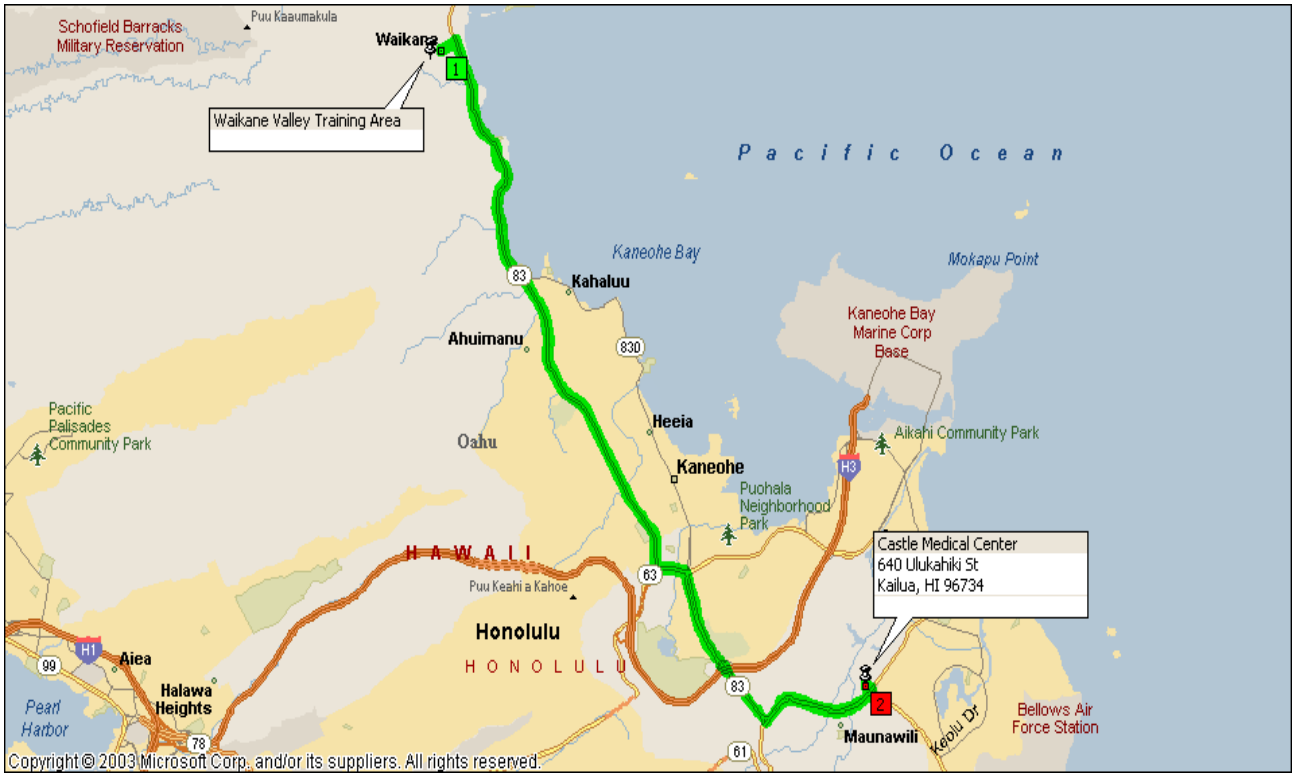
For most anticipated types of on-site injuries, site personnel will report to the UXOSO, who will summon the EMT to examine the injury and provide first aid treatment. In cases of more serious injuries or illnesses, the victim will still report to the UXOSO (or he will be summoned to the victim) and the UXOSO will examine the victim and consult with the EMT to determine if further medical treatment is indicated. If required, the UXOSO will summon an ambulance to transport the victim to the nearest hospital, which is Castle Medical Center, 640 Ulukahiki Street, Kailua, HI.

12.2.9.1 Directions to Hospital

This section provides a map and directions to the Castle Medical Center, located at 640 Ulukahiki Street, Kailua, HI. The emergency room phone number is (808) 263-5164. The outpatient clinic phone number is (808) 263-5174.

Mile	Instruction	For
0.0	**Depart Waikane on Local road(s) (East)**	0.2 mi
0.2	Turn RIGHT (South) onto SR-83 [Kamehameha Hwy]	8.0 mi
8.2	Road name changes to Local road(s)	21 yds
8.2	Turn LEFT (East) onto SR-83 [Likelike Hwy]	0.4 mi
8.7	Take Local road(s) (RIGHT) onto SR-83 [Kamehameha Hwy]	2.4 mi
11.1	Road name changes to Local road(s)	21 yds

11.1	Turn LEFT (North-East) onto SR-61 [Kalanianaole Hwy]	1.8 mi
12.9	Turn LEFT (West) onto Local road(s)	21 yds
12.9	Keep STRAIGHT onto Ulukahiki St	142 yds
13.0	**Arrive Castle Medical Center [640 Ulukahiki St, Kailua, HI 96734]**	



12.2.10 CRITERIA FOR ALERTING THE LOCAL COMMUNITY RESPONDERS

In the event of an on-site emergency the individual team leader or first person aware of the emergency will contact the UXOSO by field radio, cellular telephone, or in person, as circumstances allow. The UXOSO will normally be responsible for contacting the EMT to administer first aid services and the ambulance to transport the victim to the hospital, should that be needed. If the order is given to evacuate the site of all personnel, each on-site team leader will assemble, account for, and evacuate all team personnel to the pre-designated staging area in the support zone. The EMT will render emergency first aid treatment and the UXOSO will authorize site personnel to assist, where required. There is a military Fire Department at the Marine Corps Base Hawaii and a local volunteer Fire Department at Kaneohe, and should circumstances warrant their assistance, they would be called by the UXOSO. The UXOSO will assure that the Fire Departments, if called to the site, do not approach any closer than 200 feet from the fire.

12.2.11 MATERIAL SAFETY DATA SHEETS

As part of the USAE Hazard Communication Program, an MSDS binder will be maintained on site, which includes copies of MSDSs for all hazardous materials brought onto the site by USAE. It will be kept in the

SUXOS site vehicle during operations. This MSDS binder will be available on request to all site personnel during all working hours of the site. If site workers have further questions about any of the hazardous materials they come into contact with, the USAE UXOSO or the Program Safety and Health Manager will locate the required information and pass it on to the employee. If an employee is injured as a result of exposure to a chemical onsite, that MSDS will be retrieved and given to the medical providers.

12.2.12 TRAINING

Training in emergency procedures will be accomplished by performing drills. After any drill or real emergency scenario, the Project Manager, Program Safety and Health Manager, and UXOSO will evaluate the situation and determine any potential areas for improvement in the procedures. Procedures will be updated accordingly.

12.2.13 SPILL PLANS

USAE will conduct cleanup operations in the event of a spill of hazardous material (e.g., fuel or oil from UXO field operations). The UXOSO will manage the collection of the spilled material with absorbent pads and containerize the pads or materials within Department of Transportation approved drums for disposal as potential contaminated hazardous waste. A complete spill kit will be maintained on site when spills are a potential hazard.

In the event of a spill or leak of any potentially harmful material (regardless of quantity), on-site personnel will:

- Notify the UXOSO immediately;
- The UXOSO shall notify the Project Manager of the spill/leak with relative information (location, time, chemical identity, quantity, hazards listed on the MSDS), and any corrective actions/measures taken;
- Locate the source and stop the leak/spill if it can be done safely (as dictated by the UXOSO);
- Begin containment and recovery of spilled material (as directed by the UXOSO), using appropriate PPE and spill clean-up equipment and materials; and
- Once notified, the Project Manager will in turn notify the Client Project Manager and the Contracting Officer. The Client Project Manager will advise USAE if any additional actions are necessary.
- At the end of an emergency procedures drill or an actual emergency, the site managers will critique the situation in order to determine if the procedures were effective in addressing the site needs. In areas where problems occurred, they will re-evaluate the procedures to make them more effective.

12.2.14 FIREFIGHTING PLANS

In the event of a fire or explosion, the UXOSO will notify the police, fire department, and ambulance, as required. The UXOSO will also contact the Navy site representative and the Navy Project Manager, and escort the response personnel to the location of the fire or explosion. Site personnel will not fight fires, but will exit the project area and gather at the predetermined rally location. The responding fire department personnel will be informed of the nature of the fire and, if explosives are present, the fragmentation distance from which to fight or contain the fire.

12.2.14.1 Small Fires

A small fire is defined as a fire that can most likely be extinguished by site personnel using portable extinguishers. A small fire must also be free and clear of explosive materials, especially MEC. If a small fire occurs, the UXOSO will direct site personnel to perform the following, if safe to do so:

- Evacuate unnecessary personnel to an upwind position;
- Attempt to extinguish the fire using portable fire extinguishers or by smothering;
- Remove any essential or flammable items from the path of the fire; and
- Notify emergency response services (fire, police, ambulance, hospital, etc.) as needed.

If a fire extinguisher is used, this must be immediately reported to the UXOSO. The fire extinguisher must be immediately removed from service until it can be recharged. Another fire extinguisher must be made available to the operating area. The area around where the fire occurred must be watched for a minimum of 30 minutes after the fire has been extinguished to assure re-ignition does not occur. If personnel are not working in the area, the UXOSO should check the area of the fire periodically to assure re-ignition does not occur.

12.2.14.2 Large Fires

A large fire is defined as a fire, which cannot be extinguished, or which, due to its size, cannot be extinguished using portable fire extinguishers. In the event that a large fire occurs and the fire does not involve explosive materials, the UXOSO will direct personnel to conduct the following, if safe to do so:

- Evacuate all non-essential personnel from the site to an upwind location;
- Notify the Fire Department and other emergency response services (police, ambulance, hospital, etc.) as needed;
- Order the appropriate level of protective equipment to be worn by personnel responding to the fire;
- Attempt to control the fire to the extent possible; and
- Remove any essential or flammable items from the path of the fire.

12.2.14.3 Fires Involving Explosive Materials

If a fire occurs that involves explosive materials such as chemicals, fuels or MEC, the UXOSO will order the immediate evacuation of all site personnel to an upwind assembly point at least fragmentation distance from the fire site. The UXOSO will then notify the Fire Department and any other emergency services (police, ambulance, hospital, etc.) as needed. At no time will USAE personnel fight a fire involving explosive materials, nor will they allow outside emergency personnel to do so. The Fire Department personnel may not enter any closer than fragmentation distance from the fire and they may spray water to surrounding buildings or structures in order to prevent the spread of fire.

After the fire has burned itself out, the site must be barricaded and entry prohibited until adequate cooling time has passed (at least 24 hours for a large fire). Explosive materials that may not have discharged during the fire may still be liable to function in the presence of extreme heat. After the site has cooled down, the SUXOS and UXOSO will inspect the site. Any MEC that is observed on the surface will be marked with pin flags to identify its location and the customer will be notified. This MEC should be blown in place by the local EOD unit. All MEC must be destroyed in place before non-UXO qualified personnel are permitted to enter the area.

If non-UXO qualified personnel must enter the site for purposes of fire investigation, they must receive a briefing on the potential hazards of MEC on the site. They must be accompanied at all times by a UXO-qualified employee of USAE. NO OUTSIDE PERSONNEL WILL BE PERMITTED ONTO THE SITE WHILE THERE IS A KNOWN MEC HAZARD PRESENT. If during the course of the investigation MEC is observed, the site will be evacuated of all non-UXO qualified personnel until the site can be rendered safe for re-entry.

12.2.14.4 Explosions

In the event of an explosion, the UXOSO will order the evacuation of all site personnel to a safe, upwind assembly point at least fragmentation distance away. The UXOSO will then notify all necessary emergency response services. After an explosion has occurred the site will remain barricaded a minimum of 30 minutes before entry is permitted. The UXOSO will enter the site with a team member and inspect for presence and condition of MEC. If MEC is non-hazardous, it will be removed to a secured collection point for later sale to a qualified recycler. If MEC is hazardous, it will be marked with a pin flag to identify it's location and the customer will be notified so that it can be blown in place by the local EOD unit. Non-UXO qualified personnel may not enter the area until all known MEC has been removed or destroyed. If non-UXO qualified personnel need to enter the site, they must first be briefed on the potential hazards of the site. They must be accompanied at all times by an UXO-qualified employee of USAE. If MEC is discovered during the course of their visit, they must immediately leave the site until it can be rendered safe for re-entry.

12.2.15 SAFE DISTANCES AND PLACES OF REFUGE

The EZ of this project is the actual project footprint and an additional 200 feet around it for separation distance. As this project is a MEC avoidance project, any MEC on the sites are not expected to be disturbed or destroyed. This is the reason for using the separation distance as opposed to fragmentation distance. Outside of that distance is the support zone. Normally, during an evacuation, personnel would evacuate to the support zone, where the UXOSO would take role and account for all site personnel. An exception to this rule would be in the case of encountering a CWM item, in which case personnel would evacuate at least 450 feet upwind of the item. This location would change with the shifting winds, so it cannot be specifically identified.

12.2.16 POSTING OF EMERGENCY TELEPHONE NUMBERS

Emergency resources are listed in Table 12-1.

Table 12-1: Emergency Contact Numbers

CONTACT	PHONE NUMBER
Ambulance	911
Fire Department (Civilian)	911
Police	911
EOD Marine Corps Base Hawaii	(808) 257-7112
NAVFAC Pacific COTR, Steve Oshiro	(808) 472-1440
NAVFAC Pacific RPM, Cowan Azuma	(808) 472-1421
Hospital – Castle Medical Center, 640 Ulukahiki Street, Kailua, HI	(808) 263-5164
Poison Control Hotline	1-800-222-1222

CONTACT	PHONE NUMBER
USEPA National Response Center	1-800-424-8802
CHEMTREC	1-800-424-9300
Federal OSHA Emergency Hotline	1-800-321-OSHA (6742)
TEU (duty hours)	410-671-3601
TEU (after duty hours)	410-671-2773
USAE Program Manager, George Spencer	813-343-6358
USAE Program Safety and Health Manager, Robert Crownover	813-343-6364
USAE Program Occupational Safety Manager, Cheryl M. Riordan	757-486-8567

12.2.17 WILD LAND FIRE PREVENTION PLAN

In order to prevent grass fires from starting in the area, USAE will control employee smoking. Smoking will only be permitted in designated areas. These areas will be equipped with a fire extinguisher, as well as a can containing sand, where cigarette butts can be safety discarded without concern for the spread of fire. All lighters and matches will remain in the designated smoking area and will not be permitted into the site. All flammable liquids brought to the site for the purpose of fueling equipment, will be stored in an approved flammable liquid container in a designated flammable liquid storage area. No smoking will be permitted within 50 feet of the storage or use of flammable materials.

In the event that a grass fire does start in the area, all personnel will be trained in the use of fire extinguishers, and fire extinguishers will be available to all site operations. Fire extinguishers are designed for the incipient stages of a fire, which is when they are most effective. If a large fire starts, employees will be instructed to evacuate the area to at least fragmentation distance from the site and to contact the Marine Corps Base Hawaii Fire Department via telephone at 911. The Fire Department will remain at least fragmentation distance from the fire and implement applicable procedures to prevent the fire from spreading outside of the fragmentation distance.

12.2.18 MAN OVERBOARD/ABANDON SHIP PLAN

Due to the fact that water operations are not expected to occur on this site, no Man Overboard/Abandon Ship Plan is required.

12.3 HAZARD COMMUNICATION PROGRAM

The program establishes procedures for USAE employees who handle and store chemical products at USAE sites. It ensures that hazards of all chemicals purchased are evaluated and the information concerning their hazards is transmitted to employees. The delivery of information is to be accomplished by employee training, container labeling, and other forms of warning and MSDS. All MSDS are requested from the suppliers at the time of order. If not available then a recent MSDS will be downloaded off the Internet.

- As part of the USAE Hazard Communication Program, an MSDS binder will be maintained onsite, which includes copies of MSDSs for all hazardous materials brought onto the site by USAE. It will be kept in the UXOSO site vehicle during operations, and all USAE personnel will be made aware of that fact. This MSDS binder will be available on request to all site personnel during all working hours of the site. If site workers have further questions about any of the hazardous

materials they come into contact with, the USAE Program Safety and Health Manager will locate the required information and pass it on to the employee.

- All USAE employees who will be performing work involving the handling of hazardous materials will receive Hazard Communication training detailing the hazards of the product, appropriate protective measures to prevent exposure to the product, as well as safe procedures for storage and handling of the product, and response to emergencies. Personnel may request an MSDS for any hazardous material on the site at any time. This training will occur as part of the initial mobilization training at the site and will be documented on the USAE Documentation of Training Form.

The UXOSO must ensure that project personnel can immediately obtain the required information about chemicals of concern during an emergency.

12.4 RESPIRATORY PROTECTION PLAN

Due to the type of work taking place, respirators are not expected to be required on this site. Should unforeseen hazards develop, which would require a respirator, the USAE Respiratory Protection Program would be followed per the USAE Corporate Safety and Health Program.

12.5 HEALTH HAZARD CONTROL PROGRAM

Due to the type of work that will be taking place on this project site, toxic environments are not anticipated; therefore, the Health Hazard Control Program is not required. However, if toxic material or chemical agents are encountered, an Activity Hazard Analysis will be conducted and a Health Hazard Control Program will be implemented.

12.6 LEAD ABATEMENT PLAN

As lead is not expected to be a contaminant on this site, a Lead Abatement Plan will not be required. However, if lead should be encountered, a Lead Abatement Plan would be prepared in accordance with the requirements of the USAE Corporate Safety and Health Program.

12.7 ASBESTOS ABATEMENT PLAN

As asbestos is not expected to be encountered on this outdoor site, an Asbestos Abatement Plan is not required.

12.8 ABRASIVE BLASTING

Abrasive blasting is not required on this project.

12.9 CONFINED SPACE

Work in confined spaces is not expected to occur on this project.

12.10 HAZARDOUS ENERGY CONTROL PLAN

The work on this project should not require the use of equipment that would require a Hazardous Energy Control Plan. Should a change in the scope of work require it, the USAE Lock Out/Tag Out program would be implemented per the Corporate Safety and Health Safety Program.

12.11 CRITICAL LIFT PROCEDURES

USAE will not be performing any crane operations on this project, so critical lift procedures will not be required.

12.12 CONTINGENCY PLAN FOR SEVERE WEATHER

Rain and severe wind conditions can constitute a safety hazard to field operations at this site. The UXOSO will monitor the weather closely. If the area becomes wet, muddy, slippery, or windy such that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then MEC operations will cease until the UXOSO determines it to be safe to continue.

No MEC operations will take place if an electrical storm is within 10 miles of the site. An electrical storm monitor will be used to determine if an electrical storm is approaching. MEC operations will cease when an electrical storm is within 10 miles of the site, and will not resume again until the UXOSO determines that the electrical storm is at least 10 miles past the site.

Daily weather conditions will be a part of the daily briefing. Many people incur injuries or are killed due to misinformation and inappropriate behavior during severe weather. During severe weather, project personnel will seek shelter in an appropriate location (i.e., building or vehicle).

The individual is ultimately responsible for his/her personal safety and has the right to take appropriate action when threatened by severe weather.

12.12.1 SAFE LOCATIONS DURING SEVERE WEATHER AND LOCATIONS TO AVOID

No place is absolutely safe from severe weather; however, some places are safer than others.

- Large enclosed structures (substantially constructed buildings) tend to be much safer than smaller or open structures;
- The risk for lightning injury depends on whether the structure incorporates lightning protection, construction materials used, and the size of the structure; and
- In general, fully enclosed metal vehicles such as cars, trucks, buses, or vans with the windows rolled up, provide good shelter from many weather conditions.

AVOID being in or near:

- High places and open fields, light poles, metal fences, water (lakes, streams, rivers, or wet surfaces).

When inside a building AVOID:

- Use of the telephone, washing your hands, or any contact with conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, telephone wiring, cable TV wiring, or plumbing if lightning is a factor.

12.12.2 SAFETY GUIDELINES FOR INDIVIDUALS

Generally speaking, identify and seek shelter that is appropriate for the type of severe weather you are encountering. Proper shelter will always include a sound structure and removes you from the elements.

When available, pay attention to weather warning devices such as National Oceanic and Atmospheric Administration weather radio and/or credible weather detection systems. However, do not let this information override good common sense.

12.13 ACCESS AND HAUL ROAD PLAN

There are no plans to create access and haul roads for this project, so the Access and Haul Road Plan is not required. The only access road to the site will be controlled by USAE for the duration of site operations as a means of site control. This is further detailed in the Site Control Plans.

12.14 DEMOLITION PLAN (ENGINEERING AND ASBESTOS SURVEYS)

As work on this plan does not involve demolition of buildings containing asbestos containing material, the Demolition Plan is not required.

12.15 EMERGENCY RESCUE (TUNNELING)

As work on this project does not involve tunneling operations, this Emergency Rescue plan is not required.

12.16 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

As underground construction is not required on this project, the Underground Construction Fire Prevention and Protection Plan is not required.

12.17 COMPRESSED AIR PLAN

As there are no plans to use compressed air on this project, a Compressed Air Plan is not required.

12.18 FORMWORK AND SHORING ERECTION AND REMOVAL PLANS

As this project will not involve formwork and shoring erection and removal, this plan will not be required.

12.19 JACKING PLAN (LIFT) SLAB PLANS

As there will be no Lift Slab work on this project, this plan will not be required.

12.20 BLASTING PLAN

As the work on this project involves only MEC avoidance, a blasting plan will not be required.

12.21 PLAN FOR PREVENTION OF ALCOHOL AND DRUG ABUSE

The USAE program is included as Attachment 4. All project personnel will be asked to read and abide by this plan. The policy will be posted at the job site.

12.22 FALL PROTECTION PLAN

As work will be occurring at ground level and below, a Fall Protection Plan should not be required.

12.23 12.23 STEEL ERECTION PLAN

As no steel erection will be taking place on this project, this plan is not required.

12.24 NIGHT OPERATIONS LIGHTING PLAN

As there are no plans to operate during hours of darkness, there is no requirement for a Night Operations Lighting Plan.

12.25 SITE SANITATION PLAN

Adequate sanitation facilities will be provided at each work site to ensure proper personal hygiene. Site sanitation will be established and maintained in accordance with OSHA 29 CFR 1910.120(n).

An adequate supply of potable (drinkable) water shall be provided on site at all times, and will be supplied in accordance with the following provisions:

- Containers used for potable water shall be capable of being tightly closed, equipped with a tap and maintained in a clean and sanitary condition.
- A container used for distribution of drinking water shall be clearly labeled as to its contents and not used for any other purpose.
- Water shall not be dipped from the container and use of a common cup will not be allowed.
- Where single service cups are provided, separate sanitary containers will be provided for the storage of the unused cups and for the disposal of the used cups.
- Water coolers of drinking water will be placed in the support zone.
- Personnel will be instructed to wash their face and hands prior to drinking.
- Outlets and storage containers for non-potable water, such as water for fire fighting or decontamination will be clearly labeled to indicate that the water is not suitable for drinking with the following: "CAUTION – WATER UNSAFE FOR DRINKING, WASHING, OR COOKING." There shall at no time be a cross connection or open potential between a system furnishing potable water and a system furnishing non-potable water.
- Chemical toilets will be available at the work site. The toilet will be equipped with toilet paper, toilet paper holder, light, washing facilities, locking door, and adequate ventilation.
- Hand and face washing facilities will be set up in the support zone of the work area. These will be utilized by all personnel exiting the EZ prior to eating, drinking, tobacco use or other hand to face activities. Washing facilities will consist of potable running water, soap and drying towels. Portable eyewash will be available in site vehicles and with the EMT.
- Waste Disposal: A trash receptacle will be present in the support zone for the disposal of hand drying materials, any disposable PPE, paper towels used to dry hands and other generated site debris.
- Where eyewashes are required by OSHA due to specific eye hazards, they will be in compliance with ANSI STD.Z-358.1-2004 or later. Where not specifically required by OSHA, eyewash bottles will be maintained with the first aid kit in the site vehicles.

12.26 FIRE PREVENTION PLAN

In order to prevent fire from occurring, every step will be taken to keep the site neat and clean. All equipment and materials not in use will be put away in designated locations. There will be trash cans with lids at the site, which will be emptied on a daily basis to keep trash from accumulating. All flammable

liquids will be stored in approved flammable liquid cans in order to prevent spillage and ignition of the material. Bonding and grounding procedures will be in place when transferring flammable liquids from their designated containers and into equipment. Equipment will never be fueled in the back of a pick-up truck containing a bed liner. Personnel handling explosive and/or flammable materials will wear cotton under and outer garments to prevent build-up and transfer of static electricity.

12.26.1 FIRE PROTECTION

Portable fire extinguishers are rated and classified with NUMERAL and LETTER designations, based on fire tests conducted by the Underwriters Laboratories, Inc. or other nationally recognized testing laboratories. The numeral rating indicates the relative extinguishing effectiveness of extinguishers classified for Class A and B fires only. The Letter classified coincides with the Class of Fire. Extinguishers found to be effective on more than one Class of fire have multiple Letter classifications (Example: B:C).

The rating of hand-portable fire extinguishers is based on the following:

- Class A fire extinguisher is used for ordinary combustible materials
- Class B fire extinguisher is for flammable liquids
- Class C fire extinguisher is for electrical fires
- Class D fire extinguisher is for combustible metal fires

Many fires are small at origin and may be extinguished by the use of proper hand-portable fire extinguishers. It is strongly recommended that the fire department be notified as soon as a fire is discovered. This alarm should not be delayed awaiting result of application of portable fire extinguishers.

Fire extinguishers can represent an important segment of any overall fire protection program. However, their successful functioning depends upon meeting the following conditions:

- The extinguisher is properly located and in working order
- The extinguisher is of proper type for a fire, which may occur
- The fire is discovered while still small enough for the extinguisher to be effective
- The fire is discovered by a person ready, willing, and able to use the extinguisher

Class A fires can be readily extinguished by quenching-cooling with water or a water-mixture agent. Class B fires are more effectively extinguished by an agent that blankets-smothers the fire through exclusion of oxygen surrounding the fire area. Those extinguishers containing bromochlorodifluoromethane, monobromotrifluoromethane, carbon dioxide, or dry chemical are generally best suited for extinguishing Class B fires. For Class C fires, the primary consideration in extinguishing this type of fire is the selection of nonconductive extinguishing agent to prevent dangerous electrical shock and possible death to user.

Water or water-mixture type extinguishing agent must not be used under any circumstances on energized electrical equipment (Class C) fires. When possible, electrical equipment and circuits should be de-energized before attacking a Class C fire. Due to its corrosive nature, dry chemical is not recommended for use on computerized, electronic, or other equipment with extensive circuitry.

13.0 CONTRACTOR INFORMATION

USAE is the prime contractor on this project. This APP and attached SHSP is based on USAE procedures. The project subcontractor, CH2MHILL, will be required to comply with all site requirements

and will attend the initial mobilization training, which will describe the work to be performed, and all safety and health requirements regarding that work. They will also be required to attend the daily tailgate safety briefings, which will go over the operations expected to take place that day. CH2MHILL will also attend any special safety meetings that are taking place for the duration of their operations on the site.

14.0 SITE-SPECIFIC HAZARDS AND CONTROLS

Site-specific hazards and controls are detailed in the Activity Hazard Analyses for each activity of the operation. These can be found in Attachment 2. The specific activities on this site are as follows:

- Geophysical Prove–Out Test Strip
- Location Surveying and Mapping
- Site Investigation
- Quality Control
- Vegetation Removal
- Soil Sampling

14.1 SAFETY HAZARDS

Due to the nature of planned site operations, the potential risk for exposure to safety hazards is high. Anticipated safety hazards, which may be encountered during site activities, and precautions to be followed are listed below and in individual Activity Hazard Analyses.

14.1.1 SLIPS, TRIPS, AND FALL HAZARDS

This project covers the Waikane Valley Training Area within the Marine Corps Base Hawaii. This area has greatly differing elevations due to the volcanic surface, creating steep hillsides, some of which are heavily covered in vegetation. This type of uneven surface creates a slip, trip and fall hazard for personnel walking in the area. Site personnel shall be instructed to make themselves aware of foot placement at all times to avoid slips, trips, and falls. The use of sturdy leather work boots with ankle support and non-slip soles will reduce the risk of slips, trips, and falls.

14.1.2 CUTS/LACERATION HAZARDS

Although this is a MEC avoidance operation, there are plenty of opportunities for cuts and lacerations from working around heavy vegetation, as well as in vegetation clearance operations. Personnel will be instructed to wear leather work gloves during site operations involving vegetation removal and heavy vegetation areas to prevent injury to hands.

14.1.3 HAND TOOL OPERATION

Use of improper or defective tools can contribute significantly to the occurrence of accidents on site. Therefore, the safe work practices listed below shall be observed when using hand tools:

- Hand tools will be inspected for defects prior to each use.
- Defective hand tools will be removed from service and repaired or discarded.
- Tools will be selected and used in the manner for which they were designed.
- Be sure of footing and grip before using any tool.
- Do not use tools that have split handles, mushroom heads, worn jaws, or other defects.

- Gloves will be worn whenever they increase gripping ability or if cut, laceration, or puncture hazards may exist during the use of hand tools.
- Safety glasses with side shields, goggles, or a face shield will be used if tool use presents an eye/face hazard.
- Do not use makeshift tools or other improper tools.
- Use non-sparking tools where there are explosive vapors, gases, or residue.

14.1.4 MATERIAL LIFTING

Many types of objects are handled in normal day to day operations. Care shall be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably.
- A firm grip on the object is essential; therefore, the hands and object shall be free of oil, grease, and water, which might prevent a firm grip.
- The hands and especially the fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and gloves shall be used, if necessary, to protect the hands.
- The feet shall be placed far enough apart for good balance and stability.
- Personnel will ensure that solid footing is available prior to lifting the object.
- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.
- To lift the object, the legs are straightened from their bending position.
- Never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting, with the back kept straight, the legs bent at the knees and the object lowered.
- If the item to be lifted is too large, bulky, or heavy for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, use the equipment instead of trying to lift it yourself.
- When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

14.2 MUNITIONS AND EXPLOSIVES OF CONCERN

MEC may be present and located during site activities. UXO qualified personnel will follow the requirements of the USAE Safety Program, and the Basic Safety Concepts and Considerations for Ordnance and Explosives Operations, which outline the safety and health precautions to be taken if MEC are encountered and/or destroyed. All non-UXO qualified personnel will follow the safe work practices listed below:

- Non-UXO qualified personnel will receive site-specific MEC recognition training prior to participation in site activities.

- No soil penetrating activities will be allowed without the area first being cleared by UXO qualified personnel.
- Non-UXO qualified personnel will be escorted on site by UXO qualified personnel, until such time as the area is cleared.
- Once an area has been cleared and flagged, non-UXO qualified personnel may perform duties in the area unescorted, but shall not leave the cleared area unescorted.
- Non-UXO qualified personnel will not touch or disturb any object which could potentially be MEC related, and will immediately notify the nearest UXO qualified person of the presence of the object.
- In order to protect other personnel and the general public, an EZ will be set up at a distance of 200 feet all around the project footprint area of the project where work is occurring. This represents the separation distance of a non-intrusive, MEC avoidance operation. MEC located on the site will be flagged and avoided. USAE will have control of the entrance to the project area until the area has been cleared. Should personnel not associated with the project operations need to enter the EZ, it will be coordinated with the SUXOS and they will be escorted at all times. All MEC operations will halt for the duration of time the person is within the EZ. Once they have departed the area, MEC operations may resume.

14.3 CHEMICAL HAZARDS

The only anticipated chemical hazards, which would be expected during site activities, are those fuels and oils brought on site for equipment use and maintenance. All site personnel will follow the procedures and precautions outlined in the appropriate MSDS. The MSDS binder will be kept in the SUXOS site vehicle and will be available to all employees on request. Chemical Warfare Materiel (CWM) is not expected to be found on this site.

14.4 PHYSICAL HAZARDS

For the planned site activities to be conducted, the potential for exposure to physical hazards is high for this project. The physical hazards that may be encountered during site operations and precautions to be taken are listed below.

14.4.1 FLAMMABLE/EXPLOSIVE HAZARDS FROM FUELING EQUIPMENT AND SITE VEHICLES

The chance of fire and/or explosion during vehicle and equipment refueling and maintenance is high when improper procedures are used. All site vehicles will be equipped with a portable fire extinguisher readily available to fight a fire. Equipment will never be refueled on the back of a pick-up truck with a bed liner. Cellular phones will not be used around Flammable Liquids in accordance with Ordnance and Explosives Safety Group Safety Advisory 03-2003. Grounding and bonding procedures will be used during all fueling operations. No smoking will be permitted in the vicinity (within 50 feet) of fueling operations, and flammable and combustible materials will be removed from the vicinity of fueling operations.

14.4.2 NOISE HAZARDS

Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table 14-1, as measured on the A scale of a standard sound level meter at slow response. When employees are subjected to sound exceeding those listed in Table 14-1, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound to a safe level, personal protective equipment shall be provided and used to reduce sound exceeding protective levels. If the variations in noise level involve maximal intervals of 1 second or less, it is to be considered continuous.

Table 14-1: Permissible Noise Exposures

PERMISSIBLE NOISE EXPOSURES (1)	
Duration per Day, (Hours)	**Sound level dBA (Slow Response)**
8.00	90
6.00	92
4.00	95
3.00	97
2.00	100
1.50	102
1.00	105
0.50	110
0.25	115
Footnote (1). When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: C1./T1. + C2./T2. C(n)/T(n) exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C(n) indicates the total time of exposure at a specified noise level, and T(n) indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level	

USAE shall make hearing protection available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater. Hearing protection shall be replaced as necessary. Hearing protection will be required for all personnel working in and around any operations likely to produce high noise levels, such as during the use of chain saws and weed-eaters used for vegetation clearance operations.

14.5 HEAT STRESS

Heat stress is one of the most common (and potentially serious) illnesses that affect hazardous waste site workers. When site personnel are engaged in operations involving hot environments and/or the use of semi- or impermeable clothing, a number of physiological responses can occur which may seriously affect the health and safety of the workers. These affects can be eliminated or controlled through the use of a comprehensive heat stress prevention and monitoring program. Therefore, it is the objective of this program to outline the methods and procedures by USAE personnel for the prevention, control and/or treatment of heat related illnesses.

14.5.1 CAUSES OF HEAT STRESS

The most common cause of heat stress during site activities is the affect that PPE has on the body's natural cooling mechanism. Impermeable PPE interferes with the evaporation of perspiration and causes the body to retain metabolic and environmentally induced heat. Individuals will vary in their susceptibility and degree of response to the stress induced by increased body heat. Heat stress can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors including environmental condition, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at hazardous waste sites, regular monitoring and other preventive precautions are vital.

Factors which may predispose a worker to heat stress include:

- Lack of physical fitness.
- Lack of acclimatization to hot environments.
- Degree of hydration.

- Level of obesity.
- Current health status (i.e., having an infection, chronic disease, diarrhea, etc.).
- Alcohol or drug use.
- The worker's age and sex.
- Sunburn.

Reduced work tolerance and the increased risk of excessive heat stress is directly influenced by the amount and type of PPE worn. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Therefore, when selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increasing the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the:

- Anticipated work rate.
- Ambient temperature and other environmental factors.
- Type of protective ensemble.
- Individual worker characteristics and fitness.

Prior to initiating site activities each day, and periodically throughout the day, the UXOSO will inspect the site personnel for evidence of the previously mentioned factors to determine those personnel who are at increased risk for heat stress related disorders. Evidence of extreme dehydration, illness or drug or alcohol use may require the UXOSO to restrict the worker's activities until such time as the worker is fit for duty. Personnel identified as being at high risk for heat stress who are allowed to participate in site operations will be monitored frequently by the UXOSO throughout the day.

14.5.2 HEAT STRESS DISORDERS

This Section outlines the major heat related illnesses that may result from exposure to high heat environments and/or the use of semi- or impermeable clothing. For the purpose of this Program, reference to "liquids" will indicate the use of water or an electrolyte replacement solution, and not tea or coffee (unless it is decaffeinated) or carbonated soft drinks.

14.5.2.1 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet, chafing clothes. This condition can decrease a worker's ability to tolerate hot environments.

Symptoms: Mild red rash, especially in areas of the body that sweat heavily.

Treatment: Decrease amount of time in protective gear and provide powder such as corn starch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into day clothes if needed.

14.5.2.2 Heat Cramps

Heat cramps are caused by a profuse rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen and extremities.

Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Consult with physician if condition does not improve. If available, an electrolyte replacement solution should be taken along with liquids.

14.5.2.3 Heat Exhaustion

Heat exhaustion is a state of very definite weakness or exhaustion caused by increased stress on various organs to meet increased demands to cool the body due to excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

Symptoms: Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated.

Treatment: Use passive and active cooling. Orally administer cool water and/or electrolyte replacement liquids immediately, to hydrate the victim, starting with small sips and continuing with larger amounts as the victim is able to hold it down. Total liquid consumption should be about 1 to 2 gallons per day. Transfer to a medical facility if symptoms do not subside, or become more severe.

14.5.2.4 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the heat regulating mechanisms of the body. The failure of the individual's temperature control system causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises very rapidly to a point (105+°F) where brain damage and death will result if the person is not cooled quickly.

Symptoms: The victim's skin is hot and may or may not be red and dry (due to the fact that the individual may still be wet from having sweat while wearing protective clothing earlier); nausea; dizziness; confusion; extremely high body temperatures; rapid respiratory and pulse rate; delirium; convulsions; unconsciousness or coma.

Treatment*: Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. The victim should be moved to a shady area; lie down and keep the head elevated. Passive and active cooling should be used. If conscious, orally administer cool water and/or electrolyte replacement liquids immediately to hydrate the victim, starting with small sips and increasing amounts as the victim is able to hold it down. Rapidly transfer the victim to an emergency medical facility for immersion in cool water. Do not give the victim caffeinated or alcoholic beverages. Heat stroke is considered a medical emergency.*

14.5.3 Preventive Measures

14.5.2.5 Required Preventive Measures

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat exhaustion, that person may become predisposed to additional heat injuries. In order to avoid heat related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need. These preventive measures represent the minimal steps to be taken and will include the following procedures:

The UXOSO will examine each site worker prior to start of daily operations to determine the individuals susceptible to heat induced stress. Workers exhibiting factors that make them susceptible to heat stress will be closely monitored by the UXOSO.

Site workers will be trained to recognize and treat heat-related illnesses. This training will include the signs, symptoms and treatment of heat stress disorders as outlined in this Program.

In order to maintain workers' body fluids at normal levels, workers will be encouraged to drink, as a minimum, approximately sixteen ounces of liquids prior to start of work in the morning, after lunch and prior to leaving the site at the conclusion of the day's activities. Disposable four (4) to twelve (12) ounce cups and liquids will be provided on site. Acceptable liquids will include water and an electrolyte replacement solution. It is recommended that the water to balanced electrolyte liquids be taken at a 2:1 ratio with the intake of water being twice the intake of the balanced electrolyte liquids. Liquids containing caffeine are to be avoided.

When ambient conditions and site workload requirements dictate, as determined by the UXOSO, workers will be required to drink a minimum of sixteen (16) to thirty-two (32) ounces of liquids during each rest cycle. The normal thirst mechanism is not sensitive enough to ensure that enough water will be ingested to replace lost sweat. When heavy sweating occurs, workers should be encouraged to drink even though they may not be thirsty. The following strategies may useful in encouraging fluid intake:

- Maintain water temperature at 50 ºF to 60 ºF (10 ºC to 15.6 ºC).
- Provide small disposable cups that hold about 4 ounces (0.1 liter).
- Have workers drink 16 ounces (0.5) liters) of fluids (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- A shelter or shaded area will be provided where workers may be protected from direct sunlight during rest periods.

Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat induced stress. Monitoring will be conducted in accordance with applicable paragraphs of this Program.

Site workers will be given time to acclimatize to site work conditions, temperature, protective clothing, and workload. Acclimatization usually takes about a week to 10 days of continued work in hot environments, and allows the worker's body to become adjusted to this level and type of work. This process involves a gradual increase in the workload over the required period, the length of which depends upon the nature of the work performed, the ambient temperatures, the level of PPE required for the job, and the individual's susceptibility to heat stress.

Work schedules will be adjusted as follows:

- Modify work/rest schedules according to monitoring requirements.
- Mandate work slowdowns as needed.
- Rotate personnel: alternate job functions to minimize overstress or overexertion at one task.
- Add additional personnel to work teams.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.

14.5.2.6 Supplemental Preventive Measures

When possible and/or feasible, the following measures will also be implemented to aid in prevention or reduction of the affects of heat induced stress:

- Designated rest areas should be air-conditioned and the temperature maintained between 72 °F and 76 °F.
- Cooling devices will be provided to aid in body heat exchange. Cooling devices may include cooling jackets, vests or suits and field showers or hose-down areas. Depending on the severity of the heat exposure some form of artificial cooling may be required to ensure protection of the workers.
- Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person will have: less physiological strain; a lower heart rate and body temperature; and a more efficient sweating mechanism.

14.5.3 HEAT STRESS MONITORING

Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, should be monitored. Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see Table 14-2). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress. If the actual clothing worn differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly.

When site personnel are engaged in site activities involving the use of semi-permeable or impermeable clothing in ambient temperatures greater than 70°F, physiological monitoring will be conducted. The goal of all heat stress monitoring is to ensure that the worker's body temperature does not exceed 100.4°F. The physiological monitoring methods listed below are to be implemented based upon the severity of the heat and workload. As a minimum, the UXOSO will monitor the worker's heart rate as an indication of potential heat stress. However, if monitoring with the heart rate method indicates the need for closer, more direct monitoring, the oral temperature method will be implemented. The need for monitoring body water loss will be determined by the UXOSO, and will be based upon observation of the sweat loss experienced by site personnel during their work cycle. The frequency of physiological monitoring will be determined using the information presented in Table 14-2.

For monitoring the body's recuperative ability toward excess heat, both of the following techniques should be used as a screening mechanism unless the UXOSO modifies the procedures and documents the log. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70°F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates to baseline (pre-work) levels are indicated.

14.5.3.1 Heart Rate Monitoring

The worker's baseline heart rate should be recorded prior to initiation of site activities by measuring the radial pulse rate for thirty seconds. After each work cycle, the heart rate should be measured by taking the pulse rate (PR) for 30 seconds and multiplying that number by 2 as early as possible into the resting period. Taking the radial (wrist) pulse rate is the preferred method, however the carotid (neck) pulse rate

may be taken if a worker has difficulty finding the radial pulse. The PR at the beginning of the rest period should not exceed one hundred and ten (110) beats per minute (bpm). If the PR is higher than 110 bpm, the next work period should be shortened by thirty-three percent, while the length of the rest period stays the same. If the PR exceeds 110 bpm at the beginning of the next rest period, the work cycle should be further shortened by thirty-three percent. This procedure will be continued until the worker's PR at the beginning of the rest cycle is maintained below 110 bpm.

14.5.3.2 Oral Temperature Monitoring

If deemed necessary by the UXOSO, and the conditions warrant, oral temperature (OT) monitoring will be conducted. The worker's OT will be taken and recorded prior to initiation of site activities using a clinical thermometer placed under the tongue. The OT must be taken prior to consumption of cool liquids and will be done at the end of each work period or at a frequency determined by Table 14-3. Whenever the OT exceeds 99.6°F, the work cycle must be shortened by one third, without changing the length of the rest period. If a worker's OT has exceeded 99.6°F, test the OT again at the end of the rest cycle, and do not allow the worker to return to work until the OT drops below 99.6°F. If a worker's OT exceeds 100.4°F the worker will not be allowed to work in impermeable or semi-permeable PPE for the remainder of that workday.

14.5.3.3 Body Weight Loss

If expected site conditions and work requirements have the potential for causing excessive fluid loss, the UXOSO will monitor the workers' fluid loss by weighing each worker prior to and again at the conclusion of each day's site activities. This will be needed to ensure that proper hydration is being maintained and that the total amount of water weight loss throughout the day does not exceed 1.5% of the employee's body weight. Body weights will be taken with the workers wearing undergarments only. If, as determined by the UXOSO, site conditions and work requirements cause an extreme amount of fluid loss, body weights will also be taken prior to the lunch break. Calculation of the water weight loss, and assessing the effectiveness of hydration shall be conducted as follows:

Once the ending weight is obtained subtract it (W_{end}) from the daily starting weight (W_{start}) to obtain the weight lost (W_{lost}) during a given work period, i.e.,: (W_{start}) - (W_{end}) = (W_{lost}).

Multiply the starting weight by 1.5% to obtain permissible weight loss (W_{perm}), i.e.,:

(W_{start}) x 0.015 = (W_{perm}).

Compare (W_{lost}) to the (W_{perm}), if (W_{lost}) is less than or equal to (W_{perm}), then hydration during the measured period has been adequate, but if (W_{lost}) is greater than (W_{perm}), then hydration should be increased during the next work period.

14.5.3.4 Wet Bulb, Dry Globe Temperature (WBGT) Monitoring

For site conditions where personnel are working in Level D PPE, and the ambient temperature is greater than 75°F, the UXOSO will conduct WBGT monitoring to assist in controlling the potential for site workers experiencing heat related adverse health affects. The UXOSO will use a real-time direct reading WBGT monitor, and after estimating the work load, use the values expressed in Table 14-3, to determine the work/rest schedule to be implemented. The values outlined in this table are designed such that nearly all acclimatized, fully clothed workers with adequate salt and water intake will be able to function without the body temperature exceeding 100.4°F. If conditions and/or work loads warrant, the UXOSO may also implement the OT and water weight loss monitoring.

Acclimatization is the adaptive process that results in a decrease of the physiological response produced by the application of a constant environmental stress. On initial exposure to a hot environment, there is an impaired ability to work and evidence of physiological strain. If the exposure is repeated on several successive days, there is a gradual return of the ability to work and a decrease in physiological strain. Within 4 to 7 days following initiation of the acclimatization process, a dramatic improvement in the ability to perform work is noticed: subjective discomfort practically disappears; body temperature and heart rate are lower; there is a more stable blood pressure; and the sweat is more profuse and dilute.

Alcohol should not be consumed in a hot environment because the loss of body fluids increases the risk of heat stress.

14.5.4 HEAT STRESS DOCUMENTATION

The UXOSO will be responsible for recording all heat stress related information. This will include training sessions, monitoring data. Training sessions will be documented using the Documentation of Training form. Pulse rate monitoring data will be recorded on the Heat Stress Monitoring Log (see Safety Forms in Attachment 7), with the WBGT, OT and/or water loss calculations being recorded in the Site Safety Log, and/or Site Monitoring Log.

Table 14-2: Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers

ADJUSTED TEMPERATURE[b]	NORMAL WORK ENSEMBLE[c]	IMPERMEABLE ENSEMBLE
90 °F (32.2 °C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90 °F (30.8°- 32.2 °C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5 °F (28.1°-28.1 °C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5 °F (25.3°-28.1 °C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5 °F (22.5°-25.3 °C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour.

[b] Calculate the adjusted air temperature (at adj) by using this equation: at adj °F = ta °F + (13 x % sunshine). Measure air temperature (at) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

Table 14-3: Permissible WBGT Heat Exposure Threshold Limit Values

Work - Rest Regimen	WORK LOAD		
	Light*	Moderate	Heavy
Continuous work	86 (30.0)	80 (26.7)	77 (25.0)
75% Work - 25% Rest, each hour	87 (30.6)	82 (28.0)	78 (25.9)
50% Work - 50% Rest, each hour	89 (31.4)	85 (29.4)	82 (27.9)
25% Work - 75% Rest, each hour	90 (32.2)	88 (31.1)	86 (30.0)

* Consult the ACGIH TLV booklet for definitions of Light, Moderate and Heavy work loads.

Values are given in ^{0}F and (^{0}C) WBGT, and are intended for workers wearing single layer summer type clothing. Use of semi or totally impermeable clothing require monitoring IAW the USAE Heat Stress Prevention Program. As workload increases, the heat stress impact on an unacclimatized worker is exacerbated. For unacclimatized workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 2.5^{0}C.

14.6 IONIZING RADIATION HAZARDS

Ionizing radiation is not expected to be an issue on this project site.

15.0 BIOLOGICAL HAZARDS

Biological hazards, which are usually found on site, include hazardous plants, bees, spiders, and parasites. Employee awareness and the safe work practices outlined in the following paragraphs should reduce the risk associated with these hazards.

15.1 BEES, HORNETS, AND WASPS

Contact with stinging insects like bees, hornets, and wasps may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to being life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in remote wooded or grassy areas.
- The nests can be situated in trees, rocks, and bushes or in the ground, and are usually difficult to see.
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active.
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention.
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock.

- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages.
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure, therefore even if someone has been stung previously, and not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

With these things in mind, and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp, or hornet stings, he must inform the UXOSO of this condition prior to participation in site activities.
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the UXOSO if a stinging insect nest is located or suspected in the area.
- Any nests located on site will be flagged off and site personnel will be notified of its presence.
- If stung, site personnel will immediately report to the UXOSO to obtain first aid treatment and to allow the UXOSO to observe them for signs of allergic reaction. If a breathing emergency (anaphylactic shock) occurs as a result of the sting, immediately call 911.
- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times, and will let the UXOSO and co-workers know where it is kept.

15.2 SPIDERS

A large variety of spiders may be encountered during site activities. While most spider bites merely cause localized pain, swelling, reddening and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological effects caused by their venom, are dangerous. These species include the black widow and the brown or violin spiders.

The black widow is a coal-black bulbous spider about ¾-inch in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite.
- Appearance of small punctures (but sometimes none are visible).
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils, and generalized swelling of face and extremities.

The brown or violin spider is brownish to tan in color, rather flat, about 5/8-inch long with a dark brown “violin” shape on the top. Of the brown spider, there are three varieties found in the United States, which present a problem to site personnel. These are the brown recluse, the desert violin and the Arizona violin. These spiders may be found in a variety of locations including trees, rocks or in dark locations. Victims of a brown or violin spider bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, postulating lesion with a bull’s-eye appearance.

- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting.
- Pain may become severe after 8 hours, with the onset of tissue necrosis.

There is no effective first aid treatment for either of these bites. Except for very young, very old or weak victims, these spider bites are not considered to be life threatening; however, medical treatment must be sought to reduce the extent of damage caused by the injected toxins. If either of these spiders are suspected or known to be on site, the UXOSO will brief site personnel as to the identification and avoidance of the spiders. As with stinging insects, site personnel shall report to the UXOSO if they locate either of these spiders on site or notice any type of bite while involved in site activities.

15.3 PARASITES

Parasites are known to exist in fresh water lakes and streams in Hawaii. They can enter the system through drinking or swimming in the water and can cause stomach and intestinal distress. It is recommended that personnel working on this site not engage in swimming in fresh-water lakes and streams in the area. It is also recommended that personnel not drink water that has not been processed for drinking.

15.4 ANIMALS

15.4.1 FERAL DOGS

Feral dogs like other canids are most active from dusk to dawn and travel in packs. Feral dogs usually do not fear humans and may display aggressive behavior during encounters with people. Do not approach or attempt to interact with any wild animals on the project site. Do not run unless you are sure you can escape as this will trigger the dog's hunting instinct, remain facing the animals and slowly retreat. Feral dogs may carry numerous pathogens that can be transmitted to humans including, tetanus, rabies, and tapeworms. If bitten, clean the wounds and seek immediate medical treatment.

15.4.2 FERAL PIGS

Feral pigs are found throughout Hawaii to include the project site. Feral pigs normally feed in the early morning and late afternoon, but in cooler weather, may be seen feeding at any time of day. Feral pigs are not generally aggressive but may charge if cornered. Feral pigs carry infectious diseases that can be transmitted to humans, among them are rabies and swine brucellosis. Symptoms of swine brucellosis include malaise, loss of appetite, myalgia, depression and intermittent fever.

15.5 HAZARDOUS PLANTS

During the conduct of site activities the number and variety of hazardous plants that may be encountered is large and extensive. The ailments associated with these plants range from mild hay fever to contact dermatitis, to carcinogenic affects. However the plants which present the greatest degree of risk to site personnel (i.e. potential for contact vs. affect produced) are those which produce, skin and tissue injury and skin reactions.

15.5.1 PLANTS CAUSING SKIN AND TISSUE INJURY

Contact with splinters, thorns and sharp leaf edges is of special concern to site personnel, as is the contact with the pointed surfaces found on branches, limbs and small trunks left by site clearing and grubbing crews. This concern stems from the fact that punctures, cuts and even minor scrapes caused by accidental contact may result in non-infectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. This is especially important in light of the fact that the warm moist environment created inside impermeable protective clothing is ideal for the propagation of fungal and bacterial

infection. Personnel receiving any of the injuries listed above, even minor scrapes will report immediately to the UXOSO for initial and continued observation and care of the injury.

15.5.2 PLANTS CAUSING SKIN REACTIONS

A number of plants are found in Hawaii cause skin reactions, among them are the mango tree and the elephant ear. The sap from the mango tree contains toxins related to poison ivy and poison oak. Individuals sensitive to poison ivy or poison oak may have a reaction to the mango leaves and the fruit's skin. Repeated exposures to the mango increases the reaction, so sensitive individuals should avoid contact.

The elephant ear is related to the taro plant and grows in wet, muddy conditions near streams and rivers. The plants' leaves grow to 4 feet and contain calcium oxalate crystals, tiny sharp needles inside the plant cells that irritate the skin. Crushing the leaves or stalk will cause a burning rash where the crystals embed in the skin.

The allergic reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact.
- Reddening, swelling, itching and burning at the site of contact.
- Pain, if the reaction is severe.
- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin.

If the rash is scratched, secondary infections can occur. The rash usually disappears in 1 to 2 weeks in cases of mild exposure and up to 3 weeks when exposure is severe. Preventive measures, which can prove effective for most site personnel, are:

- Avoid contact with any poisonous plants on site, and keep a steady watch to identify, report and mark poisonous plants found on site.
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each workday.
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing.
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventive solution.
- Keeping the skin covered as much as possible (i.e., long pants and long sleeved shirts) in areas where these plants are known to exist will limit much of the potential exposure.

16.0 LOGS, RECORD KEEPING, AND REPORTS

USAE will perform and document safety inspections, as well as maintain a site visitor log. Personnel records will be kept on site, which document medical surveillance and appropriate training certifications. In addition, accident reports and site monitoring reports will also be maintained on site. All site logs, documents, and records will be included in the final report.

16.1 SAFETY INSPECTION LOGS

The UXOSO will perform and document daily and weekly safety inspections of all site operations on a scheduled and non-scheduled basis. The UXOSO will conduct non-scheduled safety and health

inspections as deemed appropriate, based upon the ongoing site activities. Scheduled safety and health inspections will be conducted as outlined in Table 16-1. When discrepancies are observed, follow-up will be documented in the UXOSO log until the corrective actions required have been completed.

Table 16-1: Inspection Type and Frequency

AREA	FREQUENCY
Sanitation	Daily
Medical and First Aid	Daily
Temporary Facilities	Weekly
Personal Protective and Safety Equipment	Daily
Hazardous Substances, Agents, and Environments	Weekly
Lighting	Monthly
Accident Prevention Signs, Tags, Labels, and Signals and Piping System Identification	Monthly
Fire Prevention and Protection	Weekly
Hand and Power Tools	Daily, if applicable
Material Handling, Storage and Disposal	Weekly
Machinery and Mechanized Equipment	Daily, if applicable
Motor Vehicles	Daily
Safe Access and Fall Protection	Weekly, if applicable
HTRW	Daily, if applicable

16.2 VISITOR LOG

The Visitor's Log will be maintained by the UXOSO and will document the visitor's name, company name, date, time, and reason for visit. There will also be documentation that the visitor was given a safety briefing prior to being permitted to enter the EZ of the site. Visitors will be escorted by UXO personnel at all times within the EZ. MEC operations will cease while visitors are within the EZ.

16.3 RECORD KEEPING

Each person on the site will have an individual file folder, which contains a copy of the following:

- 40-hr HAZWOPER Certificate;
- Current 8-hr HAZWOPER Annual Refresher Certificate;
- 8-hr HAZWOPER Supervisor Certificate, if applicable;
- EOD Training Certificate; and
- Any other applicable training certificates.

Personnel folders will be maintained by the UXOSO on site for the duration of site activities. A Training/Tailgate Safety Record will be completed for all on-site daily training. The UXOSO will maintain the file, which will be made available for the client as requested.

16.4 MEDICAL SURVEILLANCE RECORDS AND CERTIFICATIONS

A copy of the Physician Statement from a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, regarding the current annual HAZWOPER physical examination, will be maintained in the personnel folder with the HAZWOPER certificates. The Physician Statements will remain in the individual's file on the project site for the duration of site operations. The files will then be transferred to the Corporate Office in Oldsmar, FL at the end of site operations.

16.5 ACCIDENT REPORTING RECORDS

Should an accident occur on the site, all reports and records will be documented. Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the Oldsmar, FL office.

16.6 SITE MONITORING RESULTS

All site monitoring results will be documented. This will be kept in a file at the project site for reference, and will become a part of the permanent site record at the conclusion of site activities. At this site, heat exposure monitoring is the only monitoring anticipated which is dependent upon the site temperature and wind speed.

16.7 FINAL REPORT

USAE will develop, retain and submit as part of the final report, all visitor registration logs, training logs, and daily safety inspection logs as part of the daily QC reports.

APPENDIX E - ATTACHMENT 1: OSHA FORMS

E-1.0 OSHA FORMS

This attachment contains the following USAE Occupational Safety and Health Administration (OSHA) forms for the Site Inspection at the Waikane Valley Training Area

- OSHA's Form 300 – Log of Work-Related Injuries and Illnesses
- OSHA's Form 300A – Summary of Work-Related and Illnesses

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OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 2005

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name: USA Environmental, Inc.

City: Tampa State: Florida

Identify the person				Describe the case		Classify the case												
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	**CHECK ONLY ONE** box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
						Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M) Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
								Job transfer or restriction	Other record-able cases								
						(G)	(H)	(I)	(J)	(K)		(1)	(2)	(3)	(4)	(5)	(6)
5-001	Charity R. Fizzell	A/P Clerk	8/30/05	Accounting Office, Tampa, FL.	Tendonitis, R. Wrist				X			X					
5-002	Kristen L. Burton	UXOT I	9/21/05	Lowery B.R., Denver, CO.	Tendonitis, R. Arm and Wrist			X				X					
					Page totals	***0***	***0***	***1***	***1***	***0***	***0***	***2***	***0***	***0***	***0***	***0***	***0***

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Page 1 of 1

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 2005

U.S. Department of Labor
Occupational Safety and Health Administration
Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	1	1
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	2	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Establishment information

Your establishment name USA Environmental, Inc.

Street 5802 Benjamin Center Drive, Suite 101

City Tampa State Florida Zip 33634

Industry description (e.g., Manufacture of motor truck trailers)
Environmental Management Services

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
8 7 4 4

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 6 2 9 1 0

Employment information

Annual average number of employees 132

Total hours worked by all employees last year 287,664

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

John Q. Adams
Company executive

Vice President
Title

(813) 884-5722
Phone

1-Feb-06
Date

APPENDIX E - ATTACHMENT 2

E-2.0 AHA FORMS

This attachment contains the following Activity Hazard Analysis sheets:

- Establish Instrument Test Strip
- Location, Survey and Mapping
- Detector Aided Non-Intrusive Survey
- Quality Control Inspection
- Soil Sampling
- Vegetation Removal.

Activity Hazard Analysis (AHA)

Instrument Test Strip

Activity: Establish Instrument Test Strip (ITS)	**Date: January 10, 2008**
	Project: Site Inspection of Waikane Valley Training Area, Kaneohe, HI
Description of the work: Emplace inert ordnance items or simulants at various depths and attitudes in the Geophysical Prove-out Test Strip	**Prepared By: Cheryl Riordan, CSP**
	Analyzed by Robert Crownover
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Using geophysical equipment, the UXOQCS will locate a plot of land where an ITS can be prepared and assure there are no buried anomalies in the area. • Using inert ordnance or other items that would give off a similar signature, the UXOQCS will bury these items at differing depths and directions throughout the ITS. • The UXOQCS will prepare a map of the ITS showing all of the buried items. • Each day, prior to use of geophysical equipment, each person will test the equipment on the ITS. • If the geophysical equipment is able to locate all buried items in the ITS, it will be used for work that day. If the geophysical equipment is not able to locate all buried items in the ITS, it will be removed from service until repairs can be made. Another piece of equipment will be tried until one is found that can detect all buried items in the GPO Test Strip.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments, using shovels. • Heat stress • Biological hazards - bees, wasps, parasites, feral dogs, feral pigs and hazardous plants. • Cuts and abrasions from handling rocks or buried debris during burial of inert ordnance.	• On-site MEC training. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance. • PPE – leather work gloves. • Wear light weight long sleeved shirts and long pants.

Activity Hazard Analysis (AHA)

Instrument Test Strip

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE (to include leather gloves). • First aid kit. • Fire extinguishers. • WBGT monitor.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • On site MEC training. • Site-specific training, slip/fall hazards. • Site-specific training/lifting techniques. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE Training. • All site personnel will have current HAZWOPER training.
HAZWOPER = Hazardous Waste Operations and Emergency Response PPE = Personal Protective Equipment UXOQCS = UXO Quality Control Specialist		

Instrument Test Strip

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UXOSO Name:			**Date/Time:**
Employee Name(s):			**Date/Time:**
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Activity Hazard Analysis (AHA)

Location, Survey and Mapping

Activity: Location, Survey and Mapping	**Date: January 10, 2008**
	Project: Site Inspection of Waikane Valley Training Area, Kaneohe, HI
Description of the work: Locate Various Range Boundaries and Establish Site Grid System for Conducting Site Inspection.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: Robert Crownover
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• UXO personnel will accompany survey team to site. • UXO personnel will lead team into area and will clear the path of entry into the site. If MEC is encountered, path will be routed around it. • If live MEC is encountered, the area will be marked and photographed. • Where intrusive operations, such as driving stakes, are required UXO personnel, using geophysical equipment, will determine if there are potential MEC beneath the ground surface. • If potential MEC is located below the ground surface, the area for the intrusive operations will be moved. • When clear area is located, the stakes will be driven. • Location data will be prepared and submitted at completion of work.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat Stress • Biological hazards - bees, wasps, parasites, feral dogs, feral pigs, and hazardous plants.	• On-site MEC training. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance. • Wear light weight long sleeved shirts and long pants.

Activity Hazard Analysis (AHA)

Location, Survey and Mapping

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE to include leather gloves, safety glasses or goggles. • First aid kit. • Fire extinguishers. • WBGT monitor.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly,	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training, slip/fall hazards. • Site-specific training/lifting techniques. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE training. • Current HAZWOPER Training.

EOD = Explosive Ordnance Disposal
HAZWOPER = Hazardous Waste Operations and Emergency Response
MEC = Munitions and Explosives of Concern
PPE = Personal Protective Equipment
UXO = Unexploded Ordnance

Activity Hazard Analysis (AHA)

Location, Survey and Mapping

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Activity Hazard Analysis (AHA)

Detector Aided Non-Intrusive Survey

Activity: Detector Aided Non-Intrusive Survey	**Date: January 10, 2008**
	Project: Site Investigation, Waikane Valley Training Area, Kaneohe, HI
Description of the work: Employ approved techniques and methods during investigation of MEC/UXO contamination of site.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: Robert Crownover
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Locate anomalies using geophysical equipment as well as visual survey. • In areas where vegetation is too dense to accurately perform survey, vegetation clearance operations will be performed in accordance with established procedures. • Surface MEC will be identified using pin flags, GPS coordinates or other identification, and photographs. This is an MEC avoidance operation, so at no time will physical contact be made with MEC. • Search for indication of MEC releases, identify pertinent site features, confirm/refine the boundaries of the site, and identify or confirm areas of concern.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat Stress • Biological hazards – bees, wasps, parasites, feral dogs, feral pigs and hazardous plants. • Unauthorized personnel entering site during operations. • Noise hazards. • Cuts/lacerations hazards	• On-site MEC Training. • Establish 200 foot exclusion zone around project site. • Establish 200 foot separation distance between teams. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance; PPE • Site control measures will be implemented (fencing, barricades, signage) and exclusion zone established. • PPE for noise and cuts/lacerations. Tools and equipment will be used in the manner in which it was designed to be used. • Chainsaw engines will be started and stopped when all co-workers are clear of the saw. • Chainsaws will be properly supported when in use. • Operator will shut off saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel. • Saw can be carried with the engine idling for short distances (less than 50 feet) as long as it is carried to prevent contact with the chain or muffler. • Chopping tools with loose or cracked heads or

		splintered handles will not be used. • Chopping tools shall not be driven as wedges or used to drive metal wedges.

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Vegetation clearance equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional) • Communications equipment. • Appropriate clothing and PPE to include safety glasses or goggles, leather gloves. Hearing protection, hard hat, face shield, and leg chaps will be worn during vegetation clearance operations. • Barricades and signage. • First aid kit. • Fire extinguishers. • WBGT monitor.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training on slip, trip and fall hazards. • Site-specific training/lifting techniques. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • All site personnel will have current HAZWOPER training.

Activity Hazard Analysis (AHA)

Detector Aided Non-Intrusive Survey

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Activity Hazard Analysis (AHA)

QC Inspection

Activity: Quality Control Inspection.	**Date: January 10, 2008**
	Project: Site Inspection, Waikane Valley Training Area, Kaneohe, HI
Description of the work: Inspect work performance of project personnel and task at project site.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: Robert Crownover
	Review for latest use: Each time before the job is performed.

Task Breakdown	Identify & Analyze the Hazards	Identify Hazard Controls
• Inspection of Project Documentation, Site Conditions, Work Performance and Operations. • Inspection of Material and Packaging of Containers. • Inspection of Completed Project Documentation.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Muscle strain carrying instruments • Heat Stress • Biological hazards – bees, wasps, parasites, feral dogs, feral pigs, and hazardous plants. • Unauthorized personnel entering site during operations • Cuts, lacerations, eye and face hazards due to vegetation removal operations. • Noise due to vegetation clearance operations.	• On-site MEC Training. MEC avoidance will be practiced. • Post barriers and barricades as necessary prior to commencing operations and maintain positive site control. • MEC items will not be handled if encountered. • Wear the appropriate PPE for the task being performed. • Keep personnel to a minimum during operations. • Ensure required site documentation is on hand. • Ensure logs, briefings, reports and forms are completed in a timely and accurate manner. • Use and enforce the buddy system. • Ensure 1st. Aid Kits and Fire Extinguishers are in place. • No smoking, except in designated areas. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance; PPE. • Observe all MEC safety precautions, and follow safe work practices. • Be alert. Cease operations if unsafe conditions arise. • Identify safety/hazardous zones of operations. • Review or inspect all site generated documents for accuracy and deliverability.

QC Inspection

		• Ensure concerned parties receive copies of documents pertaining to their activities. • Ensure contract deliverables have been met.

Equipment to be used	Inspection Requirements	Training Requirements
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional) • Communications equipment. • Appropriate clothing and PPE to include leather gloves, safety glasses or goggles. Hard hats, face shields, hearing protection and leg chaps for vegetation removal operations. • Barricades and signage. • First aid kit. • Fire extinguishers. • WBGT monitor.	**The UXOQCS** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use. • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly.	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training on slip, trip and fall hazards. • Site-specific training/lifting techniques. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE training. • All site personnel will have current HAZWOPER training.

QC Inspection

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Activity Hazard Analysis (AHA)

Soil Sampling

Activity: Soil Sampling	**Date: January 10, 2008**
	Project: Site Inspection of Waikane Valley Training Area, Kaneohe, HI
Description of the work: Perform Soil Sampling for Munitions Constituents	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: Robert Crownover
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• UXO personnel will accompany sampling team to site. • UXO personnel will lead sampling team into area and will clear the path of entry into the site. If MEC is encountered, path will be routed around it. • If live MEC is encountered, the area will be marked and photographed. • When sampling team selects location to take sample, UXO personnel, using geophysical equipment, will determine if there are potential MEC beneath the ground surface. • If potential MEC is located below the ground surface, the area for the soil sampling will be moved. • When area that is free of anomalies is located, the soil samples will be taken • In accordance with EPA requirements, soil samples will be collected with clean, stainless steel implements, labeled as to sample number, location, date, time and person taking sample, and the samples will be sent to a certified laboratory for analysis.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Muscle strains carrying instruments. • Heat Stress • Biological hazards - bees, wasps, parasites feral dogs, feral pigs, and hazardous plants.	• On-site MEC training. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Follow appropriate lifting/ carrying procedures. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance. • Wear light weight long sleeved shirts and long pants.

Activity Hazard Analysis (AHA)

Soil Sampling

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Appropriate geophysical equipment. • Footwear with ankle support and non-slip soles (no steel toes around magnetometers). • Back braces (optional). • Communications equipment. • Appropriate clothing and PPE to include leather gloves, safety glasses or goggles. • First aid kit. • Fire extinguishers. • WBGT monitor.	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly,	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training, slip/fall hazards. • Site-specific training/lifting techniques. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • PPE training. • Current HAZWOPER Training.

EOD = Explosive Ordnance Disposal
HAZWOPER = Hazardous Waste Operations and Emergency Response
MEC = Munitions and Explosives of Concern
PPE = Personal Protective Equipment
UXO = Unexploded Ordnance

Activity Hazard Analysis (AHA)

Soil Sampling

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SUXOS Name:			**Date/Time:**
UXOSO Name:			**Date/Time:**
Employee Name(s):			**Date/Time:**
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Activity Hazard Analysis (AHA)

Vegetation Removal

Activity: Vegetation Removal	**Date: January 10, 2008**
	Project: Site Investigation, Waikane Valley Training Area, Kaneohe, HI
Description of the work: Conduct a vegetation removal (as needed) to facilitate a safe and effective MEC avoidance site investigation.	**Prepared By: Cheryl Riordan, CSP**
	Analyzed By: Robert Crownover
	Review for latest use: Each time before the job is performed.

PRINCIPLE STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
• Lanes will be established throughout the footprint of the site. • UXO personnel will walk down each lane while performing magnetometer assisted visual survey. • If there are areas where dense vegetation prevents a good reading on potential MEC contamination in the area, vegetation removal will be conducted as needed. • Vegetation is extremely dense in some areas; vegetation clearing will be required using gasoline-powered weed eaters, chain saws, etc. • If live MEC is encountered, the area will be marked, identified and photographed.	• MEC hazards • Uneven working surfaces – slip, trip, fall hazards. • Heat Stress • Biological hazards - bees, wasps, feral dogs, feral pigs, parasites and hazardous plants. • Muscle strain carrying instruments/equipment. • Lacerations and cuts from vegetation clearing equipment. • Eye/face injuries due to use of vegetation clearing equipment. • Noise	• On-site MEC training. • Maintain 200 foot team separation distance. • Be observant while walking. Use sturdy leather work boots with ankle support and non-slip soles. • Heat stress monitoring, drinking water, work-rest schedule, and cool shelter for breaks. • Training in biological hazards avoidance. • Follow appropriate lifting/ carrying procedures. • PPE – hard hat, face shield, safety glasses, hearing protection, leather gloves and leg chaps during vegetation clearance operations. • Wear long sleeved shirts and long pants. • Tools and equipment will be used in the manner in which it was designed to be used. • Chainsaw engines will be started and stopped when all co-workers are clear of the saw. • Chainsaws will be properly supported when in use. • Operator will shut off saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel. • Saw can be carried with the engine idling for short distances (less than 50 feet) as long as it is carried to prevent contact with the chain or muffler. • Chopping tools with loose or cracked heads or splintered handles will not be used. • Chopping tools shall not be driven as wedges or used to drive metal wedges.

Activity Hazard Analysis (AHA)

Vegetation Removal

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Geophysical equipment. • Vegetation removal equipment: weed eaters, chain saws, etc. • Footwear with ankle support and non-slip soles (No steel toes around magnetometers). • Back braces, optional. • Communications equipment. • Appropriate clothing and PPE to include protective eyewear, leather gloves, hard hat, face shield, hearing protection, and leg chaps. • First aid kit. • Fire extinguishers • WBGT monitor	**Team Leader/UXOSO** will assure that all controls are being followed; all equipment is being utilized and that all personnel have received appropriate training. • Equipment inspected daily prior to use. • PPE inspected daily prior to use • Communications equipment checked daily prior to use. • First aid kits checked daily and inspected weekly. • Fire extinguishers checked daily and inspected weekly,	• UXO personnel will meet training and experience requirements outlined in DDESB TP 18. • Site-specific MEC training will be presented to all site personnel. • Site-specific training, slip/fall hazards. • Heat Stress symptoms/first aid. • Site-specific flora/fauna to include first aid. • Training in proper lifting techniques. • Training in use of equipment. • Noise prevention training • PPE training. • All site personnel will have current HAZWOPER training.

EOD = Explosive Ordnance Disposal
HAZWOPER = Hazardous Waste Operations and Emergency Response
MEC = Munitions and Explosives of Concern
PPE = Personal Protective Equipment
UXO = Unexploded Ordnance

Activity Hazard Analysis (AHA)

Vegetation Removal

	PRINT	SIGNATURE	
SUXOS Name:			**Date/Time:**
UXOSO Name:			**Date/Time:**
Employee Name(s):			**Date/Time:**
			Date/Time:
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APPENDIX E - ATTACHMENT 3: DIRECTIONS TO THE HOSPITAL

This attachment contains a map and directions to the Castle Medical Center, located at 640 Ulukahiki Street, Kailua, HI. The emergency room phone number is (808) 263-5164. The outpatient clinic phone number is (808) 263-5174.

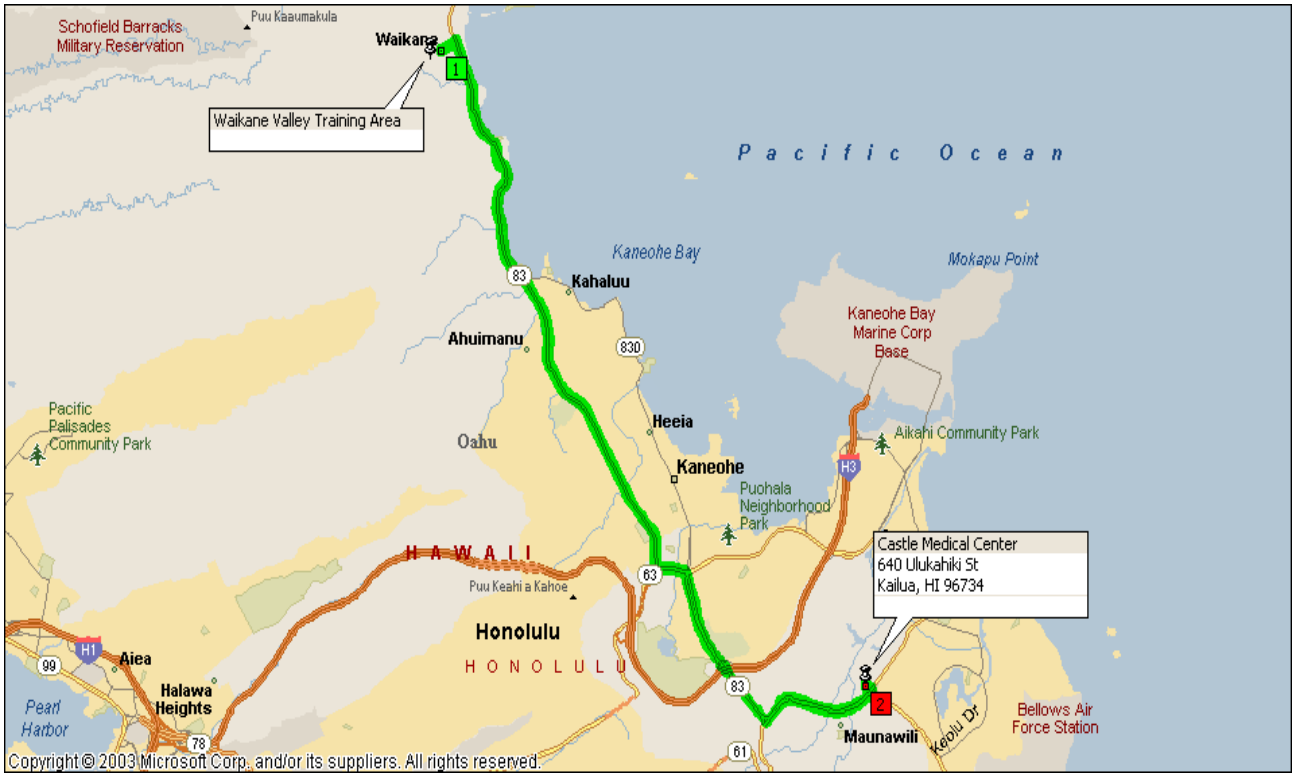


FIGURE 1: HOSPITAL ROUTE

Mile	Instruction	For
0.0	**Depart Waikane on Local road(s) (East)**	**0.2 mi**
0.2	Turn RIGHT (South) onto SR-83 [Kamehameha Hwy]	8.0 mi
8.2	Road name changes to Local road(s)	21 yds
8.2	Turn LEFT (East) onto SR-83 [Likelike Hwy]	0.4 mi
8.7	Take Local road(s) (RIGHT) onto SR-83 [Kamehameha Hwy]	2.4 mi
11.1	Road name changes to Local road(s)	21 yds
11.1	Turn LEFT (North-East) onto SR-61 [Kalanianaole Hwy]	1.8 mi
12.9	Turn LEFT (West) onto Local road(s)	21 yds
12.9	Keep STRAIGHT onto Ulukahiki St	142 yds
13.0	**Arrive Castle Medical Center [640 Ulukahiki St, Kailua, HI 96734]**	

APPENDIX E - ATTACHMENT 4

E-4.0 SITE HEALTH AND SAFETY PLAN

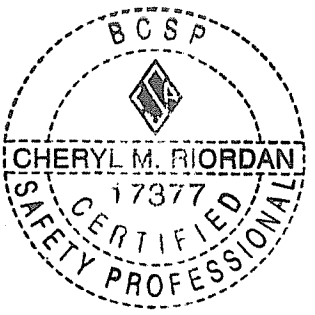
This attachment contains the Site Health and Safety Plan.

SITE HEALTH AND SAFETY PLAN
MUNITIONS RESPONSE SITES
WAIKANE VALLEY TRAINING AREA, HAWAII

Plan approval:

Cheryl M. Riordan Date: 5/14/08

Cheryl M. Riordan,
Certified Safety Professional
USA Environmental, Inc.
(813) 343-6412



Plan concurrence:

Robert D. Crownover Date: 5-14-08

Robert Crownover
Corporate Safety and Health Manager
USA Environmental, Inc.
(813) 343-6364

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ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
°F	Degrees Fahrenheit
DoD	Department of Defense
EM	Engineer Manual
EOD	Explosive Ordnance Disposal
EZ	Exclusion Zone
GPO	Geophysical Prove-Out
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
MSD	Minimum Separation Distance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PPE	Personal Protective Equipment
RG-01	Rifle Grenade Range - 01
SOW	Statement of Work
SUXOS	Senior Unexploded Ordnance Supervisor
SZ	Support Zone
USAE	USA Environmental, Incorporated
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

1.0 INTRODUCTION

This Site Health and Safety Plan (SHSP) establishes the responsibilities, requirements and procedures for protecting the project personnel and the surrounding community from the hazards associated with the Site Inspection (SI) of Waikane Valley Training Area at Kaneohe, Hawaii. This Contract Task Order requires the inspection and data collection for this training area.

The SI is the on-site investigation to determine whether there is a release or potential release and the nature of associated threats. Its purpose is to augment the data collected in the PA and to generate, if necessary, sampling and other field data to determine if further response action or remedial investigation is appropriate. The SI shall consist of a visual and detector-aided field inspection focusing on identifying surface evidence of MEC contamination using, as a basis, available information from the Preliminary Assessment (PA), Archive Search Reports, and other existing information previously collected. This information shall be used to delineate boundaries, collect broad site information, and assess the risk/hazard posed by any Munitions and Explosives of Concern (MEC) found at the site in order to support the final recommendations. Extensive soil sampling will also take place in order to determine extent of soil contamination from MEC.

1.1 SITE DESCRIPTION

The site is located in the Waiahole and Waikane Valley on Oahu's windward side (Kaneohe, HI) approximately 10 miles Northwest of Kaneohe Bay. The area had been used for jungle training, field maneuvers and an air-to-ground bombing range. It was later used for maneuvers, tactical problems and small arms, artillery and mortar firing. The lease ended in 1976 and the land was mostly turned back to the original owners. A parcel of 187 acres remains as government property and is fenced due to it being deemed improbably that it can be cleared of all ordnance contamination. Of the 187 acres, this project will involve approximately 20 acres. The land is a rain forest, with thick vegetation and steep terrain.

1.2 CONTAMINANT CHARACTERISTICS

Based on past usage of the site, it in expected to contain heavy concentrations of MEC contamination, particularly small arms, artillery and mortar rounds. The purpose of this SI is to determine the extent of MEC contamination. This will include extensive soil sampling to determine if explosive constituents have migrated into the soil.

2.0 HEALTH AND SAFETY HAZARD ASSESSMENT

An Activity Hazard Analysis (AHA) has been conducted and documented for each activity warranted by the hazards associated with the activity (see Attachment 2 for the site specific AHAs). The following activity hazard analyses have been prepared for all anticipated field operations:

- Geophysical Prove-Out Test Strip
- Location Surveying and Mapping
- Detector Aided Non-Intrusive Survey
- Quality Control
- Vegetation Removal
- Soil Sampling

Should conditions, equipment, or types of operations change during the course of the project work, the Corporate Safety and Health Manager will update an existing AHA for continuing work, or prepare a new

AHA for new operations. Work on this project site will not involve moving or handling MEC. This is a MEC avoidance operation. The site exclusion zone (EZ) will be based on a minimum separation distance (MSD) of 200 feet around the footprint of the site operations for the protection of the general public. This separation distance will also be established between UXO teams to protect individual operating units in the event of an accidental detonation while site operations are underway. The MSD of 200 feet is in accordance with Engineer Manual (EM) 1110-1-4009, Engineering and Design Ordnance and Explosives Response, 23 June 2000; United States Army Corps of Engineers (USACE) regulations; and the Memorandum on the Determination of Appropriate Safety Distances on Ordnance and Explosives (OE) Project Sites, OE Center of Expertise (CX) Interim Guidance Document 00-01.

Risk management is and will continue to be integrated into the planning, preparation, and execution of all operations at the Waikane Valley Training Area site. Risk management is a dynamic process, and is continuously improved upon as personnel become more familiar with the site operations, equipment, and environment. Site personnel are trained to continuously identify hazards and assess accident risks. Once identified, these hazards will be brought to the attention of the Team Leader or UXO Safety Officer (UXOSO). Control measures will be developed and coordinated by USAE safety personnel. All site personnel are responsible for continuous assessment of variable hazards and the implementation of risk controls.

2.1 HAZARD MITIGATION

The hazards listed above will be addressed through a combination of training, engineering controls, and personal protective equipment (PPE).

2.1.1 IMPLEMENTATION OF ENGINEERING CONTROLS AND WORK PRACTICES

Training in site procedures and the use of site equipment can prevent accidents from occurring. Training in recognition of MEC or MEC pieces that could be hazardous will be given to all site workers. When MEC or pieces of MEC are encountered, MEC avoidance will be practiced. Other controls include the MSD of 200 feet, which will provide protection of individual teams from nearby site operations, and will protect the general public from the hazards of site operations.

2.1.2 UPGRADES/DOWNGRADES IN LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

Due to the types of hazards at this site, Level D PPE will be required. This type of PPE is used for levels of contamination that may present a nuisance, but not an identifiable hazard. Level D PPE consists of a hard hat, leg chaps, face shield, safety glasses, hearing protection, leather work gloves, and leather work boots. The hard hat, leg chaps and face shield will only be worn in the vicinity of vegetation clearance operations. If site hazards are encountered that require additional PPE, the PPE level can be increased by the Corporate Safety and Health Manager, who would base the decision on documented evidence of the hazards. If the site is not as hazardous as originally anticipated, the level of PPE can be downgraded by the Corporate Safety and Health Manager. This decision would also be based on definitive data that confirms the PPE can be lessened. Normally, downgrading of PPE would require at least one week's worth of data demonstrating that the site is not as hazardous as originally suspected.

2.1.3 WORK STOPPAGE

All personnel are trained to be constantly aware of their work environment. Anyone has the ability to stop operations for safety reasons. No worker is expected to perform any operation for which he has not been properly trained, or to perform any operation that is considered to be unsafe. After operations are stopped for safety reasons, the UXOSO will be notified and will evaluate the situation. The UXOSO will, in consultation with the Corporate Safety and Health Manager, determine what steps need to be taken to make the situation safe for operations to continue.

2.1.4 EMERGENCY EVACUATION

In the event of an emergency that requires evacuation of the site, verbal instruction will be given by the UXOSO to evacuate the area. Personnel will exit the area to the pre-designated assembly point. After evacuation, the UXOSO will account for all personnel, ascertain information about the emergency and advise responding on-site personnel. The UXOSO will contact, advise, and coordinate with responding off-site emergency personnel if deemed necessary by the situation.

In all situations that require evacuation, personnel shall not re-enter the work area until:

- The conditions causing the emergency have been corrected;
- The hazard has been reassessed;
- The Site Specific Health and Safety Plan has been revised and reviewed with on-site personnel, if needed; and
- Instructions have been given for authorized re-entry by the UXOSO.

2.1.5 PREVENTION AND/OR MINIMIZATION OF PUBLIC EXPOSURE TO HAZARDS CREATED BY SITE ACTIVITIES

The creation of an EZ of 200 feet between the site footprint and the general public, acts as a safety buffer to protect the public from site hazards. Controlling access to the site, closing roads, and installing signs and barricades are all means of keeping the general public from accidentally wandering into the site during operations. In addition, the training of all site workers in the hazards and recognition of MEC will reduce the potential for public exposure to hazards. Any worker observing MEC or pieces of MEC will not touch or handle it in any way. This is a MEC avoidance project. If unauthorized personnel are observed in the EZ, all MEC operations will cease until the area is cleared of unauthorized personnel.

3.0 SAFETY STAFF

See Section 3 of the Accident Prevention Plan.

4.0 HEALTH AND SAFETY STAFF ORGANIZATION AND RESPONSIBILITIES

See Section 3 of the Accident Prevention Plan

5.0 SITE-SPECIFIC TRAINING

See Section 5 of the Accident Prevention Plan.

6.0 SITE-SPECIFIC MEDICAL SURVEILLANCE

Medical surveillance of USAE employees will be conducted in accordance with the requirements of the Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120(f), 29 CFR 1910.134(b)(10) and other established guidelines. Personnel to be included in the Medical Surveillance Program will be those who perform hazardous waste operations that may potentially expose the worker to hazardous substances or other significant safety and health threats. All USAE personnel on the project site will participate in the USAE Medical Surveillance Program. Visitors desiring entry into the EZ must participate in their employer's Medical Surveillance Program and must have a current physician's statement prior to entry.

6.1 BASELINE HEALTH ASSESSMENT PHYSICAL OR ANNUAL PHYSICAL

A baseline health assessment physical or annual physical will be conducted prior to participating in site operations, to determine the worker's ability to perform hazardous waste operations in a safe and healthful manner. The Project Manager, in conjunction with the Program Occupational Safety Manager (POSM), will ensure that all health assessments address the site specific health hazards to which workers may be exposed.

Physicals will be scheduled through the POSM, who will contract the services of a board certified occupational medicine physician in the vicinity of the employee's home or job site. The designated physician will perform the medical assessments and review medical examination results to determine each worker's ability to perform his assigned hazardous waste duties. The physician will also be responsible for determining if supplemental or follow-up examinations are required, and for maintaining medical and exposure records in accordance with OSHA 29 CFR 1910.120(d).

The purpose of the Medical Surveillance Program is to:

- Assess the individual's health status prior to participation in hazardous waste operations;
- Determine the individual's ability to perform work assignments that require the use of PPE;
- Establish baseline data for comparison to future medical data in order to provide a means of monitoring a worker's health status;
- Establish facilities and procedures for emergency and non-emergency medical treatment; and
- Establish procedures for maintenance and storage of medical and exposure records.

The USAE medical surveillance program examination consists of:

- Medical and occupational history questionnaire, which includes information on past gastrointestinal, hematological, renal, cardiovascular, reproductive, immunological, and neuralgic problems;
- Information and history of respiratory disease and personal smoking habits;
- Physical examination;
- Blood pressure measurements;
- Complete blood count and differential to include hemoglobin and hematocrit determinations, red cell indices, and smear of peripheral morphology;
- Blood urea nitrogen and serum creatinine;
- SMAC 24;
- Chest x-ray;
- Pulmonary function test;
- Audiogram;
- Echocardiogram for employees over 45 years old, or when other complications indicate the necessity;
- Drug (HR Panel 10) and alcohol screening; and
- Visual acuity.

The following information is provided to the examining physician:

- Description of the employee's duties;
- Anticipated hazardous exposure and levels;
- Description of the PPE commonly used; and
- Information from previous medical exams.

The medical surveillance provided to the employees includes a judgment by the medical examiner of the ability of the employee to use either positive or negative pressure respiratory equipment in accordance with 29 CFR 1910.134. Any employee found to have a medical condition that could directly or indirectly be aggravated by exposure to chemical substances or by the use of respiratory equipment will not be employed for the project requiring clearance under the Respiratory Protection Program. A copy of the medical examination is provided at the employee's request.

The employee will be informed of any medical conditions that would result in work restriction or that would prevent them from working at hazardous waste sites.

Contractors will certify that all their employees have successfully completed a physical examination by a qualified occupational health physician and will supply certification of medical clearance for each on-site employee.

6.2 PHYSICIAN'S STATEMENT

The results of this examination will be made available to the employee and a written physician's statement will be sent to USAE. A copy of the physician's statement will be kept in each employee's file at the project site for the duration of site operations. The physician's statement will include the following:

- The physician's opinion regarding any conditions that would place the employee at an increased risk from working in hazardous waste operations;
- The physician's recommended limitations upon the employee's assigned work, if any; and
- A statement that the employee has been informed by the physician of the results of the examination, and any conditions that may require further examination or treatment.

6.3 SUPPLEMENTAL EXAMINATION

Any site worker who has: been injured; received health impairment; developed signs or symptoms from possible over-exposure; or received a documented over-exposure without the use of respiratory protection, will undergo a supplemental examination. The contents of this examination will be based upon the type of injury, illness, signs or symptoms of exposure involved and will be determined by the physician. Prior to reassignment to site activities, the physician will certify that the employee is fit to return to work. If necessary, the physician will specify in writing any activity restrictions or additional tests that may be required.

6.4 FOLLOW-UP HEALTH ASSESSMENTS

If, during any pre-assignment, annual or supplemental examination, a condition is detected that requires follow-up tests, the physician will notify USAE and the employee as to the nature of the follow-up health assessment. The physician will determine the schedule and content of the follow-up health assessment. A statement outlining the employee's fitness for work will be provided to USAE and the employee upon conclusion of the follow-up health assessment.

6.5 EMERGENCY AND NON-EMERGENCY MEDICAL TREATMENT

USAE will have an Emergency Medical Technician (EMT) assigned to the site as well as a minimum of two site workers certified in First Aid/CPR. The EMT, with assistance as needed from the First Aid/CPR certified workers will act as the first responders on site in the event of an accident or injury. They will provide emergency first aid services until professional medical personnel arrive on site to take over the treatment. The EMT will take care of all first aid and non-serious injuries to site personnel and will inform the UXOSO when such injuries occur. For serious injuries, the medical treatment facility for use at this project site will be the Castle Medical Center at 640 Ulukahiki Street, Kailua, HI. For map and directions to Castle Medical Center, please refer to paragraph 12.2.9.1 in the Accident Prevention Plan.

6.6 MEDICAL RESTRICTION

Should an occupational injury or illness occur that restricts an employee's ability to function at full capacity, USAE maintains a policy of providing these employees with restricted duty assignments whenever possible to allow them to continue to be productive.

6.7 RECORD KEEPING

USAE will retain and maintain copies of all physician statements, exposure records, and associated information for USAE employees involved in hazardous waste operations, in accordance with the requirements of 29 CFR 1910.120(f). These records will be kept at the project site for the duration of site operations. When the site work is complete, the records will be retained by USAE at the Corporate Office located in Oldsmar, FL. Examining physicians will be responsible for maintaining records related to laboratory analyses and other tests for each USAE employee examined. All records, whether maintained by USAE or by the examining physician, will be kept on file for a period of 30 years beyond an employee's termination.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The Personal Protective Equipment Program for USAE is described in the Personal Protective Equipment section of the Accident Prevention Plan (APP). Due to the expected hazards at this site during most operations, Level D PPE will be required. Level D PPE is a work uniform affording minimal protection, used for nuisance contamination only. The following Level D equipment will be required on this site:

- Hard hat;
- Face shield – when working around vegetation removal equipment;
- Leather gloves;
- Safety glasses with side shields or safety goggles;
- Hearing protection, where required by high noise levels, in the vicinity of vegetation clearance operations;
- Leather work boots with ankle support and non-slip soles;
- Cotton work clothes;
- Back supports (optional); and
- Leg chaps – when working around vegetation removal equipment.

8.0 MONITORING AND SAMPLING PLANS

Chemical monitoring will not be required as no significant exposure to hazardous chemicals at this site is expected. Soil sampling will be conducted on the site in order to determine the extent of soil contamination from munitions constituents. Chain of Custody requirements will be applicable to soil sampling on this site. While personnel performing vegetation removal operations will be provided with hearing protection, noise monitoring may also be conducted. If the noise exposure level can be consistently demonstrated to be below the action level for noise, (i.e., at least one week of readings below 85 dBA) the Corporate Safety and Health Manager may decide to reduce this requirement based on monitoring results. Workers on this site will normally be in Level D PPE; however, heat stress monitoring will be required if the temperature goes above 75˚F. Should heat stress monitoring be required, site monitoring data will be recorded using the Site Monitoring Log and will be maintained as part of the project record.

8.1 SOIL MONITORING

Soil monitoring will be performed in order to determine the extent of soil contamination by munitions constituents. Prior to performing soil sampling, the area to be sampled will be surveyed by a UXO Technician with a magnetometer, in order to assure there is no buried MEC in the vicinity of where the sampling will occur. If potential buried MEC is detected, the sampling will be moved to another area where no anomalies are detected. In accordance with EPA requirements, all samples will be taken with clean, stainless steel implements, properly labeled and sealed and shipped to a certified laboratory for testing. Chain of Custody requirements will be strictly enforced and records will be maintained. The number of samples taken will depend upon the size of the sampling area and the amount of contamination detected. Enough samples will be taken to adequately characterize the extent of contamination by MEC constituents at each of the ranges.

8.2 HEAT STRESS MONITORING

Heat stress monitoring will be conducted using temperature readings, obtained from an on-site WBGT, in order to assure adequate work/rest cycles are determined and implemented at the site. When the temperature approaches 75˚F or above, heat stress monitoring is required. Monitoring will be performed by the UXOSO and results will be documented. The WBGT readings may also be supplemented by pulse rate monitoring, body temperature monitoring, and/or body fluid weight loss monitoring, at the discretion of the UXOSO, if he feels it is necessary to assure all site personnel are adequately acclimatized to the site conditions. All site monitoring records for heat stress will be maintained on site for the duration of site operations, after which they will become part of the official project files. Plenty of cold drinking water will be available on site to maintain hydration of site personnel.

8.3 METEOROLOGICAL MONITORING

Rain can constitute a safety hazard to field operations at this site. The UXOSO will be responsible for monitoring the weather closely. If the area becomes wet, muddy, or slippery such that an unacceptable level of risk exists for personnel who are working in proximity to MEC items, then site operations will cease until the UXOSO determines the area as safe to continue.

No site operations will take place if an electrical storm is within 10 miles of the site. An electrical storm monitor will be used to determine if an electrical storm is approaching. Site operations will cease when an electrical storm is within 10 miles of the site, and will not resume again until the UXOSO determines that the electrical storm is at least 10 miles away from the site. Personnel will evacuate the site to the pre-designated evacuation point and will await the determination by the UXOSO that it is safe to resume operations.

8.4 PERIMETER MONITORING

No perimeter monitoring of USAE operations will be required on this site.

9.0 HEALTH AND SAFETY WORK PRECAUTIONS AND PROCEDURES

Using common sense and following safe practices can reduce hazards. Personnel must keep the prudent guidelines listed below in mind when conducting field activities.

- Hazard assessment is a continuous process. Personnel must be aware of their surroundings and constantly be aware of MEC, chemical and physical hazards that are or may be present.
- The number of personnel in the EZ will be the minimum number necessary to perform work tasks in a safe and efficient manner.
- Team members will be familiar with the physical characteristics of each site including wind direction, site access, and the location of communication devices and safety/emergency equipment.
- Detection or appearance of unusual or unknown liquids, odors or discolored soil could indicate the presence of contaminants and should be reported to the UXOSO immediately.
- Site personnel are to report any other unusual or potentially hazardous condition to the UXOSO for investigation and/or corrective action.

9.1 SITE RULES/PROHIBITIONS

All personnel on site will be required to follow the safe work practices contained in this Plan, as they relate to the hazards encountered during site activities. All site personnel will be required to read, understand, and comply with the provisions of this SHSP. If new tasks or hazards are identified during site operations, which pose additional hazards, the SHSP will be amended by the POSM to include additional safe work practices and other control methods as needed.

9.1.1 SAFE PRACTICES

Safe practices can reduce hazards associated with normal site activities. Personnel must keep the prudent guidelines listed below in mind when conducting field activities. General personnel requirements include:

- Horseplay or fighting is prohibited.
- Eating, drinking, smoking, chewing gum, tobacco, or any other hand-to-face activities are prohibited on site, except in designated areas after both face and hands have been washed.
- Wearing contact lenses is prohibited in the EZ.
- When required to sit or kneel on the ground, avoid contaminated surfaces.
- Placing equipment on contaminated surfaces should be avoided.
- Climbing on or over obstacles is prohibited. Stacks of materials can be unstable and could cause injury.
- Open flames of any type are prohibited on site.
- Bringing defective or unsafe equipment on site is prohibited.

Only authorized employees may enter the work site. Visitors must check in with the UXOSO, receive an appropriate safety briefing, and be escorted by UXO-qualified personnel at all times while on site.

9.1.2 BUDDY SYSTEM

The buddy system is a safety practice in which each individual is concerned with the health and well being of co-workers. The buddy system will be implemented during all on-site activities and will be incorporated when workers may be isolated or as determined by the UXOSO. The UXOSO will assign "buddies" to ensure accounting of all site personnel. Additional procedures include:

- A minimum of two personnel, with one being a UXO-qualified person, will be present during all MEC operations to ensure that one person will always act as a safety observer. During all MEC operations, only the minimum number of personnel required to safely perform the task will be allowed on site. All other personnel will evacuate to a pre-designated assembly point.
- At no time will an individual desert his "buddy" unless his "buddy" goes down, and it is considered too hazardous to render assistance. "Buddies" will enter and exit the EZ together and frequently monitor one another for signs of fatigue, heat stress, and any other problems. In such cases, the worker in danger may not be aware he/she is having a problem. The "buddy" must always be alert to changes in the behavior of his "buddy" so that he can remove him/her from the situation immediately.
- "Buddies" should frequently inspect each other's equipment, including PPE, to ensure that it is adequate and in proper working order.

9.2 WORK PERMIT REQUIREMENTS

At this time USAE does not anticipate work permits for the work associated with this project. Under the Statement of Work (SOW) and activities anticipated for this project, there are no requirements for hot work, (welding). All site personnel will utilize the general fire safety precautions and procedures to eliminate the hazards from ignition sources. There are expected to be no confined spaces or radioactive work on this project. Should this situation change, this SHSP will be updated to include these additional hazards, and shall handle them in accordance with the USAE Corporate Safety and Health Program, which addresses all of these issues.

9.3 MATERIAL HANDLING PROCEDURES

Many types of objects are handled in normal day-to-day operations. Care will be taken and training will be provided to all personnel for lifting and handling heavy or bulky items, as this is the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape, and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably.
- A firm grip on the object is essential; therefore, the hands and object will be free of oil, grease, and water, which might prevent a firm grip.
- The hands, and especially the fingers, will be kept away from any points that may cause them to be pinched or crushed, especially when setting the object down.
- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces, and pinch points, and gloves will be used, if necessary, to protect the hands.
- The feet will be placed far enough apart for good balance and stability.

- Personnel will ensure that solid footing is available prior to lifting the object.
- When lifting, get as close to the load as possible, bend the legs at the knees, making sure that the back is kept as straight as possible.
- To lift the object, the legs are straightened from their bending position.
- Never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting, with the back kept straight, the legs bent at the knees, and the object lowered.
- If the item to be lifted is too large, bulky, or heavy (over 50 pounds) for one person to safely lift, ask a co-worker for assistance. If a piece of material handling equipment is available that can do the job, the employee should use the equipment instead of trying to lift the object himself/herself.
- When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, will face the direction in which the object is being carried.

9.4 SPILL CONTAINMENT

Major spills are not expected on this site. Hazardous materials, where necessary, are being brought to the site in small quantity containers. This will minimize the amount of material involved, should a spill occur, as well as reduce the amount of hazardous material on hand to the minimum amount consistent with efficient operations. If a small amount of liquid hazardous material is spilled, it will be cleaned up with absorbent material by site personnel wearing appropriate chemical resistant gloves. It will then be containerized, labeled, and sent for disposal at an approved facility.

9.5 DRUM, CONTAINER, AND TANK HANDLING

USAE does not anticipate the use of drums, containers, or tanks during activities under the SOW.

9.6 COMPREHENSIVE ACTIVITY HAZARD ANALYSIS OF TREATMENT TECHNOLOGIES

Treatment technologies are not expected to be used on this project. This is a MEC avoidance project.

9.7 MATERIAL SAFETY DATA SHEETS

The Material Safety Data Sheets are located in Attachment 6.

9.8 SUBCONTRACTOR CONTROL

See the “Subcontractors and Suppliers” section of the Accident Prevention Plan.

10.0 SITE CONTROL MEASURES

Site control measures are used to prevent or minimize the potential for site hazards. The site control measures as well as all requirements of this SHSP are mandatory for all personnel entering the EZ of this project site. Authorized government personnel will undergo the mobilization training along with all USAE personnel and any subcontractors who may be required to work on this site, which includes a briefing in all of the requirements of this SHSP. All personnel receiving this training must sign a statement that they were trained and fully understand the requirements of this SHSP.

10.1 SITE MAP

A site map (see Appendix 3 for detailed site maps) will be utilized by the UXOSO during the tailgate safety briefing to inform the workers of the location of hazardous areas on the site, the assembly areas to be used in the event of site evacuation, and any other information relevant to the day's activities. The site map will include:

- Site topography
- Site work zones
- Location of unusual/hazardous areas
- Prevailing winds
- Ingress and egress corridors
- Evacuation routes and assembly points
- Location of emergency supplies

10.2 WORK ZONE DELINEATION AND ACCESS POINTS

Site work zones will be established by the UXOSO prior to initiating operations to control site access. Establishment of site work zones is based upon site conditions, activities, and exposure potentials. A site EZ will be set up, which includes the footprint of the area where work will take place and a 200 foot separation distance around that to protect areas outside the site from potential site hazards. Within the EZ, operating teams will maintain a 200 foot MSD to protect the teams from each other's operations. Site work zones will be marked using barricades and signage closing roads into the area to unauthorized vehicular traffic. Barricades and signs will remain in place for the duration of site operations.

10.3 SITE ACCESS CONTROL

The UXOSO will control access to each work zone and will ensure that all site workers and visitors have received the proper training and medical surveillance required to enter a specific zone. Access will be denied to any potential entrant not meeting these requirements. The following work zones will be established at this site:

- Exclusion Zone (EZ) – Area where a significant hazard does or could occur and includes all areas where PPE is required to control worker exposure to chemical or physical hazards. All personnel entering the EZ will be logged in/out by the UXOSO. All visitors to the EZ must be escorted by a UXO-qualified USAE employee (normally this would be the UXOSO). The EZ of this site will be designated as the footprint area of actual project operations and the required separation distance of 200 feet surrounding the area. This separation distance is being used because this is a MEC avoidance project and any MEC on the site will not be disturbed. Entry into the project area where the work will be performed will be under the control of USAE. USAE will control use of the roads inside the project area where the work is taking place. When personnel who are not UXO qualified are required to enter within the exclusion zone, all UXO operations will cease until all unrelated personnel are outside of the exclusion zone.
- Support Zone (SZ) – Area outside the EZ where site support activities are conducted. This zone includes break areas and sanitation facilities. Visitors desiring entry into the EZ must first meet with the UXOSO and receive the appropriate safety and emergency procedures briefing in the SZ before gaining admittance to the EZ. In addition, visitors will be escorted at all times by a UXO-qualified employee while in the EZ.

Site access control will be implemented by USAE and will be accomplished through a program that limits movement and activities of people and equipment at the project site. This control will be based on site-specific characteristics to include:

- Potential chemical, biological, physical or explosive hazards;
- Terrain;
- Expected weather conditions;
- Planned site activities; and
- Site proximity to populated areas.

The degree of site access control will include the following:

- Controlled site ingress/egress points – Work area will be clearly visible to anyone approaching the site and vice versa. The access road leading into the area will be closed and barricaded. Signs will be posted to warn unauthorized personnel against entry into the area. Anyone entering the work area must clear access through USAE. Only authorized personnel will be permitted within the EZ during MEC operations. All others will remain in the SZ.
- Worker/visitor registration – All personnel working on the site sign in daily at the time of their daily safety briefing in the morning. All visitors to the site must sign the visitor log when they report to the site for their visitor briefing.
- Escort of visitors – All visitors to the site will be escorted by a UXO-qualified USAE employee. Visitors will be briefed on site hazards, PPE requirements, and emergency procedures. Visitors who are not UXO-qualified will not be permitted within the EZ during MEC operations. If visitors need to access the EZ, all MEC operations will cease while they are in the area, and the visitors will be escorted at all times.
- PPE requirements – PPE requirements have been established based on the site hazards. Personnel working in areas requiring PPE will wear required PPE for the duration of the operation. Visitors to the area will be required to have the required PPE for the area they will be visiting.

10.4 ON AND OFF-SITE COMMUNICATION SYSTEM

On-site communication will be conducted by voice or hand signals. If off-site communication is required, it will be established through the use of cellular telephones. The SUXOS and UXOSO will have cell phones available and all site vehicles will be equipped with a cell phone. The list of emergency telephone numbers will be posted in each site vehicle and with each cell phone.

11.0 PERSONNEL HYGIENE AND DECONTAMINATION FACILITIES AND PROCEDURES

Sanitation facilities will be provided in the support zone area so that employees can wash prior to eating, drinking, smoking, or engaging in any other hand-to-face activities. Chemical toilets will be available in the support zone of the work area. As chemical contamination is not expected to be an issue at this site, basic washing of equipment and standard hygiene practices are the minimum requirements. Site sanitation will be established and maintained in accordance with OSHA 29 CFR 1910.120(n) and USACE EM 385-1-1, Section 2. In particular:

- Temporary toilet facilities will be provided in the work areas of the site. Chemical toilets will be used in these locations and will be serviced every week. Each temporary toilet will be naturally lighted, have a toilet seat with a seat cover, have a urinal, have ventilation with vents screened,

and be lockable from the inside. There will be at least one toilet for every 15 workers at the work site, as required.

- Hand and face washing facilities will be set up at the USAE work site and will be utilized by all personnel exiting the EZ prior to eating, drinking, tobacco use, or other hand-to-face activities. Paper towels will be provided for drying. A trash receptacle will be provided for discarded paper towels. In accordance with ANSI Z358.1-1998, eye-wash facilities will be available on all work sites where operations involve handling substances that could be hazardous to the eyes. An eyewash kit will also be located in each site vehicle.

General work practices include the following:

- Safe work practices will be implemented when possible to eliminate or reduce the potential for employee exposure.
- Employees will wash their hands immediately or as soon as feasible after removal of gloves or other PPE.
- Employees will wash hands and any other skin with soap and water, or flush mucous membranes with water immediately following contact with blood or potentially infectious materials.
- If potentially contaminated sharps are encountered, the item will immediately be disposed of in an appropriate container or decontaminated.
- Eating, drinking, smoking, applying cosmetics or lip balm, handling of contact lenses, or storage/handling of food are prohibited in all areas where potentially infectious materials are present.
- Equipment that has become contaminated will be decontaminated prior to servicing or storage, unless decontamination is not feasible, in which case the equipment will be disposed of properly.

12.0 EQUIPMENT DECONTAMINATION FACILITIES AND PROCEDURES

Due to the fact that chemical contamination is not anticipated at this site, basic washing of equipment is all that will be required.

13.0 ON-SITE FIRST AID AND EMERGENCY PROCEDURES AND EQUIPMENT

An approved emergency first aid kit, blood-borne pathogen kit, CPR mask, stretcher, blankets, eye wash kits, trauma supplies, and basic emergency equipment will be kept in the EMT vehicle. First aid kits are assigned by the Safety Office and approved by the Occupational Health Physician. An EMT will serve as the first responder to any site emergency. Site personnel certified in First Aid/CPR may be requested to assist the EMT in responding to site emergencies. The UXOSO will be charged with providing regular inspections of the emergency supplies, replacing any items that are used, and maintaining readiness. Any emergencies will be reported immediately to the UXOSO, who will consult with the EMT to make the determination as to whether professional medical treatment is required. The UXOSO will call for an ambulance in case of a serious emergency, or he will drive the victim to the hospital for situations that are not life-threatening, but still require professional medical care.

Portable eyewashes will be located in the work area. Where eyewashes are required by OSHA due to specific eye hazards, they will be in compliance with ANSI STD.Z-358.1-2004 or later. Where not specifically required by OSHA, eyewash bottles will be maintained with the first aid kit in the site vehicles.

A 5-pound ABC fire extinguisher will be kept in each site vehicle for emergency use on site. This equipment will be inspected on a weekly basis to assure it is maintained and ready to use. Any used items will be replaced immediately.

Fire extinguishers will be stored where they are well marked and readily accessible. Fire extinguishers shall be protected from the damaging effects of environmental elements. The UXOSO is responsible for ensuring that all fire extinguishers are visually inspected monthly and that these inspections are documented. All site personnel will be familiar with the locations of fire extinguishers and will be trained in their use.

14.0 EMERGENCY RESPONSE PLAN AND CONTINGENCY PROCEDURES

The Emergency Response Plan and contingency procedures address emergencies that could occur during site operations, and outlines the appropriate response actions. This information can be found in "Emergency Response Plan and Contingency Procedures" under the "Plans, Programs and Procedures" Section of the APP.

15.0 EVACUATION PLAN

In the event of an emergency requiring evacuation, the evacuation signal will be given as an alarm or through verbal instructions. Personnel will evacuate to a pre-determined evacuation point in the support zone. The UXOSO will account for all personnel and will summon emergency response personnel, if required. If the Fire Department is summoned, the UXOSO will meet them upon their entrance to the site and will inform them of the presence of MEC, and provide the appropriate fragmentation distance from the fire for the purpose of fighting or preventing the spread of fire from the site.

Potentially hazardous weather conditions will be closely monitored by the UXOSO. The UXOSO will determine if high wind or heavy rain conditions pose a hazard to site operations, in which case, personnel will evacuate to the pre-determined evacuation point and will wait for conditions to clear or for further instructions from the UXOSO.

After the emergency situation has been controlled and eliminated, or has passed the Project Manager, UXOSO, and POSM will review the way the emergency was handled and change procedures if necessary.

After allowing the appropriate wait time (24 hours in the case of a fire), the SUXOS and the UXOSO will enter the site together and determine if the site is safe for re-entry. If MEC is encountered that may have been subjected to extreme temperatures in a fire, that MEC will not be disturbed and will be identified with pin flags. This will be coordinated with the customer, so they can decide to have their EOD unit dispose of such items.

16.0 LOGS, REPORTS, AND RECORD KEEPING

See the "Logs, Reports and Record Keeping" section of the APP.

17.0 ON-SITE WORK PLANS

The approved Work Plans will be maintained on site by the SUXOS, UXOSO, and UXOQCS, which include the Accident Prevention Plan/Site Specific Health and Safety Plan, the Explosive Safety Submission, and the Quality Control Plan. These plans will be fully implemented for the duration of site operations. If new hazards are encountered that are not fully addressed within these documents, the documents will be amended in accordance to the requirements of DoD 6055.9 and will be sent for approval through the same appropriate channels that approved the original plans.

18.0 COMMUNICATION PROCEDURES

On-site communication will be verbal. The site is small enough that where there is a need for groups to communicate with each other, they will be able to hear each other. There may also be an alarm signal used for the purposes of site evacuation.

Off-site communication and between-site communication will be by cellular telephone. Telephones will be available in each site vehicle and the list of emergency telephone numbers will be posted with the telephone.

19.0 SPILL CONTAINMENT PROCEDURES

Small quantity containers of chemicals will be used at the work site, which will minimize the amount of hazardous materials that could potentially become part of a spill should an accident occur. The majority of chemicals used will include oils and lubricants for use in vegetation clearance equipment. Spill clean-up kits will be available for use to clean up these chemicals and the impacted soils in the event a spill occurs. Chemical resistant gloves will be used during all cleanup activities. The spilled chemical and the contaminated soil will be cleaned up, placed in labeled plastic bags, and stored in drums or other secured location until such time as they can be removed from the site and sent to a certified disposition facility.

20.0 CONFINED SPACE PROCEDURES

Due to the nature of this SOW, confined spaces are not expected to be an issue on this site.

21.0 FIRE PROTECTION REQUIREMENTS

Through appropriate use and storage of flammable products, USAE intends to prevent fires as much as feasible during operations on this site. Should a fire occur, all site teams will have at least one ABC fire extinguisher with them during the course of operations. Fire extinguishers are the first line of defense should a fire start in this location. USAE personnel will be trained in the use of fire extinguishers and they will be instructed to try to fight a fire only in the incipient stages. If the fire is too large to fight, personnel will evacuate the site and the UXOSO will call in the Fire Department, who will stand no closer than fragmentation distance from the fire to fight or prevent spreading of the fire. If it is possible to safely do so, USAE will remove any flammable and/or combustible materials from the path of the fire.

After the fire has been extinguished, the area will be closely monitored by the UXOSO for a period of at least 1 hour for a small fire, to assure that re-ignition does not occur. For larger fires or explosions, a wait time of 24 hours will be given after the fire has been extinguished before anyone would be permitted to gain access to the site. At that point, the SUXOS and the UXOSO would enter the site together. If MEC is observed, it will be considered to be unstable due to exposure to extreme heat. The MEC will be marked with pin flags to identify it's location. This will be coordinated with the customer, so that the local EOD unit can blow it in place. After all visible MEC has been disposed of, it is considered safe for other personnel to enter the site for the purposes of site investigations. All personnel entering the site who are not UXO-qualified will be escorted by a UXO-qualified person for the duration of the site visit. If MEC is encountered while non UXO-qualified personnel are visiting the site, they will be removed from the site until the MEC can be blown in place and the site can be made safe for re-entry.

22.0 INCIDENT REPORTING REQUIREMENTS

Should an accident or mishap occur on the site, regardless of the severity, it will be fully investigated by USAE and all reports and records will be documented on the USAE Accident Report Form and the Contractor Significant Incident Report (CSIR-1). Copies will be maintained on site for the duration of site activities. A permanent copy will be maintained in the USAE Oldsmar, Florida Office. Accidents/incidents

shall be reported in accordance with EM 385-1-1. All accident/incident reports will be reviewed by the Program Occupational Safety Manager and the Program Safety and Health Manager to assure all root causes of the accident/incident have been adequately addressed in order to prevent future recurrences on this or any other project sites.

The Site Manager will notify the Navy technical representative immediately of an accident that appears to have any of the consequences listed below and fill out and submit the CSIR-1 form to the Contracting Officer or designated representative for review within one working day after the event.

- A fatal injury
- Permanent total disabling injury
- Permanent partial disabling injury
- Three or more persons admitted to a hospital
- Property damage in the amount of $100,000 or more.

Any accident involving a fatality or three or more hospitalizations from the same incident will be reported telephonically to the nearest OSHA Area office within 24 hours by the Program Safety and Health Manager. If all information is not known at that time, an initial report will be made and a follow-up report will be submitted after all of the facts are documented.

APPENDIX E - ATTACHMENT 5: DRUG FREE WORKPLACE PROGRAM

This attachment contains the USAE Drug Free Workplace Program for the Site Inspection at the Waikane Valley Training Area.

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DRUG FREE WORK PLACE PROGRAM

June 1, 2005

The USA Environmental, Inc. program is an extension of our work safety and employee health programs. The program requires refraining from substance abuse both on and off the job as a condition of continued employment.

WHAT IS SUBSTANCE ABUSE

Federal Acquisition Regulation Clause 23.500 defines substance abuse as the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in the workplace. USA Environmental's program further expands that definition as follows: Substance abuse includes but is not limited to the consumption, by any means, of any legal or illegal substance that alters an individual's normal behavior and results in intoxication and/or renders the employee incapable of safe/efficient job performance. Substance abuse also includes over use or abuse of legally prescribed drugs. Also prohibited are the selling, trading, giving away, possession or offering for sale illegal drugs, prescription drugs, or alcohol whether on company property, while operating a company vehicle (on or off company property), or operating a personal vehicle while on company business.

USA ENVIRONMENTAL SUBSTANCE ABUSE TESTING PROGRAM

The substance abuse program includes substance abuse testing under the following situations:

1. Pre-employment testing.
2. Testing for reasonable suspicion of substance abuse.
3. Testing following on-the-job accidents.
4. Testing as part of all "fitness for duty" medical examinations.
5. Quarterly testing for a period of 2 years after program completion for all employees participating in a substance abuse rehabilitation program.
6. Random testing of employees to promote abstinence.
7. Testing following a 30-day or greater lay off or return to work following a leave of absence.

A urine, saliva or blood specimen will be analyzed for the presence of any of the following substances:

1. Alcohol - Ethyl alcohol as a beverage or as part of a medication
2. Marijuana - Cannabinoids, THC
3. Cocaine
4. Methadone - Dolophine, Methadose
5. Barbiturates - Nembutal, Tuinal, Seconal, etc.
6. Amphetamines - Desoxyn, Biphetamine, Dexedrine, etc.
7. Methaqualone - Qualudes
8. Opiates - Codeine, Percodan, Paregoric, Morphine, etc

9. Propoxyphene - Darvon, Dolene, etc.
10. Phencyclidine - (PCP)
11. Benzodiazepines - Librium, Valium, Xanax, Serax, Halcion, etc.

A list of the most common drugs or medication by brand name, common name, as well as chemical name, which may alter or affect a drug test will be provided to all job applicants and employees at the time of testing.

A form is provided for employees or job applicants to report, voluntarily and confidentially, the use of prescription or non-prescription medications both before and after being tested.

Specific confirmation testing will be performed for all positive screening test results. Employees testing positive for prescription drugs that are commonly abused must produce evidence from their attending physician to justify the treatment necessity for use of the drug(s).

USA Environmental is responsible for testing costs, except for test costs incurred by the employee or job applicant challenging test results.

RANDOM TESTING

Unless prohibited by law, USA reserves the right to randomly test its employees for substance abuse. The number of personnel tested and the frequency of tests will be solely at the discretion of USA or as contractually specified by USA's clients.

REASONABLE SUSPICION TESTING

Employees reporting to work or a USA Environmental job site who demonstrate impaired conduct will be interviewed by two (2) supervisors or managers to determine the cause of the irregular behavior.

If both supervisors conclude that the irregular behavior is unsafe, the employee will not be allowed to continue working and will be transported home or to a medical facility. The employee will not be allowed to drive any motor vehicle. If a medical problem is not the cause, the employee may be tested for substance abuse. The employee may also be tested for substance abuse regardless of the cause of irregular behavior.

Reasonable suspicion testing shall also be conducted when there is:

1. An independently corroborated report of observed substance abuse.
2. Evidence that an individual tampered with a drug test during his or her employment with USA Environmental.
3. Information that an employee caused or contributed to an accident while at work.
4. Evidence that an employee has used, possessed, sold, solicited, or transferred drugs while working on USA Environmental premises or while operating vehicles, machinery or equipment belonging to USA Environmental.

Supervisors will complete an incident report for observed irregular conduct, documenting their observations and the results of the employee interview. Final disposition of the incident will be documented with signatures and the dates listed by both supervisors.

A copy of the supervisor's report will be provided to the employee, with appropriate employee's signature of receipt.

This confidential Incident Report will be retained by USA Environmental for a period of at least one (1) year.

CONSEQUENCES OF POSITIVE TEST OR TEST REFUSAL

Refusal or failure to submit to testing or positive test results following an on-the-job injury disqualifies an employee from Workers' Compensation benefits.

Testing positive for abused substances will eliminate applicants from employment consideration.

Any employee may be terminated from employment for a positive test result. Refusal or failure to submit to testing following an on-the-job accident will result in termination of employment.

Any employee who is given a "second chance" must seek treatment. Time away from work for treatment will be in a leave without pay status. The USA Environmental Employee Assistance Program (EAP) will coordinate the employee's treatment plan. If the employee is enrolled in the employee health benefit plan or another medical plan, it may provide benefits to help pay for this treatment.

A second positive test for abused substances will result in termination.

OTHER GROUNDS FOR TERMINATION

An employee bringing onto the USA Environmental premises or job sites; having possession of; being under the influence of; possessing in the employee's body, blood or urine (at levels exceeding or equal to established cut-off levels, 38F-9.007 (4)); or using, consuming, transporting, selling or attempting to sell, giving away any illegal drugs (including prescription drugs illegally obtained or prescribed for the individual only), or alcohol, at any time is guilty of misconduct and is subject to discipline to include discharge, suspension without pay or other actions even for a first offense.

RIGHT TO INSPECT

USA Environmental reserves the right to inspect the property and person of individuals suspected of illegal drug or alcohol possession while on company property or at company job sites. This right includes, but is not limited to, the inspection of vehicles, parcels, packages, purses, lunchboxes, briefcases, lockers, work stations and desks. In addition, the company reserves the right to access all computer files, e-mail and voice mail systems that any employee utilizes at the workplace.

CHALLENGING TEST RESULTS

An employee may challenge a confirmed positive test by submitting an explanation in writing to the Human Resources Department, concerning personal circumstances that might have affected test results. This challenge must be submitted within 5 working days following the employee notification of a confirmed positive test result. The donor of a tested specimen will be responsible for providing all necessary documentation, i.e., a doctor's report, signed prescription or current prescription container with relevant information and other related supporting documents.

USA Environmental will, within 15 days of receipt of the employee's written explanation or challenge of positive test results, provide a written explanation to the employee as to whether, and if so, why, the employee's explanation is unsatisfactory, along with a copy of the positive test results.

The employee or job applicant desiring to challenge a test result will be responsible for notifying the original testing laboratory of an alternate HRS licensed laboratory, for the purpose of transferring, under Chain of Custody, a portion of the employee's or job applicant's specimen for re-testing. The employee may have a portion of their original specimen re-tested during a period of 180 days following written notice of a positive test result. When an employee undertakes a challenge to the result of a test, it shall be the employee's responsibility to notify the laboratory and the sample shall be retained by the laboratory until the matter is settled.

In the case of a denial of a workers' compensation claim, an employee may undertake an administrative challenge by filing a claim for benefits with a judge of Compensation Claims, concerning workplace injury. Other challenges not involving workplace injuries must challenge a test result in a court of competent jurisdiction.

Employees or job applicants may call the testing laboratory for technical information regarding prescription or non-prescription medications that may affect test results.

Employees and job applicants may report, in confidence, to the Personnel or Human Resource Manager, the use of prescription or non-prescription medications that may affect job performance or testing results, either before or after testing.

Job applicants or employees whose drug test results are confirmed positive shall not by virtue of the result alone, be defined as having a "handicap" under the Americans with Disabilities Act.

GETTING HELP

Employees who require a treatment program will be referred to USA Environmental's Employee Assistance Program (EAP) with CIGNA Behavioral Health at 1-888-371-1125.

Employees may inspect this program file and/or receive more information on the program on a confidential basis, in the USA Environmental business office, during normal hours of operation.

REQUIREMENT TO NOTIFY USA OF CONVICTION

Any employee convicted of a violation of a criminal drug statute for a violation occurring in the workplace must notify USA Environmental, Inc., Attention: Human Resource Department, within 5 calendar days of the conviction. This notification must be in writing.

CONFIDENTIALITY OF INFORMATION

All drug test information, reasonable suspicion reports, or other related information concerning an employee or applicant will remain confidential and will not be disclosed except under conditions required by law.

Release of such information under any circumstances, other than those required by law, will be solely pursuant to a written consent voluntarily signed by the person tested. The consent duration and precise information to be disclosed will be stated,

GOVERNMENTAL COMPLIANCE

This Drug Free Work Place Program is implemented pursuant to the requirements of Florida Statute 440.102 and Administrative Rules 38F-9-001 through 38F-9.014 of the Florida Department of Labor and Employment Security, Division of Workers' Compensation, and 48 CFR 23.500 (Federal Acquisition Regulation 23.500).

Robin Miller
Human Resources Director

APPENDIX E - ATTACHMENT 6: MATERIAL SAFETY DATA SHEETS

This attachment contains the following material safety data sheets for the Site Inspection at the Waikane Valley Training Area:

- Deep Woods Off
- Diesel
- Fire Extinguishers
- Insect Repellent
- Unleaded Gasoline

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MSDS
DEEP WOODS OFF

*** IDENTIFICATION ***

MSDS RECORD NUMBER : 668986
PRODUCT NAME(S): DEEP WOODS OFF PUMP SPRAY

MATERIAL SAFETY DATA SHEET

WHMIS Serial No: 8 Issued: 1993-04-26
Supersedes: 1993-01-27

PRODUCT IDENTIFICATION

PRODUCT NAME: DEEP WOODS OFF! PUMP SPRAY

PRODUCT USE: HOUSEHOLD INSECT REPELLANT

HMIS RATING
HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 0
SPECIAL WARNING:

INGREDIENT INFORMATION

WEIGHT %	CAS	INGREDIENT
25	134-62-3	DIETHYLTOLUAMIDE LD50: 1,950 MG/KG (ORAL - RAT) EXP. LIMITS: NOT ESTABLISHED
15 - 40	64-17-5	ETHANOL LD50: 7,060 MG/KG (ORAL - RAT) EXP. LIMITS: 1000 PPM (TLV-TWA ACGIH)

PHYSICAL DATA
PHYSICAL STATE: LIQUID
ODOUR/APPEARANCE: CLEAR, COLOURLESS LIQUID WITH CHARACTERISTIC FLORAL ODOUR
ODOUR THRESHOLD: NOT AVAILABLE
SPECIFIC GRAVITY: 0.923 (WATER = 1.0)
VAPOUR PRESSURE (MM HG): NOT AVAILABLE
VAPOUR DENSITY (AIR=1.0): NOT AVAILABLE
CARCINOGENICITY : NONE KNOWN
REPRODUCTIVE TOXICITY : NONE KNOWN
WATER SOLUBILITY: DISPERSIBLE
EVAPORATION RATE: NOT AVAILABLE (BUTYL ACETATE = 1.0)
BOILING POINT (DEG C): 75
FREEZING POINT (DEG C): NOT AVAILABLE PH: 7.5
COEF. WATER/OIL: NOT AVAIL.

FIRE AND EXPLOSION INFORMATION
FLASH POINT (DEG C): 25 (TCC)
FLAMMABLE LIMITS: NOT AVAILABLE
AUTO-IGNITION TEMP (DEG C): NOT APPLICABLE
FLAMMABILITY CLASSIFICATION : FLAMMABLE LIQUID
EXTINGUISHING MEDIA : CARBON DIOXIDE, FOAM, DRY CHEMICAL, "ALCOHOL" FOAM.
SPECIAL FIREFIGHTING PROCEDURES :
NORMAL FIRE FIGHTING PROCEDURE MAY BE USED. COOL AND USE CAUTION WHEN APPROACHING CONTAINERS.
FIRE FIGHTERS SHOULD WEAR SCBA AND PROTECTIVE CLOTHING.
EXPLOSION DATA : RISK OF EXPLOSION BY FIRE OR OTHER SOURCES OF IGNITION.

TOXICOLOGICAL AND FIRST AID DATA
LD50 : 5,400 MG/KG (ORAL-MALE RAT), 2,510 MG/KG (ORAL-FEMALE RAT)
SOURCE: RALTECH SCIENTIFIC SERVICES REPORT 795400 LC50 : NOT AVAILABLE
PRIMARY ROUTE OF ENTRY :
EYE CONTACT, INHALATION, INGESTION.
EFFECTS OF ACUTE EXPOSURE :
MAY CAUSE EYE IRRITATION.
MAY DRY OR DEFAT SKIN ON PROLONGED CONTACT.
INHALATION MAY CAUSE DIZZINESS AND DROWSINESS.
EFFECTS OF CHRONIC EXPOSURE :
NOT AVAILABLE
IRRITANCY OF PRODUCT : MODERATELY IRRITATING TO EYES.
MILDLY IRRITATING TO SKIN ON PROLONGED CONTACT.
SENSITIZATION : NONE KNOWN

TERATOGENICITY : NONE KNOWN
MUTAGENICITY :NONE KNOWN

MSDS
DEEP WOODS OFF

FIRST AID PROCEDURES

EYE CONTACT : FLUSH IMMEDIATELY WITH WATER FOR 15 MINUTES.
IF IRRITATION OCCURS, GET MEDICAL ATTENTION.
SKIN CONTACT : NO SPECIAL REQUIREMENT FOR NORMAL USE.
IF IRRITATION OCCURS, GET MEDICAL ATTENTION.
INHALATION : REMOVE TO FRESH AIR.
ADMINISTER ARTIFICIALRESPIRATION, IF NEEDED.
INGESTION : DILUTE WITH 1 - 2 GLASSES OF MILK. SEEK MEDICAL AID.

REACTIVITY DATA

STABILITY : STABLE
CONDITIONS TO AVOID : EXCESSIVE HEAT.
INCOMPATIBILITY : AVOID PLASTIC, RUBBER AND OXIDIZERS.
HAZARDOUS DECOMPOSITION PRODUCTS : WHEN EXPOSED TO FIRE, PRODUCES NORMAL COMBUSTION PRODUCTS.
HAZARDOUS POLYMERIZATION : WILL NOT OCCUR.

CONDITIONS TO AVOID :NOT APPLICABLE

PREVENTIVE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED :
ELIMINATE ALL SOURCES OF IGNITION.
ABSORB WITH OIL-DRI. SWEEP/SCRAPE UP. CONTAINERIZE IN STEEL DRUMS.
WASTE DISPOSAL INFORMATION :
KEEP STORAGE CONTAINERS WELL SEALED. OBSERVE ALL FEDERAL, STATE AND MUNICIPAL REGULATIONS FOR IGNITABLE WASTE.

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION : NOT REQUIRED FOR NORMAL USE.
VENTILATION : ROOM VENTILATION SHOULD BE SUFFICIENT.
PROTECTIVE GLOVES : NOT REQUIRED FOR NORMAL USE. GROSS CONTACT POSSIBLE (E.G. SPILLS): NEOPRENE GLOVE.
EYE PROTECTION : SAFETY GLASSES.
OTHER PROTECTIVE MEASURES :

SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING : KEEP AWAY FROM SOURCES OF IGNITION.
KEEP AWAY FROM HEAT.
OTHER HANDLING AND STORAGE CONDITIONS : BOND AND GROUND DURING MATERIAL TRANSFER.
DO NOT TRANSFER WITH AIR PRESSURE.
KEEP CONTAINER WELL CLOSED WHEN NOT IN USE.

ADDITIONAL INFORMATION

SHIPPING NAME: ETHANOL SOLUTION
TDG CLASSIFICATION: 3.3
PIN/NIP: 1170
PACKING GROUP:
PLACARD: FLAMMABLE LIQUID
EXEMPTION NAME: CONSUMER COMMODITY
HMIS CLASSIFICATION : REGULATED UNDER P.C.P. ACT NO. 22258

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1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Identity
Product Name: DIESEL FUEL #2
General or Generic ID: HYDROCARBON

Company
The Valvoline Company
P.O. Box 14000
Lexington, KY 40512

Telephone Numbers
Emergency: 1-800-274-5263
Information: 1-859-357-7206

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient(s)	CAS Number	% (by weight)
ALIPHATIC & AROMATIC HYDROCARBONS	68476-34-6	100.0

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3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye
May cause mild eye irritation.

Skin
May cause mild skin irritation. Prolonged or repeated contact may dry and crack the skin. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Swallowing
Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. This material can get into the lungs during swallowing or vomiting. This results in lung inflammation and other lung injury.

Inhalation
It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful.

Symptoms of Exposure
Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea) irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), loss of coordination, liver damage.

Target Organ Effects

Exposure to this material (or a component) has been found to cause kidney damage in male rats. The mechanism by which this toxicity occurs is specific to the male rat and the kidney effects are not expected to occur in humans. Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals, and may aggravate preexisting disorders of these organs in humans: anemia, lung damage.

Developmental Information

Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

Cancer Information

Diesel engine exhaust is listed as carcinogenic by the International Agency for Research on Cancer (IARC). Excess lung and bladder cancers have been reported in workers exposed to these emissions. In addition, exposure to diesel exhaust particulates is listed as carcinogenic by the National Toxicology Program. This product (or a component) is a petroleum-derived material. Similar materials and certain compounds occurring naturally in petroleum oils have been shown to cause skin cancer in laboratory animals following repeated exposure without washing or removal.

Other Health Effects

No data

Primary Route(s) of Entry

Inhalation, Skin absorption, Skin contact, Eye contact, Ingestion.

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4. FIRST AID MEASURES

Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is any visual difficulty, seek medical attention.

Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

Swallowing

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Note to Physicians

This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity (See Section 3 - Swallowing) when deciding whether to induce vomiting. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for

example, asthma-like conditions), liver, Exposure to this material may aggravate any pre-existing condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemias.

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5. FIRE FIGHTING MEASURES

Flash Point
> 135.0 F (57.2 C)

Explosive Limit
No data

Autoignition Temperature
No data

Hazardous Products of Combustion
May form: carbon dioxide and carbon monoxide, various hydrocarbons.

Fire and Explosion Hazards
Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat, pilot lights, other flames and ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.

Extinguishing Media
regular foam, carbon dioxide, dry chemical.

Fire Fighting Instructions
Water or foam may cause frothing which can be violent and possibly endanger the life of the firefighter. Wear a self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of this MSDS.

NFPA Rating
Health - 1, Flammability - 2, Reactivity - 0

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6. ACCIDENTAL RELEASE MEASURES

Small Spill
Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks. Absorb liquid on vermiculite, floor absorbent or other absorbent material.

Large Spill
Eliminate all ignition sources(flares, flames, including pilot lights, electrical sparks). Persons not wearing protectivve equipment should be excluded from the area of the spill until clean-up has been completed. Contain spill to the smallest area possible. Dike area to prevent spreading. Prevent from entering drains, sewers, streams or other bodies of water. Recover as much of the product as possible by methods such as vacuuming and use of absorbant. Transfer contaminated absorbent, soil and other materials in proper containers for ultimate disposal.

7. HANDLING AND STORAGE

Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. All five gallon pails and larger metal containers including tank cars and tank trucks should be grounded and/or bonded when material is transferred.

Storage

Not applicable

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection

Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin Protection

Wear resistant gloves such as: neoprene, nitrile rubber, To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Respiratory Protections

If workplace exposure limit(s) of product or any component is exceeded (See Exposure Guidelines), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (consult your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Exposure Guidelines

Component

ALIPHATIC & AROMATIC HYDROCARBONS (68476-34-6)
No exposure limits established

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point

(for product) 320.0 - 400.0 F (160.0 - 204.4 C) @ 760.00 mmHg

Vapor Pressure

(for product) < 1.000 mmHg @ 68.00 F

Specific Vapor Density

> 5.000 @ AIR=1

Specific Gravity
.876 @ 60.00 F

Liquid Density
7.296 lbs/gal @ 60.00 F
.876 kg/l @ 15.60 C

Percent Volatiles (Including Water)
No data

Evaporation Rate
SLOWER THAN ETHYL ETHER

Appearance
No data

State
LIQUID

Physical Form
HOMOGENEOUS SOLUTION

Color
RED, DYED LIQUID

Odor
No data

pH
Not applicable

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10. STABILITY AND REACTIVITY

Hazardous Polymerization
Product will not undergo hazardous polymerization.

Hazardous Decomposition
May form: carbon dioxide and carbon monoxide, various hydrocarbons.

Chemical Stability
Stable.

Incompatibility
Avoid contact with: strong oxidizing agents.

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11. TOXICOLOGICAL INFORMATION

Mutagenicity
This material (or a component) caused mutations in cells in culture and in laboratory animals. The relevance of this finding to human health is uncertain.

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12. ECOLOGICAL INFORMATION

No data

13. DISPOSAL CONSIDERATION

Waste Management Information

Dispose of in accordance with all applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT Information - 49 CFR 172.101

DOT Description:

Not Regulated

Container/Mode:

No data

NOS Component:

None

RQ (Reportable Quantity) - 49 CFR 172.101

Not applicable

15. REGULATORY INFORMATION

US Federal Regulations

TSCA (Toxic Substances Control Act) Status

TSCA (UNITED STATES) The intentional ingredients of this product are listed.

CERCLA RQ - 40 CFR 302.4

None

SARA 302 Components - 40 CFR 355 Appendix A

None

Section 311/312 Hazard Class - 40 CFR 370.2

Immediate(X) Delayed(X) Fire(X) Reactive( ) Sudden Release of Pressure( )

SARA 313 Components - 40 CFR 372.65

None

International Regulations

Inventory Status

AICS (AUSTRALIA) The intentional ingredients of this product are listed.
DSL (CANADA) The intentional ingredients of this product are listed.
ECL (SOUTH KOREA) The intentional ingredients of this product are listed.
EINECS (EUROPE) The intentional ingredients of this product are listed.
ENCS (JAPAN) The intentional ingredients of this product are listed.

State and Local Regulations

California Proposition 65

None

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Last page

***** IDENTIFICATION *****

MSDS RECORD NUMBER : 503384
PRODUCT NAME(S): General Triplex Dry Chemical

***** MATERIAL SAFETY DATA *****

Material Safety Data Sheet U.S. Department of Labor May be used to comply with Occupational Safety and Health OSHA's Hazard Communication Administration
Standard, 29 CFR 1910.1200. (Non-Mandatory Form)
Standard must be consulted for Form Approved specific requirements. OMB No. 1218-0072

Section II - Hazardous Ingredients/Identity Information

Hazardous Components OSHA PEL ACGIH TLV Other Limits (Specific Chemical Identity; Recommended % (optional)
Common Name(s))

Not Applicable - Dry Chemical Fire Extinguishing Agent - Monoammonium Phosphate Base Contains No Hazardous Ingredients

Section III - Physical/Chemical Characteristics

Boiling Point NA
Specific Gravity (H2O = 1) 1.8
Vapor Pressure (mm Hg.) NA
Melting Point NA
Vapor Density (AIR = 1) NA
Evaporation Rate NA (Butyl Acetate = 1)
Solubility in Water
Water repellant. 94% soluble.
Appearance and Odor Fine yellow Powder

Section IV - Fire and Explosion Hazard Data
Flash Point (Method Used) NA

Flammable Limits NA
LEL NA
UEL NA
Extinguishing Media NA - Fire Extinguishing agent
Special Fire Fighting Procedures
Unusual Fire and Explosion Hazards

Section V - Reactivity Data
Stability Unstable [ ] Conditions to Avoid
Stable [X]

Incompatibility (Materials to Avoid)
Do not mix with bicarbonate base fire extinguishing agents.

Hazardous Decomposition or Byproducts
Decomposes to ammonia and phosphoric acid at high temperature.

Hazardous Conditions to Avoid

May Occur [ ]
Polymerization Will Not Occur [X]

Section VI - Health Hazard Data

Route(s) of Entry: NA

Inhalation?	Skin?	Ingestion?
NA	NA	NA

Health Hazards (Acute and Chronic) NA

Carcinogenicity: NA NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure NA

Medical Conditions Generally Aggravated by Exposure NA

Emergency and First Aid Procedures Wash from eyes with warm water.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Clean up in normal manner. Use vacuum to avoid causing dust.

Waste Disposal Method
Dispose of in normal manner. Use closed container to prevent dust.

Precautions to Be Taken in Handling and Storing
Protect from moisture

Other Precautions

Section VIII - Control Measures

Respiratory Protection (Specify Type)
Use particle mask, 3M 8500 Non-Toxic, when handling
Ventilation
Local Exhaust Special
Use to remove dust
Mechanical (General) Other

Protective Gloves Not needed Eye Protection Not needed

Other Protective Clothing or Equipment Not needed.

Work/Hygienic Practices
After handling, wash exposed skin with warm water and soap.

*** ***
*** M S D S ***
*** ***
*** Canadian Centre for Occupational Health and Safety ***
*** * * * * * * * * * * * * Issue : 94-4 (November, 1994) ***

***** IDENTIFICATION *****

MSDS RECORD NUMBER : 503383
PRODUCT NAME(S) : General "Quick-Aid" Dry Chemical
DATE OF MSDS : 1986-05-06

***** MANUFACTURER INFORMATION *****

MANUFACTURER : General Fire Extinguisher Corporation
ADDRESS : 1685 Shermer Road
Northbrook Illinois
U.S.A. 60062
Telephone: 312-272-7500 (Information)
EMERGENCY TELEPHONE NO. : 312-729-8800

***** MATERIAL SAFETY DATA *****

Material Safety Data Sheet U.S. Department of Labor
May be used to comply with Occupational Safety and Health
OSHA's Hazard Communication Administration
Standard, 29 CFR 1910.1200. (Non-Mandatory Form)
Standard must be consulted for Form Approved
specific requirements. OMB No. 1218-0072

IDENTITY (As Used on Label and List) Note: Blank spaces are not permitted.
General "Quick-Aid" Dry Chemical If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Date Prepared May 6, 1986
Signature of Preparer (optional) William R. Warnock

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s)) OSHA PEL ACGIH TLV Other Limits Recommended % (optional)

Not Applicable - Dry Chemical Fire Extinguishing Agent - Sodium Bicarbonate Base.
Contains no hazardous ingredients.

Section III - Physical/Chemical Characteristics

Boiling Point NA Specific Gravity (H2O = 1) 2.16
Vapor Pressure (mm Hg.) NA Melting Point NA

Vapor Density (AIR = 1) NA Evaporation Rate NA
(Butyl Acetate = 1)
Solubility in Water Water repellant. 98% soluble
Appearance and Odor Fine white powder

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) NA Flammable Limits LEL UEL
NA NA NA
Extinguishing Media NA - Fire Extinguishing agent
Special Fire Fighting Procedures NA
Unusual Fire and Explosion Hazards NA

Section V - Reactivity Data

Stability Unstable [ ] Conditions to Avoid
Stable [X]

Incompatibility (Materials to Avoid)
Do not mix with ammonium phosphate base fire extinguishing agents.

Hazardous Decomposition or Byproducts
Decomposes to sodium carbonate, carbon dioxide and water at high temperatures.

Hazardous May Occur [ ] Conditions to Avoid
Polymerization Will Not Occur [X]

Section VI - Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?
NA NA NA NA

Health Hazards (Acute and Chronic) NA

Carcinogenicity: NA NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure NA

Medical Conditions Generally Aggravated by Exposure NA

Emergency and First Aid Procedures Wash from eyes with warm water.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Clean up in normal manner. Use vacuum to avoid causing dust.

Waste Disposal Method
Dispose of in normal manner. Use closed container to prevent dust.

Precautions to Be Taken in Handling and Storing
Protect from moisture.

Other Precautions

Section VIII - Control Measures

Respiratory Protection (Specify Type)
Use particle mask, 3M 8500 Non-Toxic, when handling

Ventilation Local Exhaust Special
Use to remove dust
Mechanical (General) Other

Protective Gloves Not needed **Eye Protection** Not needed

Other Protective Clothing or Equipment Not needed.

Work/Hygienic Practices
After handling, wash exposed skin with warm water and soap.

*** ***
*** M S D S ***
*** ***
*** Canadian Centre for Occupational Health and Safety ***
*** * * * * * * * * * * * * Issue : 94-4 (November, 1994) ***

***** IDENTIFICATION *****

MSDS RECORD NUMBER : 503382
PRODUCT NAME(S) : General Purple K Dry Chemical
DATE OF MSDS : 1986-05-06

***** MANUFACTURER INFORMATION *****

MANUFACTURER : General Fire Extinguisher Corporation
ADDRESS : 1685 Shermer Road
Northbrook Illinois
U.S.A. 60062
Telephone: 312-272-7500 (Information)
EMERGENCY TELEPHONE NO. : 312-729-8800

***** MATERIAL SAFETY DATA *****

Material Safety Data Sheet U.S. Department of Labor
May be used to comply with Occupational Safety and Health
OSHA's Hazard Communication Administration
Standard, 29 CFR 1910.1200. (Non-Mandatory Form)
Standard must be consulted for Form Approved
specific requirements. OMB No. 1218-0072

IDENTITY (As Used on Label and List) Note: Blank spaces are not permitted.
General Purple K Dry Chemical If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Date Prepared May 6, 1986
Signature of Preparer (optional) William R. Warnock

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s)) OSHA PEL ACGIH TLV Other Limits Recommended % (optional)

Not Applicable - Dry Chemical Fire Extinguishing Agent - Potassium Bicarbonate Base
Contains no hazardous ingredients.

Section III - Physical/Chemical Characteristics

Boiling Point NA Specific Gravity (H2O = 1) 2.17
Vapor Pressure (mm Hg.) NA Melting Point NA

Vapor Density (AIR = 1) NA Evaporation Rate NA
(Butyl Acetate = 1)
Solubility in Water Water repellant. 94% soluble
Appearance and Odor Fine purple powder

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) NA Flammable Limits LEL UEL
NA NA NA
Extinguishing Media NA - Fire extinguishing agent
Special Fire Fighting Procedures NA
Unusual Fire and Explosion Hazards NA

Section V - Reactivity Data

Stability Unstable [ ] Conditions to Avoid
Stable [X]

Incompatibility (Materials to Avoid)
Do not mix with ammonium phosphate base fire extinguishing agents.

Hazardous Decomposition or Byproducts
Decomposes to potassium carbonate, carbon dioxide and water at high temperatures.

Hazardous May Occur [ ] Conditions to Avoid
Polymerization Will Not Occur [X]

Section VI - Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?
NA NA NA NA

Health Hazards (Acute and Chronic) NA

Carcinogenicity: NA NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure NA

Medical Conditions Generally Aggravated by Exposure NA

Emergency and First Aid Procedures Wash from eyes with warm water.

Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Clean up in normal manner. Use vacuum to avoid causing dust.

Waste Disposal Method
Dispose of in normal manner. Use closed container to prevent dust.

Precautions to Be Taken in Handling and Storing
Protect from moisture.

Other Precautions

Section VIII - Control Measures

Respiratory Protection (Specify Type)
Use particle mask 3M 8506 Non-Toxic, when handling.

Ventilation **Local Exhaust** **Special**
Use to remove dust.
Mechanical (General) **Other**

Protective Gloves **Not needed** **Eye Protection** **Not needed**

Other Protective Clothing or Equipment **Not needed.**

Work/Hygienic Practices
After handling, wash exposed skin with warm water and soap.

*** ***
*** M S D S ***
*** ***
*** Canadian Centre for Occupational Health and Safety ***
*** * * * * * * * * * * * * Issue : 94-4 (November, 1994) ***

***** IDENTIFICATION *****

MSDS RECORD NUMBER : 500586
PRODUCT NAME(S) : General LS-61 Anti Freeze Charge
DATE OF MSDS : 1990-09

***** MANUFACTURER INFORMATION *****

MANUFACTURER : General Fire Extinguisher Corporation
ADDRESS : 1685 Shermer Road
Northbrook Illinois
U.S.A. 60062
Telephone: 312-272-7500 (Information)
EMERGENCY TELEPHONE NO. : 312-729-8800

***** MATERIAL SAFETY DATA *****

Material Safety Data Sheet U.S. Department of Labor
May be used to comply with Occupational Safety and Health
OSHA's Hazard Communication Standard, Administration
29 CFR 1910.1200. Standard must be (Non-Mandatory Form)
consulted for specific reuqirements. Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)
General LS-61 Anti Freeze Charge

Note: Blank spaces are not permitted. If any item is not applicable or no information is available, the space must be marked to indicate that.

Section I

Date Prepared May 6, 1986 Septembre 1990
Signature of Preparer (optional) William R. Warnock

Section II - Hazardous Ingredients/Identity Information

Hazardous Components
(Specific Chemical
Identity; Common Name(s)) OSHA PEL ACGIH TLV % (optional)

Anti-Freeze Charge for Pressurized Water
Anti-gel charge d'eau pressurize

Fire Extinguishers Extincteurs d'incendie

Potassium Carbonate Carbone potasse Not Specified Non specifie >50%
Other Limits Recommended:

Potassium Acetate Acetate potasse Not Established Non etabli <50%
Other Limits Recommended:

Section III - Physical/Chemical Characteristics

Boiling Point Point d'ebullition NA
Vapor Pressure (mm Hg) pressure vapeur NA
Vapor Density (AIR = 1) densite vapeur NA
Specific Gravity (H20 = 1) 2.0
Gravite specifique
Melting Point point de fonte NA
Evaporation Rate taux d'evaporation NA
(Butyl Acetate = 1)
Solubility in Water 100%
solubilite d'eau
Appearance and Odor Off-White granular powder
apparence & odeur poudre granule blanc casse

Section IV - Fire and Explosion Hazard Data schema feu & explosion hazard

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Flash Point (Method Used) NA
point d'etincelles NA

Flammable Limits limite flammable LEL UEL
NA NA NA

Extinguishing Media NA- Fire extinguisher charge
point d'extinction charge d'extincteur d'incendie

Special Fire Fighting Procedures
Procedure speciale pour combattre l'incendie

Unusual Fire and Explosion Hazards
Hazard feu & explosion peu commun

Section V- Reactivity Data

Stability Unstable [ ] Conditions to Avoid
Stabilite instable Conditions a eviter

Stable [X]
Stable

Incompatibility (Materials to Avoid) NA
Incompatibilite materiel a eviter

Hazardous Decomposition or Byproducts NA
Decomposition hazardeuse sous-produit

Hazardous Polymerization May Occur [ ] Conditions to Avoid
polymerization a survenir Conditions a eviter
Will Not Occur [X]
ne surviendra pas.

Section VI - Health Hazard Data Schema hazard sante

Route(s) of Entry	Inhalation?	Skin?	Ingestion?
NA	NA	NA	NA

Health Hazards (Acute and Chronic)
May cause irritation of the skin and eyes.
Peut causer irritation de la peau et des yeux.

Carcinogenicity:	NA	NTP?	IARC Monographs?	OSHA Regulated?
cancerigene	N/A			

Signs and Symptoms of Exposure NA
Signes et symptomes a l'exposition

Medical Conditions Generally Aggravated by Exposure NA
Conditions medical aggrave par exposition

Emergency and First Aid Procedures
Alkaline, Wash from eyes with large volume of warm water.
Laver les yeux avec une large quantite d'eau tiede
Consult doctor. Wash from skin with warm water.
Consulter un medecin. Laver la peau avec eau tiede

Section VII - Precautions for Safe Handling and Use
Precaution pour utilisation secure

Steps to Be Taken in Case Material is Released or Spilled
Sweep up and dispose in normal manner. Flush spill area with water
balayer de maniere normale. Laver la piece avec de l'eau

Waste Disposal Method Methode pour dechets
Dispose in normal manner. Disposer de maniere normale

Precautions to Be Taken in Handling and Storing Protect from moisture.
precaution a prendre pour utilisation proteger de la moissisure

Other Precautions Autres precautions

Section VIII - Control Measures Mesures controle

Respiratory Protection (Specify Type)
Not required. Protection respiratoire non requise

Ventilation Local Exhaust Special
Ventilation Mechanical (General) Other

Protective Gloves
Wear rubber gloves when preparing solution.

Eye Protection
Wear goggles or glass with side shields when preparing solution.

Other Protective Clothing or Equipment

Wear long sleeves when preparing solution.

Work/Hygienic Practices
After handling, wash exposed skin thoroughly with warm water.

MSDS
INSECT REPELLENT

SECTION 1. CHEMICAL IDENTIFICATION

CHEMINFO RECORD NUMBER : 333
CCOHS CHEMICAL NAME : Permethrin
SYNONYMS :
3-(2,2-Dichloroethenyl)-2,2-dimethylcyclopropanecarboxylic acid, (3-phenoxyphenyl)methyl ester
3-Phenoxybenzyl (1RS)-cis,trans-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate Permethrine
TRADE NAME(S) :
Ambush
Ectiban
Pounce

SECTION 2. DESCRIPTION

APPEARANCE AND ODOUR : Colourless crystals or pale yellow-brown viscous liquid, depending on purity. Partially crystalizes at ambient temperature.
ODOUR THRESHOLD : No information available.
WARNING PROPERTIES : No information available for evaluation.
COMPOSITION/PURITY : Permethrin is a pyrethroid, a man-made chemical which is similar to chemicals occurring naturally in plants (pyrethrins). Commercial permethrin is a mixture of 4 isomers (chemical forms). Most technical material is a mixture of approximately 50-60% trans- and 50-40% cis-isomers, but formulations with 75:25 trans:cis ratio are also available. Permethrin may be formulated as emulsifiable or ultra low volume concentrates, dusts, fogs or wettable powders. This material is often only a small percentage of pesticide formulations. The overall physical, chemical and toxicological characteristics of the product may depend on other ingredients such as solvents.

SECTION 3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

EFFECTS OF SHORT-TERM (ACUTE) disturbances such as nausea, vomiting, irritable behaviour, tremors and muscle weakness might

EXPOSURE : INHALATION : One study reported respiratory tract irritation in a large percentage of workers exposed to permethrin formulations (emulsion or wettable powder). Symptoms included increased nasal secretion, sneezing, coughing and difficulty breathing and varied with the formulation tested.(12) Other components of products may contribute to the irritation.

SKIN CONTACT : Animal tests show that permethrin is readily absorbed through the skin, but is rapidly broken down in the body and has a low toxicity by this route. There is extensive documentation of a unique skin sensory change caused by permethrin and some other pyrethroids. This is described as a stinging, tingling or burning sensation progressing to numbness in some cases. Usually there is a short delay between exposure and onset of symptoms (30 minutes to a few hours) with a peak in about 8 hours and complete clearance within 24 hours. Inflammation (redness, swelling, blistering) is not apparent. Permethrin tends to produce relatively mild effects.(12-16) Of a group of 4 pyrethroids tested (permethrin, cypermethrin, fenvalerate and flucythrinate), permethrin produced the least amount of skin sensation. Forestry workers exposed to permethrin reported symptoms that were mainly irritative, such as itching and burning of the skin. However, it could not be discerned whether this sensation was an irritative one or a sign of peripheral sensory nerve involvement.

EYE CONTACT : Among forestry workers exposed to permethrin, eye irritation was reported for 7% or 18% of planters, depending on formulation used.(12) There are no reports of eye damage from permethrin contact.

INGESTION : No human cases of ingestion have been reported. Animal data indicates relatively low acute oral toxicity for permethrin. Due to its low toxicity and rapid metabolism, toxic effects are not expected unless there is accidental ingestion of large amounts. In this case, nervous system occur.

CARCINOGENICITY : No information available
TERATOGENICITY AND EMBRYOTOXICITY : No human information available. No teratogenic or embryotoxic effects in mice.
REPRODUCTIVE TOXICITY : No information available.
MUTAGENICITY : No human information available. Permethrin was not mutagenic in a variety of short-term tests.
TOXICOLOGICALLY SYNERGISTIC MATERIALS : No information available.
POTENTIAL FOR ACCUMULATION : Animal studies indicate rapid breakdown and excretion of this pyrethroid. Thus, the potential for accumulation in humans is considered to be low.

SECTION 4. FIRST AID MEASURES

INHALATION : If symptoms are experienced, remove source of contamination or move victim to fresh air. Obtain medical advice immediately.
SKIN CONTACT : Symptoms of skin contact are delayed. Therefore, if contact occurs, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts).
Gently blot or brush away excess chemical quickly. Wash gently and thoroughly with water and non-abrasive soap. If symptoms occur, obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before reuse, or discard.
EYE CONTACT : Gently blot or brush away excess chemical quickly. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes, by the clock, holding the eyelid(s) open. If irritation persists, obtain medical advice immediately.
INGESTION : Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz.) of water. If vomiting occurs naturally, rinse mouth and repeat administration of water. Obtain medical attention immediately.
FIRST AID COMMENTS : Consult a physician No special procedures required for permethrin. Flash point data is not available, but it is probable the material can burn only if strongly heated. Cool fire-exposed containers. Pesticide formulations may contain combustible ingredients. Select extinguishing media and prepare fire fighting and/or the nearest Poison Control Center for all exposures except minor instances of inhalation or skin contact. All first aid procedures should be periodically reviewed by a physician familiar with the material and its conditions of use in the workplace. NOTE: Other ingredients in permethrin formulations may cause toxic effects and require specific first aid measures.
NOTE TO PHYSICIANS : Studies with permethrin showed that topical Vitamin E acetate (dl-alpha tocopheryl acetate) reduced or eliminated the sensations from skin contact. Mephenesin (a muscle relaxant) has been proposed for use in treatment of pyrethroid poisoning. In tests with rats receiving lethal doses of the pyrethroids cismethrin and deltamethrin, all animals survived when treated with mephenesin.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT : No information available. Probably can burn only if strongly heated.
LOWER FLAMMABLE (EXPLOSIVE) LIMIT (LFL/LEL) : Not available
UPPER FLAMMABLE (EXPLOSIVE) LIMIT (UFL/UEL) : Not available
AUTOIGNITION (IGNITION) TEMPERATURE : Not available
EXPLOSION DATA - SENSITIVITY TO MECHANICAL IMPACT : Probably not sensitive.
EXPLOSION DATA - SENSITIVITY TO STATIC CHARGE : Information not available
COMBUSTION AND THERMAL DECOMPOSITION PRODUCTS :Carbon monoxide, carbon dioxide, hydrogen chloride gas.
FIRE HAZARD COMMENTS : Permethrin may emit toxic hydrogen chloride gas at high temperatures.
EXTINGUISHING MEDIA : Carbon dioxide, dry chemical powder, alcohol foam, polymer foam, water fog.
FIRE FIGHTING INSTRUCTIONS :

procedures appropriate for the product as a whole.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PRECAUTIONS : Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Ventilate area. Notify occupational health and safety and environmental authorities.
CLEAN-UP :Prevent material from entering sewers or waterways. Do not touch spilled material. Stop or reduce leak if safe to do so. Contain spill with earth, sand or absorbent material which does not react with spilled material. Small spills (liquid): Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Small spills (solid): Shovel into clean, dry, labelled containers and cover. Large spills: Contact fire and emergency services and supplier for advice.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION GUIDELINES :No specific guidelines are available. Contact manufacturer or supplier for advice.The NIOSH recommendations for PYRETHRUM may be applicable. See CHEMINFO record number 311 (Pyrethrins) for details.
EYE/FACE PROTECTION : No specific requirement, but it is good practice to wear chemical safety goggles. During pesticide application, a full-face shield may also be required to ensure adequate protection.

SKIN PROTECTION : No specific requirement, but it is good practice to prevent skin contact. During pesticide application, this will require the use of impervious gloves, overalls, boots and/or other resistant protective clothing.
RESISTANCE OF MATERIALS FOR PROTECTIVE CLOTHING : No specific information is available. Contact manufacturer/supplier for advice. Polyvinyl alcohol (PVA) provides good resistance to pyrethrins and related materials (higher monobasic carboxylic esters). Consider solvent base when selecting resistant materials for pyrethroid formulations. NOTE: Resistance of specific materials can vary from product to product. Evaluate resistance under conditions of use and maintain clothing carefully.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

MELTING POINT: 34-35 deg C (pure)
BOILING POINT: Very high (approximately 200 deg C at 0.008 mm Hg); probably decomposes on heating.
RELATIVE DENSITY (SPECIFIC GRAVITY) : 1.19-1.27 at 20 deg C (water = 1)
SOLUBILITY IN WATER : Practically insoluble (0.2 mg/L at 20 deg C)
SOLUBILITY IN OTHER LIQUIDS : Readily soluble in common organic solvents such as alcohols, acetone, ether, chloroform, methylene chloride, xylene; moderately soluble in ethylene glycol.
VAPOUR DENSITY: Not applicable
VAPOUR PRESSURE: Very low (3.4 x 10(-7) mm Hg at 25 deg C)
SATURATION VAPOUR CONCENTRATION : Not applicable
EVAPORATION RATE : Practically zero.
pH VALUE: Not available
CRITICAL TEMPERATURE: Not applicable
COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT) : Log P(oct) = 6.5. Also reported as 3.48.

SECTION 10. STABILITY AND REACTIVITY

INCOMPATIBILITY - MATERIALS TO AVOID : STRONG OXIDIZING AGENTS - May increase the risk of fire. STRONG BASES - Cause decomposition of material. CALCIUM NITRATE
CORROSIVITY TO METALS : Not corrosive to aluminum.
STABILITY AND REACTIVITY COMMENTS

STABILITY : Stable to heat (more than 2 years at 50 deg C).(2) Relatively stable in sunlight.(17) More stable in acid than alkaline media with optimum stability at about pH 4.(2)
HAZARDOUS POLYMERIZATION : Does not occur
HAZARDOUS DECOMPOSITION PRODUCTS : None known

:Permethrin is more stable to sunlight than natural pyrethrins, but some
degradation does occur.

SECTION 13. DISPOSAL CONSIDERATIONS

Pyrethroids are highly toxic to fish. Do not release to water. Disposal by controlled incineration or secure landfill may be acceptable. Treat with alkali (lime) before landfilling. Decontamination of waste material should only be done by specially-trained personnel using appropriate facilities and
protective equipment. Incineration must be carried out in approved facilities equipped with adequate emission control devices. Comply with applicable federal, state and local government regulations regarding disposal.

*** IDENTIFICATION ***

MSDS RECORD NUMBER : 802164
PRODUCT NAME(S) : CFR 40-86-96 RON UNLEADED GASOLINE + 15% MTBE
PRODUCT IDENTIFICATION : PRODUCT CODE R00000573200
DATE OF MSDS : 1994-09-13

*** MATERIAL SAFETY DATA ***

PRIMARY APPLICATION- MOTOR FUEL

SYNONYMS..... : UNLEADED PREMIUM GASOLINE
CAS REGISTRY NO: SEE SEC. 2
CAS NAME..... : NO CLASSIFICATION - MIXTURE
CHEMICAL FAMILY: MOTOR FUEL.

EMERGENCY PHONE NUMBERS (AFTER NORMAL BUSINESS HOURS)
CHEMTREC. 1-800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

EXPOSURE GUIDELINES

			OSHA		ACGIH				
COMPONENT/CAS NO.	LO%	HI%	TWA	STEL	TWA	STEL	TWA	STEL	UNIT
LIMITS FOR THE PRODUCT:									
			300	500	300	500			PPM
XYLENE									
1330-20-7	.00	25.00	100	150	100	150			PPM
TERT-BUTYL ALCOHOL									
75-65-0	.00	10.00	100	150	100	150			PPM
MTBE									
1634-04-4	15.00	20.00					100	150	PPM
TOLUENE									
108-88-3	.00	30.00	100	150	50				PPM
BENZENE									
71-43-2	.10	4.90	1	5	10				PPM
LIGHT PETROLEUM DISTILLATE									
8006-61-9	.00	84.00	300	500	300	500			PPM
CUMENE									
98-82-8	.00	1.00	50		50				PPM
ETHYL BENZENE									
100-41-4	.00	5.00	100	125	100	125			PPM
N-HEXANE									
110-54-3	.00	5.00	50		50				PPM
NAPHTHALENE									
91-20-3	.00	5.00	10	15	10	15			PPM
CYCLOHEXANE									
110-82-7	.00	9.00	300		300				PPM
1,2,4-TRIMETHYLBENZENE									
95-63-6	.00	5.00	25		25				PPM

ADDITIONAL EXPOSURE LIMITS
OTHER LIMIT- LIMIT IS DEPENDENT ON BENZENE, SEE SECTION 10

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
DANGER EXTREMELY FLAMMABLE LIQUID & VAPOR - VAPOR MAY CAUSE FLASH FIRE.

HARMFUL IF INHALED. HIGH VAPOR CONCENTRATIONS MAY CAUSE DIZZINESS. MAY CAUSE SKIN IRRITATION.

HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNGS AND CAUSE DAMAGE. CONTAINS MATERIAL
WHICH CAN CAUSE CANCER.

APPEARANCE-- COLORLESS LIQUID. ODOR-- GASOLINE ODOR

POTENTIAL HEALTH EFFECTS

PRIMARY ROUTES OF ENTRY- INHALATION(X) SKIN(X) EYE(X) INGESTION(X)

INHALATION: EXCESSIVE EXPOSURES MAY CAUSE IRRITATION TO EYES, NOSE, THROAT AND LUNGS. RESPIRATORY TRACT; CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS;
HEADACHES, NAUSEA; DIZZINESS, LOSS OF BALANCE AND COORDINATION;
UNCONSCIOUSNESS, COMA; RESPIRATORY FAILURE AND DEATH. REPEATED EXCESSIVE EXPOSURES MAY CAUSE BLOOD DISORDERS SUCH AS ANEMIA & LEUKEMIA. CONTAINS A MATERIAL WHICH HAS BEEN RELATED TO CANCER IN HUMANS.

SKIN
SKIN ABSORPTION OF MATERIAL MAY PRODUCE SYSTEMIC TOXICITY. MAY CAUSE MODERATE IRRITATION WITH PROLONGED OR REPEATED CONTACT.

EYE
CONTACT WITH THE EYE MAY CAUSE MILD IRRITATION.

INGESTION
HARMFUL OR FATAL IF SWALLOWED. INGESTION OF THIS MATERIAL MAY CAUSE ABDOMINAL PAIN; PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. CONTAINS MATERIAL THAT HAS
BEEN RELATED TO CANCER IN HUMANS.

CARCINOGEN LISTED BY-IARC(YES) NTP(NO) OSHA(YES) ACGIH(NO) OTHER(NO)

PRE-EXISTING MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE-
DISORDERS AND DISEASES OF THE SKIN, EYE, BLOOD FORMING ORGANS,
NERVOUS SYSTEM AND OR PULMONARY SYSTEM, LUNG (E.G. ASTHMA-LIKE CONDITIONS).

4. FIRST AID MEASURES

INHALATION
MOVE PERSON TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, OBTAIN MEDICAL ASSISTANCE.

SKIN
WASH WITH SOAP AND WATER UNTIL NO ODOR REMAINS. IF REDNESS OR SWELLING DEVELOPS, OBTAIN MEDICAL ASSISTANCE. IMMEDIATELY REMOVE SOAKED CLOTHING.
WASH CLOTHING BEFORE REUSE.

EYE
FLUSH WITH WATER FOR AT LEAST 15 MINUTES. IF IRRITATION PERSISTS, OBTAIN MEDICAL

ASSISTANCE.

INGESTION
DO NOT INDUCE VOMITING] DO NOT GIVE LIQUIDS] OBTAIN EMERGENCY MEDICAL ATTENTION. SMALL AMOUNTS WHICH ACCIDENTALLY ENTER MOUTH SHOULD BE RINSED
OUT UNTIL TASTE OF IT IS GONE.

5. FIRE FIGHTING MEASURES

FLASH POINT: -40 CLOSED CUP (DEG. F); -40 CLOSED CUP (DEG. C)
AUTOIGNITION TEMP.: APPROX. 750 (DEG. F); APPROX. 400 (DEG. C)

---FLAMMABLE LIMITS IN AIR---
LOWER EXPLOSIVE LIMIT (LEL): 1.5 % VOLUME
UPPER EXPLOSIVE LIMIT (UEL): 7.6 % VOLUME

FIRE AND EXPLOSION HAZARDS
EXTREMELY FLAMMABLE LIQUID (FLASH POINT LESS THAN 20F)

EXTINGUISHING-MEDIA
WATER SPRAY. REGULAR FOAM. DRY CHEMICAL. CARBON DIOXIDE.

SPECIAL FIRE FIGHTING INSTRUCTIONS
COOL TANK/ CONTAINER. WEAR SELF-CONTAINED BREATHING APPARATUS. WEARSTRUCTURAL FIREFIGHTERS PROTECTIVE CLOTHING.

NFPA/HMIS CLASSIFICATION HAZARD RATING
HEALTH - 1 / 1 FIRE - 3 / 3

0=LEAST 1=SLIGHT 2=MODERATE
3=HIGH 4=EXTREME

REACTIVITY - 0 / 0
PERSONAL PROTECTION INDEX - X

SPECIFIC HAZARD: FLAMMABLE

6. ACCIDENTAL RELEASE MEASURES

PREVENT IGNITION; STOP LEAK; VENTILATE AREA. CONTAIN SPILL. USE WATER SPRAY TO DISPERSE VAPORS. KEEP UPWIND OF LEAK. FOR LARGE SPILL, LEAK OR RELEASE. USE PERSONAL PROTECTIVE EQUIPMENT STATED IN SECTION 8. ADVISE EPA; STATE AGENCY IF REQUIRED. ABSORB ON INERT MATERIAL. SHOVEL, SWEEP
OR VACUUM SPILL.

7. HANDLING AND STORAGE

KEEP AWAY FROM HEAT, SPARKS AND FLAME. KEEP CONTAINER TIGHTLY CLOSED. KEEP IN WELL VENTILATED SPACE. NFPA CLASS IA STORAGE. CONSULT NFPA AND OSHA CODES. TRANSFER OPERATIONS MUST BE ELECTRICALLY GROUNDED TO
DISSIPATE STATIC BUILDUP. AVOID PROLONGED BREATHING OF MIST OR VAPOR. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. AVOID CONTACT WITH EYES.
WASH THOROUGHLY AFTER HANDLING. NEVER SIPHON BY MOUTH.

8. EXPOSURE CONTROL / PERSONAL PROTECTION

CONSULT WITH A HEALTH/SAFETY PROFESSIONAL FOR SPECIFIC SELECTION.

VENTILATION
USE ONLY WITH ADEQUATE VENTILATION. EXPLOSION PROOF VENTILATION EQUIPMENT REQUIRED.

PERSONAL PROTECTIVE EQUIPMENT

EYE
SPLASH PROOF CHEMICAL GOGGLES OR FULL FACE SHIELD RECOMMENDED TO PROTECT AGAINST SPLASH OF PRODUCT.

GLOVES
PROTECTIVE GLOVES RECOMMENDED TO PROTECT AGAINST CONTACT WITH PRODUCT. THE FOLLOWING GLOVE MATERIALS ARE ACCEPTABLE: POLYETHYLENE; NEOPRENE;
NITRILE; POLYVINYL ALCOHOL; VITON;

RESPIRATOR
CONCENTRATION-IN-AIR DETERMINES PROTECTION NEEDED. USE ONLY NIOSH CERTIFIED RESPIRATORY PROTECTION. HALF-MASK AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES IS ACCEPTABLE TO 10 TIMES THE EXPOSURE LIMIT. FULL-FACE AIR PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES
IS ACCEPTABLE TO 50 TIMES THE EXPOSURE LIMIT NOT TO EXCEED THE CARTRIDGE LIMIT OF 1000 PPM. PROTECTION BY AIR PURIFYING RESPIRATORS IS LIMITED. USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR OR SCBA FOR EXPOSURES ABOVE 50X THE EXPOSURE LIMIT. IF EXPOSURE IS ABOVE IDLH(IMMEDIATELY DANGEROUS TO LIFE & HEALTH) OR THERE IS THE POSSIBILITY OF AN UNCONTROLLED RELEASE OR EXPOSURE LEVELS ARE UNKNOWN THEN USE A POSITIVE PRESSURE-DEMAND FULL-FACE SUPPLIED AIR RESPIRATOR WITH ESCAPE BOTTLE OR SCBA.

OTHER
IF CONTACT IS UNAVOIDABLE, WEAR CHEMICAL RESISTANT CLOTHING. THE
FOLLOWING MATERIALS ARE ACCEPTABLE AS PROTECTIVE CLOTHING MATERIALS:
POLYETHYLENE; POLYVINYL ALCOHOL(PVA); NEOPRENE; NITRILE; VITON; POLYURETHANE; SAFETY SHOWER AND EYE WASH AVAILABILITY RECOMMENDED.
LAUNDER SOILED CLOTHES. FOR NON-FIRE EMERGENCIES, POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (SCBA) & STRUCTURAL FIREFIGHTERS'
PROTECTIVE CLOTHING WILL PROVIDE LIMITED PROTECTION.

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT..... : <100 - 435 (DEG. F) <38 - 223 (DEG. C)
MELTING POINT..... : N/A
SPECIFIC GRAVITY... : 0.74 (WATER=1)
PACKING DENSITY.... : N/A (KG/M3)
VAPOR PRESSURE..... : 325 TO 525 (MM HG @ 20 DEG C)
VAPOR DENSITY..... : 4 (AIR=1)
SOLUBILITY IN WATER.: SLIGHT (% BY VOLUME)
PH INFORMATION..... : N/A AT CONC. N/A G/L H2O
% VOLATILES BY VOL..: 100
EVAPORATION RATE... : RAPID & VARIES (ETHYL ETHER=1)
OCTANOL/WATER COEFF.: N.D.
APPEARANCE..... : COLORLESS LIQUID.
ODOR..... : GASOLINE ODOR
ODOR THRESHOLD..... : 15(EST) (PPM)
VISCOSITY..... : N.D. SUS @ N.D DEG F ... N.D. CST @ N.D DEG C

MOLECULAR WEIGHT... : N.D. (G/MOLE)

10. STABILITY AND REACTIVITY

STABILITY
STABLE. CONDITIONS TO AVOID-
SOURCES OF IGNITION.
INCOMPATIBLE MATERIALS
STRONG OXIDIZERS
HAZARDOUS DECOMPOSITION
CARBON MONOXIDE AND ASPHYXIANTS ARE PRODUCED BY FIRE IGNITION

POLYMERIZATION
WILL NOT OCCUR.

11. TOXICOLOGICAL INFORMATION

FOR THE PRODUCT
INHALATION: OVEREXPOSURE MAY CAUSE EYE & RESPIRATORY TRACT IRRITATION, CNS (BRAIN) EFFECTS, DIZZINESS, LOSS OF BALANCE & COORDINATION, COMA, UNCONSCIOUSNESS, DEATH. CONTAINS

BENZENE: PROLONGED/REPEATED OVER- EXPOSURE TO BENZENE CAN CAUSE BLOOD DISORDERS RANGING FROM ANEMIA TO LEUKEMIA. SKIN: PROLONGED/WIDESPREAD CONTACT MAY CAUSE ADVERSE EFFECT, IRRITATION. EYE: MILD IRRITANT.

ORAL: HARMFUL/FATAL IF SWALLOWED.
ASPIRATION HAZARD--CAN ENTER LUNGS & CAUSE DAMAGE. LIFETIME INHALATION CAUSED LIVER TUMORS (FEMALE MICE)--API STUDY ON AN UNLEADED GASOLINE.
GASOLINE ENGINE EXHAUST CLASSIFIED AS POSSIBLE (IARC 2B) CARCINOGEN (INADEQUATE EVIDENCE EXISTS IN ANIMALS & HUMANS).

XYLENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, DIFFICULTY IN BREATHING, UNCONSCIOUSNESS, COMA AND DEATH.
REPORTS OF HEART IRREGULARITIES FROM MASSIVE EXPOSURES.
PROLONGED OVEREXPOSURES CAN CAUSE BRAIN, LIVER, KIDNEY EFFECTS/DAMAGE.

SKIN: CAN BE ABSORBED. REPEATED/PROLONGED CONTACT IS IRRITATING. EYES: IRRITANT. ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNGS AND CAUSE DAMAGE. IN RATS, PROLONGED BREATHING OF 500 PPM-FETAL EFFECTS BUT NO BIRTH DEFECTS; NO EFFECTS AT 400 PPM.
HIGH ORAL DOSE WAS TOXIC TO PREGNANT MICE; CLEFT PALATE IN FETUSES.

TERT-BUTYL ALCOHOL (COMPONENT)
INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, HEADACHE, NAUSEA, DIZZINESS, DROWSINESS, VOMITING, FATIGUE, BLURRED VISION, LOSS OF BALANCE, UNCONSCIOUSNESS.

SKIN: SLIGHT IRRITANT.

EYES: SEVERE IRRITATION WITH CONTACT.

ORAL: MODERATELY TOXIC.

SYMPTOMS SIMILAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED.
PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. CAUSED TOXICITY/DAMAGE TO FETUS WHEN
REPEATEDLY FED AT VERY HIGH CONCENTRATIONS TO PREGNANT MICE.

MTBE (COMPONENT) INHALATION: MAY CAUSE EYE & RESPIRATORY TRACT IRRITATION, COUGHING,
SHORTNESS OF BREATH, CNS (BRAIN) EFFECTS, HEADACHE, NAUSEA, DIZZINESS, INCOORDINATION. SKIN: PROLONGED/REPEATED CONTACT MAY CAUSE IRRITATION.

EYE CONTACT: IRRITATION. ORAL: MODERATE ACUTE TOXICITY. HARMFUL OR FATAL IF SWALLOWED AND/OR VOMITING OCCURS BECAUSE IT CAN ENTER LUNGS AND CAUSE DAMAGE--PULMONARY ASPIRATION HAZARD. LIFETIME OVEREXPOSURES
AT HIGH CONCENTRATIONS: 3000 PPM & HIGHER--RATS: DEATH, KIDNEY DAMAGE, AND KIDNEY TUMORS (MALES); AT 8000 PPM-- LIVER TUMORS IN FEMALE MICE.
MICE: MATERNAL TOXICITY & FETAL EFFECTS AT 4000 PPM. HUMAN EXPOSURES AT THESE HIGH CONCENTRATIONS ARE HIGHLY UNLIKELY.

TOLUENE (COMPONENT) INH: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS: EYE, NOSE, THROAT, LUNG IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, DIFFICULTY IN BREATHING, COMA, DEATH. REPORTS OF HEART BEAT IRREGULARITIES FROM MASSIVE EXPOSURE. PROLONGED OVEREXPOSURE CAN CAUSE BRAIN, LIVER, KIDNEY EFFECTS/DAMAGE. SKIN: CAN BE ABSORBED. PROLONGED CONTACT IS IRRITATING.

EYE: IRRITATION.

ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD-CAN ENTER LUNG & CAUSE DAMAGE. PREG: MAY
CAUSE MENTAL AND/OR GROWTH RETARDATION IN CHILDREN OF FEMALE SOLVENT ABUSERS (SNIFFERS); IN RATS PROLONGED BREATHING WAS TOXIC TO FETUSES &
MOTHERS - 1500 PPM; NO BIRTH DEFECTS - 5000 PPM. NO EFFECTS - 750 PPM.

BENZENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN
CAUSE CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS, HEADACHE, DIZZINESS, DIFFICULTY IN BREATHING, UNCONSCIOUSNESS, COMA, DEATH. THERE ARE REPORTS OF HEART IRREGULARITIES FROM MASSIVE EXPOSURES. IARC GROUP 1- HUMAN CANCER HAZARD. REPEATED PROLONGED INHALATION CAN CAUSE BLOOD DISORDERS-ANEMIA TO LEUKEMIA. CANCER-ANIMAL STUDIES. CHANGES IN CHROMOSOMES. FETAL EFFECTS IN ANIMAL STUDIES AT REPEATED/PROLONGED EXPOSURES.

SKIN: CAN BE ABSORBED; IRRITATING.

EYE: SEVERE IRRITATION POSSIBLE.

ORAL: POISON] HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD- CAN ENTER LUNGS AND CAUSE DAMAGE.

LIGHT PETROLEUM DISTILLATE (COMPONENT) INHALATION: OVEREXPOSURE MAY CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT
IRRITATION; CNS (BRAIN) EFFECTS, NAUSEA, DIZZINESS, UNCONSCIOUSNESS, COMA, RESPIRATORY FAILURE, DEATH. SKIN: IRRITATION WITH PROLONGED AND REPEATED CONTACT.

EYE: MILD TO MODERATE IRRITATION. ORAL: HARMFUL OR FATAL IF SWALLOWED DUE TO A PULMONARY ASPIRATION HAZARD IF SWALLOWED
AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE.

CUMENE (COMPONENT) INHALATION: VAPOR HARMFUL] OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT IRRITATION, CNS (BRAIN) EFFECTS, NAUSEA, HEADACHE, DIZZINESS, DIFFICULTY IN BREATHING, INCOORDINATION, UNCONSCIOUSNESS, DEATH. SKIN: LOW ACUTE TOXICITY. CAN BE ABSORBED. MODERATE IRRITATION. EYE: MILD IRRITANT.

ORAL: MODERATE ACUTE TOXICITY. HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD - CAN ENTER LUNGS AND CAUSE DAMAGE. OVEREXPOSURE BY INHALATION/INGESTION MAY CAUSE LIVER, KIDNEY, SPLEEN AND LUNG EFFECTS/DAMAGE. EQUIVOCAL RESULTS IN ANIMAL STUDY REPORTING BIRTH DEFECTS & EMBRYONAL MORTALITY. CONFLICTING RESULTS IN GENETIC TESTS.

ETHYL BENZENE (COMPONENT)

INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT & RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM (BRAIN) EFFECTS, DIZZINESS, LOSS OF BALANCE & COORDINATION, UNCONSCIOUSNESS, RESPIRATORY FAILURE & DEATH. PROLONGED BREATHING CAN CAUSE LIVER AND KIDNEY EFFECTS.

SKIN: LOW ACUTE TOXICITY. ABSORBABLE THROUGH SKIN. MODERATE IRRITATION.

EYE: MODERATE IRRITANT.

ORAL: HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS-CAN ENTER LUNGS AND CAUSE DAMAGE. PROLONGED OVEREXPOSURE OF 1000 PPM CAUSED MATERNAL AND FETAL TOXICITY.

N-HEXANE (COMPONENT) INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY TRACT IRRITATION; CNS (BRAIN) EFFECTS, DIZZINESS, CONFUSION, COMA.

SKIN: CAN BE ABSORBED. PROLONGED AND REPEATED CONTACT MAY CAUSE IRRITATION, BURNING SENSATION, ITCHING, BLISTERS.

EYE: IRRITATING; REPEATED EXPOSURE MAY CAUSE VISUAL DISTURBANCE.

INGESTION: ASPIRATION HAZARD IF SWALLOWED AND/OR VOMITING OCCURS - CAN ENTER LUNGS AND CAUSE DAMAGE. PROLONGED EXPOSURES CAUSE HARM TO THE CENTRAL NERVOUS SYSTEM PRODUCING A LACK OF FEELING IN EXTREMITIES (HANDS AND FEET) AND MORE SEVEE NERVE DAMAGE (PERIPHERAL NEUROPATHY).

NAPHTHALENE (COMPONENT)
INHALATION: VAPORS MAY CAUSE RESPIRATORY TRACT IRRITATION, HEADACHE, CONFUSION, EXCITEMENT, PROFUSE SWEATING, ABDOMINAL PAIN, VOMITING, DIARRHEA.

SKIN: MAY BE ABSORBED THROUGH THE SKIN. MAY CAUSE IRRITATION AND DERMATITIS. CAN CAUSE ALLERGIC SKIN REACTION.

EYE: VAPOR CAUSES IRRITATION AT 15 PPM. CONTACT MAY CAUSE IRRITATION, CONJUNCTIVITIS, CORNEAL OPACITY. REPORTED TO CAUSE CATARACTS.

ORAL: MODERATELY TOXIC IF SWALLOWED . BLOOD EFFECTS (HEMOLYSIS), LIVER &

KIDNEY INJURY MAY ALSO OCCUR. MAY CAUSE GASTROINTESTINAL IRRITATION, VOMITING, AND DIARRHEA.

CYCLOHEXANE (COMPONENT)
INHALATION: OVEREXPOSURE TO HIGH CONCENTRATIONS CAN CAUSE EYE, NOSE, THROAT, RESPIRATORY IRRITATION; CNS (BRAIN) EFFECTS, HEADACHE, DIZZINESS, EXCITEMENT, DIFFICULTY BREATHING, FATIGUE, INCOORDINATION, ANESTHESIA, UNCONSCIOUSNESS, DEATH.

SKIN: LOW ACUTE TOXICITY. MAY BE
IRRITATING WITH PROLONGED AND REPEATED CONTACT.

EYE: MAY CAUSE MILD IRRITATION WITH CONTACT.

ORAL: MODERATE ACUTE TOXICITY. INGESTION OF LARGE QUANTITIES MAY CAUSE EFFECTS SIMILIAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED AND/OR VOMITING OCCURS BECAUSE IT CAN ENTER LUNGS AND CAUSE DAMAGE--PULMONARY ASPIRATION HAZARD.

1,2,4-TRIMETHYLBENZENE (COMPONENT) INHALATION: MODERATELY TOXIC. VAPOR OR MIST IRRITATES THE EYES, MUCOUS
MEMBRANES, RESPIRATORY TRACT. OVEREXPOSURE MAY CAUSE CENTRAL
NERVOUS SYTEM (BRAIN) EFFECTS, NARCOTIC EFFECTS, NAUSEA, HEADACHE, DIZZINESS, INCOORDINATION, UNCONSCIOUSNESS, COMA, DEATH.

SKIN: CAN BE ABSORBED. CONTACT MAY CAUSE IRRITATION AND DERMATITIS. EYE: IRRITATING

INGESTION: MODERATELY TOXIC. SYMPTOMS SIMILAR TO INHALATION. HARMFUL OR FATAL IF SWALLOWED. PULMONARY ASPIRATION HAZARD- HARMFUL OR FATAL BECAUSE IT CAN ENTER THE LUNGS AND CAUSE DAMAGE.

12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY: GASOLINE SPILLS ARE TOXIC TO FISH AND AQUATIC FLORA.

13. DISPOSAL CONSIDERATIONS

FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS. RCRA HAZARDOUS WASTE. DO NOT FLUSH TO DRAIN/ STORM SEWER. CONTRACT TO AUTHORIZED DISPOSAL SERVICE.

14. TRANSPORTATION INFORMATION

DOT- PROPER SHIPPING NAME- GASOLINE HAZARD CLASS- 3 (FLAMMABLE LIQUID) IDENTIFICATION NUMBER- UN1203
LABEL REQUIRED- PG II, PLACARD; FLAMMABLE LIQUID
IMDG- PROPER SHIPPING NAME- GASOLINE
IATA- PROPER SHIPPING NAME- GASOLINE

15. REGULATORY INFORMATION

SARA 302 THRESHOLD PLANNING QUANTITY. N/A

SARA 304 REPORTABLE QUANTITY ..... 204 POUNDS

SARA 311 CATEGORIES- IMMEDIATE (ACUTE) HEALTH EFFECTS.. Y
DELAYED (CHRONIC) HEALTH EFFECTS.. Y
FIRE HAZARD ..... Y
SUDDEN RELEASE OF PRESSURE HAZARD. N

REACTIVITY HAZARD ..... N

WHEN A PRODUCT AND/OR COMPONENT IS LISTED BELOW, THE REGULATORY LIST ON WHICH IT APPEARS IS INDICATED.

FOR THE PRODUCT - FL MA MN NJ 03 04
XYLENE - FL IL MA ME MN NJ PA RI 01 07
TERT-BUTYL ALCOHOL - FL MA MN NJ PA 01
MTBE - MA NJ PA 01 07
TOLUENE - CA FL MA MN NJ PA 01 07
BENZENE - CA FL MA MN NJ PA 01 03 04 06 07 10
LIGHT PETROLEUM DISTILLATE - FL MA MN NJ
CUMENE - FL MA MN NJ PA 01 07
ETHYL BENZENE - FL MA MN NJ PA 01 07
N-HEXANE - FL MA MN NJ PA
NAPHTHALENE - FL MA MN NJ PA 01 07
CYCLOHEXANE - FL MA MN NJ PA 01 07
1,2,4-TRIMETHYLBENZENE - MA NJ PA 01

01=SARA 313
02=SARA 302/304
03=IARC CARCINOGEN
04=OSHA CARCINOGEN
05=ACGIH CARCINOGEN
06=NTP CARCINOGEN
07=CERCLA 302.4
08=WHMIS CONTROLLED PROD.
10=OTHER CARCINOGEN

THIS PRODUCT OR ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE U.S. TSCA INVENTORY.

16. OTHER INFORMATION

PRECAUTIONARY LABELING FOR PUMPS, PORTABLE CONTAINERS, AND DRUMS IS REQUIRED. A "HAZARDOUS WHEN EMPTY" PICTOGRAM AND D.O.T. FLAMMABLE LIQUID LABEL ARE ALSO REQUIRED FOR DRUMS. BECAUSE BENZENE IS PRESENT IN THIS PRODUCT ABOVE 0.1%, THE OSHA STANDARD
FOR BENZENE IS APPLICABLE TO WORK LOCATIONS UPSTREAM OF FINAL DISCHARGE FROM TERMINALS. CONSULT 29CFR1910.1028 FOR DETAILS. PROLONGED AND REPEATED EXCESSIVE EXPOSURES TO BENZENE CAN RESULT IN BLOOD DISORDERS
RANGING FROM ANEMIA TO LEUKEMIA. RECOMMEND THAT EXPOSURES TO BENZENE BE KEPT BELOW 1.0 PPM FOR 8-HOURS; 5.0 PPM FOR 15-MIN. NORMAL SERVICE STATION OPERATIONS ARE BELOW THESE VALUES. FOR USE AS A MOTOR
FUEL ONLY. DO NOT USE FOR ANY OTHER PURPOSE.

APPENDIX E - ATTACHMENT 7: SAFETY FORMS

This attachment contains the following safety forms for the Site Inspection at the Waikane Valley Training Area:

- Accident Investigation Report
- Contractor Significant Incident Report (CSIR-1)
- Employee Injury Report
- Heat Stress Alert Checklist
- Heat Stress Field Monitoring Log
- Record of Safety Violation or Non-Compliance
- Safety Inspection Report
- Safety Meeting/Training Form
- Site Visitor Log
- Tailgate Safety Briefing

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For Safety Staff Only	Report No.	EROC Code	**UNITED STATES ARMY CORPS OF ENGINEERS** **ACCIDENT INVESTIGATION REPORT** (For use of this form, see help menu and USACE supplement to AR 385-40)	Requirement Control Symbol: CEEC-S-8-(R2)

1. ACCIDENT CLASSIFICATION

Personnel Classification	Injury/Illness/Fatal	Property Damage	Motor Vehicle Involved	Diving
Government ☐ Civilian ☐ Military	☐	☐ Fire Involved ☐ Other	☐	☐
☐ Contractor	☐	☐ Fire Involved ☐ Other	☐	☐
☐ Public ☐ Fatal ☐ Other			☐	

2. PERSONAL DATA

a. Name (Last, First, MI)	b. Age	c. Sex ☐ Male ☐ Female	d. Social Security Number	e. Grade
f. Job Series/Title	g. Duty Status at Time of Accident ☐ On Duty ☐ TDY ☐ Off Duty	h. Employment Status at Time of Accident ☐ Army Active ☐ Army Reserve ☐ Volunteer ☐ Permanent ☐ Foreign National ☐ Seasonal ☐ Temporary ☐ Student ☐ Other (specify)		

3. GENERAL INFORMATION

a. Date of Accident (month/day/year)	b. Time of Accident (military time) hrs	c. Exact Location of Accident	d. Contractor's Name 1) Prime: 2) Subcontractor:
e. Contract Number ☐ Civil Works ☐ Military ☐ Other (specify)	f. Type of Contract ☐ Construction ☐ Service ☐ A/E ☐ Dredge ☐ Other (specify)	g. Hazardous/Toxic Waste Activity ☐ SuperFund ☐ DERP ☐ IRP ☐ Other (specify)	

4. CONSTRUCTION ACTIVITIES ONLY (Fill in time and corresponding code number in box from list – see help menu)

a. Construction Activity Code #	b. Type of Construction Equipment Code #

5. INJURY/ILLNESS INFORMATION (Include name and corresponding code number in box for items e, f, g – see help menu)

a. Severity of Illness/Injury Code #	b. Estimated Days Lost	c. Estimated Days Hospitalized	d. Estimated Days Restricted Duty
e. Body Part Affected Primary Code # Secondary Code #	g. Type and Source of Injury/Illness Type Code # Source Code #		
f. Nature of Illness/Injury Code #			

6. PUBLIC FATALITY (Fill in line and corresponding code number in box – see help menu)

a. Activity at Time of Accident Code #	b. Personal Flotation Device Used? ☐ Yes ☐ No ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. Type of Vehicle	b. Type of Collision	c. Seat Belts	Used	Not Used	Not Available
☐ Pickup/Van ☐ Truck ☐ Automobile ☐ Other (specify)	☐ Side Swipe ☐ Head On ☐ Rear End ☐ Broadside ☐ Roll Over ☐ Backing ☐ Other (specify)	1) Front Seat ☐			
		2) Rear Seat ☐			

8. PROPERTY/MATERIAL INVOLVED

a. Name of Item	b. Ownership	c. $ Amount of Damage
1)		
2)		
3)		

9. VESSEL/FLOATING PLANT ACCIDENT (Fill in line and corresponding code number in box from list – see help menu)

a. Type of Vessel/Floating Plant Code #	b. Type of Collision/Mishap Code #

10. ACCIDENT DESCRIPTION (Use additional paper, if necessary)

11.	**CAUSAL FACTOR(S)** (Read instructions before completing)			
a. (ExplainYES answers in item 13)	YES	NO	(Continued)	YES NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐	CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents such as dust, fumes, mists, vapors or physical agents, such as noise, radiation, etc., contribute to the accident?	☐ ☐
INSPECTION/MAINTENANCE: Were inspection and maintenance procedures a factor?	☐	☐	OFFICE FACTORS: Did office settings such as lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐ ☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐ ☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐	DRUGS/ALCOHOL: In your opinion, were drugs or alcohol factor in the accident?	☐ ☐
JOB PRACTICIES: Were any job safety/health practices not followed when the accident occurred?	☐	☐	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?	
HUMAN FACOTRS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐	☐ YES (If yes, attach a copy) ☐ NO	
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐		

12.	**TRAINING**	
a. Was Person Trained to Perform Activity/Task? ☐ Yes ☐ No	b. Type of Training. ☐ Classroom ☐ On Job	c. Date of Most Recent Formal Training. (month/day/year)

13. Fully explain what allowed or caused the accident, include direct and indirect causes. (See instruction for definition of direct and indirect causes.)

a. Direct Cause

b. Indirect Cause(s)

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

Describe fully:

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. Beginning (month/day/year)		b. Anticipated Completion (month/day/year)	
c. Signature and Title of Supervisor completing Report Corps Contractor	d. Date (month/day/year)	Organization Identifier (Div/Branch/Sect)	f. Office Symbol

16. MANAGEMENT REVIEW

a. ☐ Concur b. ☐ Non- Concur c. ☐ Comments

Signature	Title	Date

17. MANAGEMENT REVIEW (2nd – Chief Operations, Construction, Engineering, etc.)

a. ☐ Concur b. ☐ Non- Concur c. ☐ Comments

Signature	Title	Date

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ Concur b. ☐ Non- Concur c. ☐ Additional Actions/Comments

Signature	Title	Date

19. COMMAND APPROVAL

Comments

Commander Signature	Date

10.	**ACCIDENT DESCRIPTION** (Continuation)
13 a.	**DIRECT CAUSE** (Continuation)
13 b.	**INDIRECT CAUSES** (Continuation**)**
14.	**ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S)** (Continuation)

☐ Initial Report
☐ Follow-up Report
☐ Final Report

Contractor Significant Incident Report (CSIR)

1. General Information

Contracting Activity/ROICC Office:

Accident Classification:

☐ Injury ☐ Fatality ☐ Environment ☐ Procedural Issues ☐ Lessons Learned
☐ Illness ☐ Property Damage ☐ Other_____

Involving:

☐ Confined Space ☐ Equip/Mrt Ver/Mat Handling (Heavy Construction Equip.) ☐ Hazardous Material
☐ Crane and Rigging ☐ Equip/Mrt Ver/Mat Handling (Material Handling) ☐ Trenching/Excavation
☐ Diving ☐ Equip/Mrt Ver/Mat Handling (Man-Lift/Elevated Platform) ☐ Waterfront/Marine Operations
☐ Demolition/Renovation ☐ Fall from Ladder ☐ Fall from Scaffold ☐ Other_____
☐ Electrical ☐ Fall from Roof ☐ Fire

2. Personal Information

Name (Last, First, MI):	**Age:**	**Sex:**

Job Title/Description:	**Employed By:**
Supervisor Name (Last, First, MI) & Title:	**Was the person trained to perform this activity/task?** ☐ **Yes** ☐ **No**
What type of training was received (OJT, classroom, etc)?	**Date of the most recent formal training and topics discussed?**

3. Witness Information

Witness #1: Name (Last, First, MI):	**Job Title/Description:**
Employed By:	**Supervisor Name (Last, First, MI):**
Witness #2: Name (Last, First, MI):	**Job Title/Description:**
Employed By:	**Supervisor Name (Last, First, MI):**

Additional Witnesses: ☐ **Yes** ☐ **No**
(List any additional witnesses on a separate sheet and attach.)

4. Contract Information

Type of Contract:

☐ A/E ☐ BOS ☐ CLEAN ☐ Construction ☐ Design Build ☐ FSCC ☐ FSSC

☐ JOC ☐ RAC ☐ Service ☐ Other_____

Contract Number & Title:	**Industrial Group & Industrial Type:**
Prime Contractor Name/Address/Phone & Fax No: **Safety Manager (Last, First, MI):** **Insurance Carrier:**	**Sub Contractor Name/Address/Phone & FAX No:** **Safety Manager (Last, First, MI):** **Insurance Carrier:**

5. Accident Description

Date of Accident:	**Time of Accident:**	**Exact Location of Accident:**

Describe the accident in detail in your words: ***(Use the back of page if you need additional space)***

Direct Cause(s) of Accident:

Indirect Cause(s) of Accident:

Action(s) taken to prevent re-occurrence or provide on-going corrective actions:

Corrective Action Beginning Date:	**Anticipated Completion Date:**

Personal Protective Equipment:

☐ Available and used ☐ Available and not used ☐ Not Required

☐ Not related to Mishap ☐ Wrong PPE for job

List PPE Used:

Type of Construction Equipment (Make, Model, Serial #, VIN#) Involved:

Was Hazardous Material Spilled/Released? ☐ **Yes** ☐ **No**

Please List Hazardous Material(s) Involved:

Who provided first aid or cleanup of mishap site?

Any blood-borne pathogen exposure, other than EMTs? ☐ **Yes** ☐ **No**

Who?

List OSHA and EM-385-1-1 standards that were violated:

Was site secured and witness statements taken immediately? ☐ **Yes** ☐ **No**

By Whom?

6. Injury Illness/Fatality Information

Severity of Injury/Illness:

- ☐ Fatality
- ☐ Lost Workday Case Involving Days Away From Work
- ☐ Temporary Disabillity
- ☐ Recordable Workday Case Involving Restricted Duty
- ☐ Permanent Total Disability
- ☐ Other Recordable Case
- ☐ Recordable First Aid Case
- ☐ Permanent Partial Disability
- ☐ Non-Recordable Case
- ☐ No Injury

Estimated Days Lost:	**Estimated Days Hospitalized:**	**Estimated Days Restricted Duty:**

List Primary Body Part Affected:	**List Other Body Part(s) Affected:**

Nature of Injury/Illness for Primary Body Part (Examples: Amputation, Burn, Hernia):

Type of Accident (Examples: Fall same level, Lifting, Bitten, Exerted):

Source of Accident (Examples: Crane, Carbon Monoxide, Ladder, Welding Equipment):

7. Causal Factors *(Explain answers on supplementary sheet)*

• **Design – Design of facility, workplace, or equipment was a factor?**	☐ **Yes** ☐ **No**
• **Inspection/Maintenance – Inspection & Maintenance procedures were a factor?**	☐ **Yes** ☐ **No**
• **Persons Physical Condition – In your opinion, the physical condition of the person was a factor?**	☐ **Yes** ☐ **No**
• **Operation Procedures – Operating procedures were a factor?**	☐ **Yes** ☐ **No**
• **Job Practices – One or more job safety/health practices not being followed when the accident occurred contributed to the accident?**	☐ **Yes** ☐ **No**
• **Human Factors – One or more human factors, such as a person's size or strength contributed to the accident?**	☐ **Yes** ☐ **No**
• **Environmental Factors – Heat, cold, dust, sun, glare, etc., contributed to the accident?**	☐ **Yes** ☐ **No**
• **Chemical and Physical Agent Factors – Exposure to chemical agents, such as dust, fumes, mist, vapors, or physical agents such as noise, radiation, etc., contributed to the accident?**	☐ **Yes** ☐ **No**
• **Office Factors – Office setting such as lifting office furniture, carrying, stooping, contributed to the accident?**	☐ **Yes** ☐ **No**
• **Support Factors – Inappropriate tools/resources were provided to perform the task?**	☐ **Yes** ☐ **No**
• **PPE – Improper selection, use or maintenance of PPE contributed to the accident?**	☐ **Yes** ☐ **No**
• **Drugs/Alcohol – In your opinion, were drugs or alcohol a factor?**	☐ **Yes** ☐ **No**
• **Job Hazard Analysis – The lack of an adequate (IAW-EM-385-1-1 Sec 01.A) activity hazard analysis was a contributing factor.**	☐ **Yes** ☐ **No**
• **Job Hazard Analysis – JHA was not site specific and/or did not address the type of work/operations performed when the mishap occurred.**	☐ **Yes** ☐ **No**
• **Management – A lack of adequate supervision contributed to the accident.**	☐ **Yes** ☐ **No**
• **Management – Inadequate information was provided at pre con meeting.**	☐ **Yes** ☐ **No**

8. OSHA Information			
Date OSHA was Notified:	**Date(s) of Investigation:**	**Date of citation:** ***(Attach Copy)***	**Dollar amount of Penalties:**

9. Report Preparer	
Name (Last, First, MI):	**Date of Report:**
Title: **Employer:** **Phone #:**	**Signature:**

CONTRACTOR SIGNIFICANT INCIDENT REPORT (CSIR) INSTRUCTIONS
Complete Sections Appropriate to Incident (Rev. 06/02).

NOTE: THE ATTACHED CSIR FORM IS TO BE USED BY CONTRACTORS TO RECORD THE RESULTS OF THEIR ACCIDENT/INCIDENTS INVESTIGATIONS AND SHALL BE PROVIDED TO THE CONTRACTING OFFICER WITHIN THE REQUIRED TIMEFRAMES.

GENERAL. Complete a separate report for each person who was injured in the accident. A report needs to be completed for all OSHA recordable accidents, property damage in excess of $2000.00 (This amount is for record purposes only. GOV is not required to enter property damage reports into FAIR database if it is less than $10,000.00.), WHE accidents, or near miss/high visibility mishaps. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es), non-applicable sections shall be marked "N/A". If additional space is needed, provide the information on a separate sheet of paper and attach to the completed form.

Mark the report:
INITIAL – If this form is being used as initial notification of a Fatality or High Visibility Mishap. The initial form is due within 4 hours of a serious accident. A form marked 'Follow-up' or 'Final' is required within 5 days.
FOLLOW-UP – If you are providing additional information on a report previously submitted.
FINAL – If you are providing a completed report and expect no changes.

SECTION 1 – GENERAL INFORMATION

CONTRACTING ACTIVITY/ROICC OFFICE - Enter the name and address of the Contracting Office administering the contract under which the mishap took place (e.g. ROICC MCBH, ROICC NORFOLK, PWC GUAM, etc.).

ACCIDENT CLASSIFICATION - INJURY/ILLNESS/FATALITY/PROPERTY DAMAGE/-PROCEDURAL ISSUES/-ENVIRONMENTAL/LESSONS LEARNED/OTHER – Mark the appropriate block(s) if the incident resulted in any of these conditions.

INVOLVING - If the mishap involved any of the conditions listed under "Involving" mark the appropriate box(es). Specific questions associated with each of these conditions are available from the Contracting Officer to assist you in your investigation. When these questions are used they shall be attached as part of this report.

SECTION 2 - PERSONAL INFORMATION

NAME - Enter last name, first name, middle initial of person involved.
AGE - Enter age.
SEX - Enter M for Male and F for Female.
JOB TITLE/DESCRIPTION - Enter the job title/description assigned to the injured person (e.g. carpenter, laborer, surveyor, etc.).
EMPLOYED BY - Enter employment company name of the person involved.
SUPERVISOR'S NAME & TITLE - Enter name and title of the immediate supervisor.
WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? - For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.
TYPE OF TRAINING - Indicate the specific type of training (classroom or on-the-job) that the injured person received before the accident happened.
DATE OF MOST RECENT FORMAL TRAINING/TOPICS DISCUSSED - Enter the month, day, and year of the last *formal* training completed that covered the activity/task being performed at the time of the accident. List topics that were discussed at the training identified above.

SECTION 3 - WITNESS INFORMATION

The following applies to Witness #1 and Witness #2:
WITNESS NAME - Enter last name, first name, middle initial of the witness.
JOB DESCRIPTION/TITLE - Enter the job title/description assigned to the witness (e.g. carpenter, laborer, surveyor, etc.).
EMPLOYED BY - Enter the name of the employment company of the witness.
SUPERVISORS NAME - Enter name of immediate supervisor of the witness.
ADDITIONAL WITNESSES - Provide same information, as above, for each witnesses. Use additional pages if necessary.

SECTION 4 - CONTRACTOR INFORMATION

TYPE OF CONTRACT - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.
CONTRACT NUMBER/TITLE - Enter complete contract number and tile of prime contract (e.g. N62477-85-C-0100, 184 Pearl City Hsg. Revitalization).
CONSTRUCTION INDUSTRIAL GROUP AND INDUSTRIAL TYPE – This is the type of construction that will be done at this project.

1. First, you must choose the Industrial Group. You have 4 choices to choose from: (**NOTE!** Review of the Industrial Types below and knowing what the projects scope of work is will assist you in deciding what the Industrial Group should be.)

a. Buildings
b. Heavy Industrial
c. Infrastructure
d. Light Industrial

2. Once you have chosen the Industrial Group, you now select the Industrial Type. You have multiple choices under each Group, chose the one you feel fits the project most closely because on most projects there won't be an exact match:

a. Buildings:
   (1) Communications Ctr.
   (2) Dormitory/Hotel
   (3) High-rise Office
   (4) Hospital
   (5) Housing
   (6) Laboratory
   (7) Low-rise Office
   (8) Maintenance Facility
   (9) Parking Garage
   (10) Physical Fitness Ctr.
   (11) Restaurant/Nightclub
   (12) School
   (13) Warehouse
b. Heavy Industrial:
   (1) Chemical Mfg.
   (2) Electrical (Generating)
   (3) Environmental
   (4) Metals Refining/Processing
   (5) Mining
   (6) Natural Gas Processing
   (7) Oil Exploration/Production
   (8) Oil Refining
   (9) Pulp and Paper
c. Infrastructure:
   (1) Airport
   (2) Electrical Distribution
   (3) Flood Control
   (4) Highway
   (5) Marine Facilities
   (6) Navigation
   (7) Rail
   (8) Tunneling
   (9) Water/Wastewater
d. Light Industrial:
   (1) Automotive Assembly/Mfg.
   (2) Consumer Products Mfg.
   (3) Foods
   (4) Microelectronics Mfg.
   (5) Office Products Mfg.
   (6) Pharmaceuticals Mfg.

CONTRACTOR'S NAME/ADDRESS/PHONE NUMBER

(1) PRIME - Enter the exact name (title of firm), address, phone and fax numbers of the prime contractor.
(2) SUBCONTRACTOR - Enter the exact name, address, phone and fax numbers of any subcontractor involved in the accident.

SAFETY MANAGER'S NAME

(1) PRIME - Enter the name of the prime contractor safety manager.
(2) SUBCONTRACTOR - Enter the name of the subcontractors safety manager.

INSURANCE CARRIER

(1) PRIME - Enter the exact name/title of the prime's insurance company. Policy number not required.
(2) SUBCONTRACTOR - Enter the exact name of the subcontractor's insurance company. Policy number not required.

SECTION 5 - ACCIDENT DESCRIPTION

DATE OF ACCIDENT - Enter the month, day, and year of accident.
TIME OF ACCIDENT - Enter the local time of accident in military time. Example: 14:30 hrs (not 2:30 p.m.).
EXACT LOCATION OF ACCIDENT - Enter facts needed to locate the accident scene (installation/project name, building/room number, street, direction and distance from closest landmark, etc.).
DESCRIBE THE ACCIDENT IN DETAIL. Fully describe the accident in the space provided. If property damage involved, give estimated dollar amount of damage and/or repair costs involved. If additional space is needed continue on a separate sheet and attach to this report. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Ensure questions below regarding direct cause(s), indirect cause(s), and actions taken are answered. **NOTE!** Review questions in Section 7 below before completing.
DIRECT CAUSE(S) - The direct cause is that single factor which most directly lead to the accident. See examples below.
INDIRECT CAUSE(S) - Indirect cause are those factors, which contributed to, but did not directly initiate the occurrence of the accident.

Examples for Direct and Indirect Cause:
1. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: Failure to provide fall protection at elevation

Indirect causes: Failure to enforce safety requirements: improper training/motivation of employee (possibility that employee was not knowledgeable of fall protection requirements or was lax in his attitude toward safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

2. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by contractor vehicle. (note contractor vehicles was in proper safe working condition.)
Direct cause: Failure of contractor driver to maintain control of and stop contractor vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

ACTION(S) TAKEN TO PREVENT RE-OCCURRENCE OR PROVIDE ON-GOING CORRECTIVE ACTIONS. Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on back or additional sheets of paper if necessary to fully explain and attach to the complete report form.
CORRECTIVE ACTION DATES -
(1) Beginning - Enter the date when the corrective action(s) identified above will begin.
(2) Anticipated Completion - Enter the date when the corrective action(s) identified above will be completed.
PERSONAL PROTECTIVE EQUIPMENT (PPE) - Mark appropriate box(es) and list PPE which was being used by the injured person at the time of the accident (e.g. protective clothing, shoes, glasses, goggles, respirator, safety belt, harness, etc.)
TYPE OF CONTRACTOR EQUIPMENT - Enter the Serial Number, Model Number and specific type of equipment involved in the mishap (e.g. dump truck (off highway), crane (rubber tire), pump truck (concrete), etc.).
WAS HAZARDOUS MATERIAL SPILLED/RELEASED? - Mark appropriate block and list name(s) of any reportable quantities of hazardous materials spilled/released during the mishap.
WHO PROVIDED FIRST AID OR CLEAN-UP OF MISHAP SITE? - List name(s) of individual(s) and employer, if known.
ANY BLOOD-BORNE PATHOGEN EXPOSURE, OTHER THAN EMT? - Mark appropriate block and list name(s) of individual(s) and employer, if known.
LIST OSHA AND/OR EM 385-1-1 STANDARDS THAT WERE VIOLATED. - Self explanatory.
WAS SITE SECURED AND WITNESS STATEMENT TAKEN IMMEDIATELY? - Mark appropriate block and list by whom.

SECTION 6 - INJURY/ILLNESS/FATALITY INFORMATION

SERVERITY OF INJURY/ILLNESS – Mark appropriate box.
ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work. Update when final data is known.
ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized. Update when final data is known.
ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties. Update when final data is known.
BODY PART(S) AFFECTED - Enter the most appropriate primary and when applicable, secondary, etc. body part(s) affected (e.g. arm: wrist: abdomen: single eye; jaw : both elbows: second finger: great toe: collar bone: kidney, etc.).
NATURE OF INJURY/ILLNESS FOR PRIMARY BODY PART - Enter the most appropriate nature of injury/illness (e.g. amputation, back strain, dislocation, laceration, strain, asbestosis, food poisoning, heart conditions, etc.).
TYPE AND SOURCE OF INJURY/ILLNESS - Type and Source Codes are used to describe what caused the incident.
(1) TYPE Code stands for an "Action" (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Type Code: Fell different levels".) Select the most appropriate Type of injury from the list below:

TYPE OF INJURY/ILLNESS

STRUCK BY/AGAINST	CONTACTED CONTACTED WITH (INJURED PERSON MOVING) CONTACTED BY (OBJECT WAS MOVING)
FELL, SLIPPED, TRIPPED SAME LEVEL/DIFFERENT LEVEL/NO FALL	EXERTED LIFTED, STRAINED BY (SINGLE ACTION) STRESSED BY (REPEATED ACTION)
CAUGHT ON/IN/BETWEEN	EXPOSED INHALED/INGESTED/ABSORBED/EXPOSED TO
PUNCTURED, LACERATED PUNCTURED BY/CUT BY/STUNG BY/BITTEN BY	TRAVELING IN

(2) SOURCE Code stands for an "object or substance." (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Source Code: "Ladder".) Select the most appropriate Source of injury from the list below:

SOURCE OF INJURY/ILLNESS

BUILDING OR WORKING AREA WALKING/WORKING AREA STAIRS/STEPS LADDER FURNITURE BOILER/PRESSURE VESSEL EQUIPMENT LAYOUT WINDOWS/DOORS ELECTRICITY	DUST, VAPOR, ETC. DUST (SILICA, COAT, ETC.) FIBERS ASBESTOS GASES CARBON MONOXIDE MIST, STEAM, VAPOR, FUME WELDING FUMES PARTICLES (UNIDENTIFIED)

ENVIRONMENT CONDITION TEMPERATURE EXTREME (INDOOR) WEATHER (ICE, RAIN, HEAT, ETC.) **FIRE, FLAME, SMOTE (NOT TABACCO)** NOISE RADIATION LIGHT VENTILATION TOBACCO SMOKE STRESS (EMOTIONAL) CONFINED SPACE	CHEMICAL, PLASTIC, ETC. DRY CHEMICAL - CORROSIVE DRY CHEMICAL - TOXIC DRY CHEMICAL - EXPLOSIVE DRY CHEMICAL - FLAMMABLE LIQUID CHEMICAL - CORROSIVE LIQUID CHEMICAL - TOXIC LIQUID CHEMICAL - EXPLOSIVE LIQUID CHEMICAL - FLAMMABLE PLASTIC WATER MEDICINE
MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANCIAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT	INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES
MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANCIAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT	INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES
VEHICLE AS DRIVER OF PRIVATELY OWNED, RENTAL VEH. AS PASSENGER OF PRIVATELY OWNED, RENTAL VEH. DRIVER OF GOVERNMENT VEHICLE PASSENGER OF GOVERNMENT VEHICLE COMMON CARRIER (AIRLINE, BUS, ETC.) AIRCRAFT (NOT COMMERCIAL) BOAT, SHIP, BARGE	ANIMATE OBJECT DOG OTHER ANIMAL PLANT INSECT HUMAN (VIOLENCE) HUMAN (COMMUNICABLE DISEASE) BACTERIA, VIRUS (NOT HUMAN CONTACT)
MATERIAL HANDLING EQUIPMENT EARTHMOVER (TRACTOR, BACKHOE, ETC.) CONVEYOR (FOR MATERIAL AND EQUIPMENT) ELEVATOR, ESCALATOR, PERSONNEL HOIST HOIST, SLING CHAIN, JACK CRANE FORKLIFT HANDTRUCK , DOLLY	PERSONAL PROTECTIVE EQUIPMENT PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES RESPIRATOR, MASK DIVING EQUIPMENT SAFETY BELT, HARNESS PARACHUTE

SECTION 7 - CAUSAL FACTORS

Review thoroughly. Answer each question by marking the appropriate block. **NOTE!** If any answer is yes, explain in section 5 above.

(1) **DESIGN** - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?
(2) **INSPECTION/MAINTENANCE** - Did inadequately or improperly maintained equipment, tools, workplace, etc., create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?
(3) **PERSONS PHYSICAL CONDITION** - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was overexertion a factor?
(4) **OPERATION PROCEDURES** - Did lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?
(5) **JOB PRACTICES** - Were any of the provision of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?
(6) **HUMAN FACTORS** - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person: i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach strengths, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?
(7) **ENVIRONMENTAL FACTORS** - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun temperature changes, wind, tides, floods, currents, terrain; dust, mud, glare, pressure changes, lighting, etc., play a part in the accident?

(8) **CHEMICAL AND PHYSICAL AGENT FACTORS** - Did exposure to chemical agents (either single shift exposure or long-term exposure such as dusts, fibers, (asbestos, etc.), silica, gases (carbon, monoxide, chlorine, etc.), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?
(9) **OFFICE FACTORS** - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?
(10) **SUPPORT FACTORS** - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized and adequate to provide proper tools, equipment, personnel, site preparation, etc.
(11) **PERSONAL PROTECTIVE EQUIPMENT** - Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?
(12) **DRUGS/ALCOHOL** - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".
(13) **JOB/ACTIVITY HAZARD ANALYSIS** - Was a written Job/Activity Analysis completed for the task being performed at the time of the accident? If one was made, did it address the hazard adequately or does it need to be updated? If none made, will one be made? These may also need to be addressed in the Corrective Actions Taken section. Mark the appropriate box. If one was made, attach a copy of the analysis to the report.
(14) **MANAGEMENT** - Did the lack of supervisor or management support play a part in the mishap? Mark the appropriate box.

SECTION - 8 OSHA INFORMATION - Complete this section if applicable

SECTION 9 - REPORT PREPARER

Providing a completed CSIR to the Contracting Officer is the PRIME CONTRACTOR'S RESPONSIBILITY. Enter the name, date of report, title, employer, phone number and signature of person completing the accident report and provide it to the Contracting Officer, or his representative, responsible for oversight of that contractor activity. **NOTE!** If prepared by other than the Prime Contractor, a person employed by the Prime Contractor must sign that they have reviewed and concur with the report and it's findings (e.g. company owner, project supervisor/foreman, Safety Officer, etc.).

USA Environmental, Inc. Employee Injury Report

Site/Location: _____ **Control Number**: _____

This is an official document to be initiated by USA supervisors. Be accurate, thorough, and answer all questions.

BACKGROUND DATA

Todays Date: ____/____/____ Date of Accident: ____/____/____ Time: _____ AM PM

Day of Accident: S M T W T F S Weather Conditions: Sunny Clear Rain Fog Overcast

Temperature: 0-32 32-50 50-70 70-85 85 + Wind Conditions: Still Moderate High None

Location of Accident: _____ Time Accident was Reported: _____ AM PM

_____ Reported to Whom: _____

PERSONAL DATA

Name: Last _____ First _____ MI _____

Sex: F M DOB: ____/____/____ Place of Birth: _____

SSAN: _____-_____-_____ DOH: ____/____/____ Position: _____

Address: _____ City: _____ State: ____

Telephone Number: (_____) _____-_____ Zip: _____

ACCIDENT DATA

Nature of Accident: Near Miss ___ 1st Aid ___ Dr Visit ___ Ambul ___ Hospitalized ___ Fatality ____

If Fatality, Name of Agency Notified: _____ Type of Injury: _____

Did Employee Leave the Work Site: Yes ___ No ___ If Yes, Time Departed: _____ AM PM

Name of Medical Facility: _____ Telephone Number: (____) ____-_____

Address: _____ City: _____ State: ___ Zip: _____

Description of Accident: _____

Activity at Time of Accident: _____

Employee Injury Report Con't.

WITNESS DATA

Witness Name: Last _____ First _____ MI _____

Address: _____ City: _____ State: ____ Zip: _____

Telephone Number: (____) _____-_____ Employed By: _____

Statement Attached: Yes ___ No ___ Telephone Number: (____) _____-_____

ACCIDENT ACTIONS/ANALYSIS

Accident Cause(s):_____
_____
_____

Lack of Safety Equipment a Factor: Yes ___ No ___ If Yes, Explain: _____
_____

Safety Regulations or Guidance Violated: Yes ___ No ___ If Yes, Explain: _____
_____

Photographs Taken: Yes ___ No ___ If Yes, Located at: _____

Regulatory Agencies Notified: Yes ___ No ___ If Yes, which: _____

Point of Contact: _____ Date and Time: ____/____/____ _____ AM PM

Corrective Actions Taken or Recommended: _____
_____
_____

Report Prepared By: _____ Signature: _____

SUXO/PROJECT MANAGER

Corrective Actions/Recommendations: _____

SUXO Signature: _____ Date: ____/____/____

Concur With Actions Taken: Yes ___ No ___ Remarks: _____

Project Manager Signature: _____ Date: ____/____/____

Is ENG Form 3394 to be submitted? Yes_____ No____ If Yes, Dated: ___/____/_____

USA Environmental, Inc.

HEAT STRESS ALERT Field Monitoring and Alert Checklist	
DATE:	SURVEYOR(S):

I. AREA INFORMATION
LOCATION:
SOURCE:
ENGINEERING CONTROLS:

II. SURVEY INSTRUMENT INFORMATION		
INSTRUMENT:	MODEL:	SERIAL #:
FACTORY CALIBRATION DATE:	PRE-CAL: BY:	POST-CAL: BY:

III. SAMPLING INFORMATION AND RESULTS		
HAZARD: Heat Stress	UNITS: °F (°C) WBGT	CORRECTIONAL FACTOR:
See attached printout or record below.		

TIME	WBGT-OUT (°F)	WB	DB	GL	COMMENTS

USA Environmental, Inc.

HEAT STRESS MONITORING LOG

Date:_____ Site Name:_____ Conditions: _____

UXOSO:_____Location:_____

Name	Organization	Start Time	Pulse Rate	Time	Pulse Rate	Time	Pulse Rate	Time	Pulse Rate

Remarks:

RECORD
OF
SAFETY VIOLATION OR NON-COMPLIANCE

Employee Name: _____ Position: _____

Site / Location: _____ Date: ____/____/____

Type of Violation: ____ PPE ____ Procedural ____ Explosive ____ Equipment ____ Other

Type of Non-Compliance: ____ Policy ____ Procedural ____ Directive ____ Contract
____ Other

Description of Violation or Non-Compliance:
_____
_____

Document Reference (Specify document, page, paragraph, etc. as applicable):
_____
_____
_____

Corrective Action(s) to be taken:
_____
_____
_____
_____

Employee or Company Response and Comments:
_____
_____
_____

Notification made to:

Manager: ____ Yes ____ No Date:

SUXOS: ____ Yes ____ No Date:

Supervisor: ____ Yes ____ No Date:

Corrective Actions Inspection Required: ____ Yes ____ No

If Yes, Date of Inspection: ____/____/___

Signature: _____ Signature: _____
Safety Officer Employee/Company Representative

SAFETY INSPECTION REPORT

Site / Location: _____ Date: ____/____/____

Type of Inspection: ____ Daily ____ Weekly ____ Re-Inspection ____ Other

Type of Operation Inspected:

_____
_____

Equipment Inspected: (Specify if Safety or Operational in Nature)

_____
_____
_____
_____
_____

Comments:

_____
_____
_____
_____
_____

Deficiencies Found or Noted:

_____
_____
_____

Corrective Action:

_____
_____
_____

Re-Inspection Required: ____ Yes ____ No If Yes, Date of Re-Inspection: ____/____/___

Signature: _____ _____
Site Safety Officer SUXO / Project Manager

* Copy to Supervisor if Deficiencies or Corrective Action were found, noted or deemed necessary.

USA Environmental, Inc.

SAFETY MEETING/TRAINING RECORD

DATE: _____/_____/_____ **TIME: _____ AM PM**

LOCATION/SITE: _____

1. Reason for Meeting/Training: (Check all that apply)	
	Daily Safety Meeting/Training
	Initial Site Safety Meeting/Training
	New Task Briefing
	Periodic Safety Meeting/Training
	New Site Procedures
	New Site Information
	Periodic Review of Site Information
	Other (Explain):

2. Personnel Attending Meeting/Training:

Name	Signature	Company

USA Environmental Inc.

Safety Meeting/Training Record Cont.:

3. Topics Covered (Check all that apply)			
	Site Safety Personnel		**Decontamination Procedures**
	Site/Work Area Description		**Emergency Response Plan**
	Site Characterization		**Hazard Communication**
	Biological Hazard(s)		**On-Site Emergency**
	Chemical Hazard(s)		**On-Site Injuries/Illnesses**
	Physical Hazard(s)		**Evacuation Procedures**
	Heat Stress		**Rally Point(s)**
	Cold Stress		**Emergency Communication**
	Site Control		**Directions to Medical Facility**
	Work and Support Zones		**Drug and Alcohol Policies**
	PPE		**Medical Monitoring Program**
	Air monitoring		**Specific Task Training**
	Safe Work Practices		**Confined Spaces**
	Engineering Controls and Equipment		**Heavy Equipment**
	Spill Containment Procedures		**Other: (Specify)**
	MEC Hazard(s)		

4. Remarks:

5. Verification:

I certify that the personnel listed above on this record received the Information and/or Training described as indicated. Personnel not attending this meeting/training will receive said information/training prior to commencing their assigned duties.

_____

Site Safety Officer **Date: ____/____/____**

SITE VISITOR LOG

DATE:	NAME:	TITLE:	COMPANY:	SAFETY BRIEF:	TIME: IN	TIME: OUT	ESCORTED BY:	SITE:	REMARKS:

USA Environmental, Inc.

Tailgate Safety Briefing

Date: _____/_____/_____ **Location:_____**

Time: _____ AM PM **Team #: _____**

1. Reason for Briefing:

	Daily Safety Briefing		New Site Procedure
	Initial Safety Briefing		New Site Information
	New Task Briefing		Review of Site Information
	Periodic Safety Meeting		Other: (Specify)

2. Personnel Attending:

Name	Signature	Position

Briefing Given By:

Name	Signature	Position

3. Topics: (Check All That Apply)

	Site Safety Personnel		Decontamination Procedures
	Site/Work Area Description		Emergency Response/Equipment
	Physical Hazards		On-Site Injuries/Illnesses
	Chemical/Biological Hazards		Reporting Procedures
	Heat/Cold Stress		Directions to Medical Facility
	Work/Support Zones		Drug and Alcohol Policies
	PPE		Medical Monitoring
	Safe Work Practices		Evacuation/Egress Procedures
	Air Monitoring		Communications
	Task Training		Confined Spaces
	MEC Precautions		Other:

4. Remarks:

APPENDIX F

F.0 QUALITY ASSURANCE PROJECT PLAN

This appendix contains the Quality Assurance Project Plan (QAPP) for the Waikane Valley Training Area.

TABLE OF CONTENTS

ATTACHMENTS

NOTE ABOUT THE DOCUMENT FORMAT

This Quality Assurance Project Plan (QAPP) has been prepared to serve as the Field Sampling and Analysis Plan for the Site Inspection, Munitions Response Program Site, Waikane Valley Training Area (WVTA), Kaneohe, Hawaii, Contract Number N62742-05-D-1868, CTO 0004.

In its June 28, 2006 newsletter, NAVFAC Pacific Environmental Restoration Division states the following:

> A Memorandum requesting immediate implementation of the *Uniform Federal Policy for Quality Assurance Plans* (UFP-QAPP) for the collection of data under the CERCLA and RCRA programs on Federal facilities was sent by Alex Beehler, Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) on 11 April 2006.
>
> New projects that include the preparation of a Work Plan involving analytical sampling and testing shall comply with the UFP-QAPP Manual of March 2005. The Work Plan shall address all elements of the UFP-QAPP and the minimum QC requirements specified in Part 2B, Quality Assurance/Quality Control Compendium: Minimum QC Activities. The worksheet format provided in Part 2A, Workbook for Uniform Federal Policy for Quality Assurance Project Plans, shall be utilized. These documents are available at: http://www.epa.gov/fedfac/documents/qualityassurance.htm

Thus this document will follow the new worksheet format of the UFP-QAPP.

QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name: Site Inspection (SI) of Waikane Valley Training Area, Munitions Response Program Site
Site Location: Waikane Valley Training Area, Kaneohe Bay, Oahu, Hawaii

Quality Assurance Project Plan (QAPP) for the Site Inspection of Waikane Valley Training Area, Munitions Response Program Site, Kaneohe, Hawaii
Document Title

Naval Facilities Engineering Command, Pacific
Lead Organization

Lynette Gehring, Wil Chee – Planning, Inc. for USA Environmental, Inc.
Preparer's Name and Organizational Affiliation

1018 Palm Dr. Honolulu, HI 96813, 808-596-4688, wcplyng@lava.net
Preparer's Address, Telephone Number, and E-mail Address

April 30, 2008
Preparation Date (Day/Month/Year)

Investigative Organization's Project Manager: _____
Signature

Robert Nore/USA Environmental, Inc
Printed Name/Organization/Date

Investigative Organization's Project QA Officer: _____
Signature

Robert D. Crownover/USA Environmental, Inc.
Printed Name/Organization/Date

Lead Organization's Project Manager: _____
Signature

Richard Hosokawa/NAVFAC Pacific
Printed Name/Organization/Date

Approval Signatures: _____
Signature

Printed Name/Title/Date — Approval Authority

Other Approval Signatures: _____
Signature

Printed Name/Title/Date

QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Site Inspection of Waikane Valley Training Area
Site Location: Waikane Valley Training Area, Kaneohe, Hawaii
Contractor Name: USA Environmental
Contractor Number:
Contract No.: N62742-05-D1868
Task No.: 0004

1. Identify guidance used to prepare QAPP:

- Uniform Federal Policy for Quality Assurance Project Plans, EPA-505-B-04-900A (March 2005)
- Preliminary Range Assessment Report and Archive Search Report for Waikane Valley Training Area. Army Corps of Engineers.(1998)
- DERP-FUDS Inventory Project Report, Waikane Training Area, Island of Oahu, Hawaii, Site No. H09H1035400. (1996)
- Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific (February 2007)
- Sampling for Defensible Environmental Decisions, EnviroStat Inc. (February 2007)
- Department of Defense Quality Systems Manual for Environmental Laboratories (January 2006)
- Characterization and Remediation of Soils at Closed Small Arms Firing Ranges (ITRC)(January 2003)
- EPA Region 9 Preliminary Remediation Goals Tables (October 2004)
- Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (Hawaii Department of Health)(February 2007)
- US Army Corps of Engineers Military Munitions Response Action Engineering Manual (EM 1110-1-4009) (June 2006)
- US Navy Range Sustainability Environmental Program Assessment Policy Implementation Manual December 2003)
- Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities. Pacific Division, Naval Facilities Engineering Command (June 2006)
- Guidance for Quality Assurance Project Plans (EPA QA G-5) (December 2002)

2. Identify regulatory program: Defense Environmental Restoration Program in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Sections 104 and 121; Executive Order 12580; and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

3. Identify approval entity: NAVFAC Pacific

4. Indicate whether the QAPP is a generic or a project-specific QAPP. (circle one)

5. List dates of scoping sessions that were held: August 29, 2006

6. List dates and titles of QAPP documents written for previous site work, if applicable:

   - Preliminary Range Assessment Report and Archive Search Report for Waikane Valley Training Area. Army Corps of Engineers (1998)
   - DERP-FUDS Inventory Project Report, Waikane Training Area, Island of Oahu, Hawaii, Site No. H09H1035400. (1996)

7. List organizational partners (stakeholders) and connection with lead organization:

Organizational partner/Stakeholder	Role
NAVFAC Pacific	Lead agency and land users
MCBH, Kaneohe	Land users
State of Hawaii, Department of Health	Government oversight
USA Environmental	Contractor
Wil Chee Planning	Subcontractor
Curtis & Tompkins	Laboratory subcontractor
Laboratory Data Consultants	Data validation subcontractor

8. List data users: NAVFAC Pacific

9. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusion below:

_____

QAPP Worksheet #2
QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	QAPP Worksheet # or Crosswalk to Related Documents*
Project Management and Objectives		
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QAPP Identifying Information (continued)

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3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References Table - Analytical Instrument Calibration Table - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Attachment C 23 24 25

QAPP Worksheet #2
QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	QAPP Worksheet # or Crosswalk to Related Documents*
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QAPP Worksheet #2
QAPP Identifying Information (continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	QAPP Worksheet # or Crosswalk to Related Documents*
Data Review		
5.1 Overview 5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	34 35 36 37
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* Several QAPP elements appear in the project work plan to which this QAPP is an appendix. References to the appropriate sections of the work plan are noted on the individual worksheets.

QAPP Worksheet #3
Distribution List

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number[1]
Richard Hosokawa	Remedial Project Manager	NAVFAC Pacific	(808) 472-1423	(808) 474-5419	Richard.hosokawa@navy.mil	
Robert Nore	Project Manager	USA Environmental, Inc.	(813) 343-6420	(813) 343-6421	bnore@usatampa.com	
Steven Mow	Remedial Project Manager	State of Hawaii Department of Health	(808) 586-4251	(808) 586-4370	smow@eha.health.state.hi.us	
Carol Wortham	Quality Control Chemist	Curtis & Tompkins, Ltd.	(518) 486-0900	(510) 486-0900	cwortham@ctberk.com	
Stella Cuenco	Data Validator	Laboratory Data Consultants	(760) 634-0437	(760) 634-0439	erauto@lab-data.com	
Derek Yasaka	Senior Manager	Wil Chee – Planning, Inc.	(808) 596-4688	(808) 597-1851	wpcderek@lava.net	
Jeff Newman	Assistant Field Supervisor	US Dept of Interior, Fish and Wildlife Service	(808) 792-9442	not available	jeff_newman@fws.gov	
Laurie Sullivan	Regional Resources Coordinator	Office of Response and Restoration, NOAA	(707) 575-6077	not available	laurie.sullivan@noaa.gov	

[1] USA Environmental does not use document control numbers

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: NAVFAC Pacific

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Richard Hosokawa	Remedial Project Manager	(808) 472-1423		

Organization: State of Hawaii Dept of Health

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Steven Mow	Remedial Project Manager	(808) 586-4251		

Organization: USA Environmental, Inc.

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Robert Nore	Project Manager	(813) 343-6420		
To be determined	UXO II/I Technician	(813) 343-6420		

Organization: Curtis & Tompkins, Ltd.

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Carol Wortham	Quality Control Chemist	(518) 486-0900		

Organization: Laboratory Data Consultants

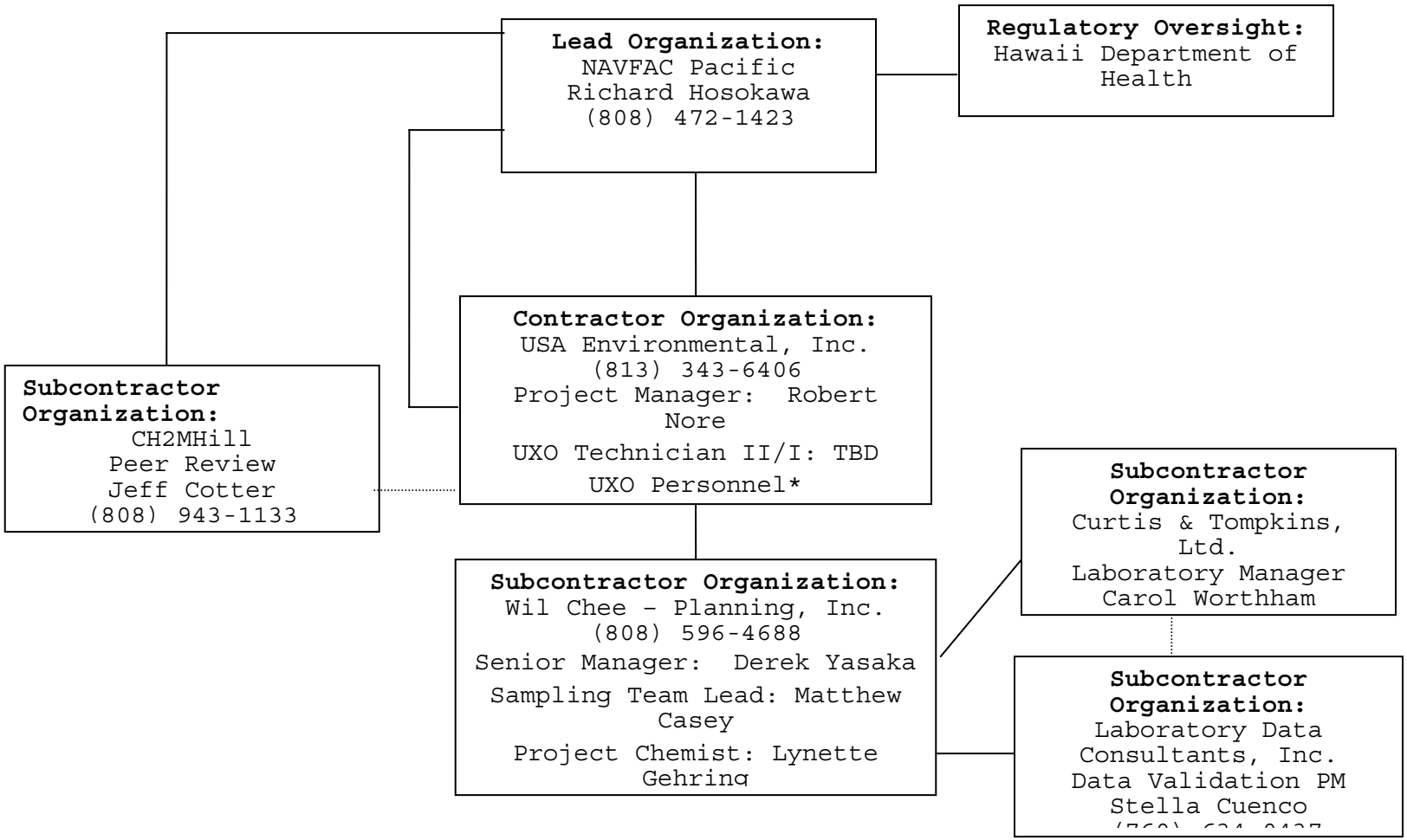
Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Stella Cuenco	Data Validator	(760) 634-0437		

QAPP Worksheet #4
Project Personnel Sign-Off Sheet (continued)

Organization: Wil Chee – Planning, Inc.

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Derek Yasaka	Senior Manager	(808) 596-4688		
Matthew Casey	Sampling Team Lead	(808) 596-4688		

QAPP Worksheet #5
Project Organizational - IChart



*Refer to Section 2.6 of the work plan for a chart of the field team organization.

QAPP Worksheet #6
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Manages all phases of work	Project Manager, USA Environmental, Inc.	Robert Nore	(813) 343-6420	Robert Nore acts as the liaison between the subcontractors and the NAVFAC Pacific RPM as well as MCBH, Kaneohe
Major modifications to work plan	Project Manager, USA Environmental, Inc.	Robert Nore	(813) 343-6420	Robert Nore is responsible for all WP changes as the project manager and WP preparer. Bob Nore will notify the NAVFAC Pacific RPM of any work plan modifications within 24 hours.
Analytical data results	Quality Control Chemist, Curtis & Tompkins, Ltd.	Carol Wortham	(518) 486-0900	Preliminary analytical data will be sent to the Project Chemist within 21 days. The analytical data will also be sent directly to Laboratory Data Consultants for data validation.
Validated analytical data	Data Validator, Laboratory Data Consultants	Stella Cuenco	(760) 634-0437	Laboratory Data Consultants will forward the results of the data validation to the Project Chemist for review within 21 days. The Project Chemist will forward the results to the Project Manager.
Release of analytical data	NAVFAC Pacific RPM	Richard Hosokawa	(808) 472-1423	No analytical data will be released until data validation is complete and NAVFAC Pacific has approved the release.
Notification of delays or changes in field work, or issues affecting sample integrity	Sampling Team Leader and Project Chemist, Wil Chee – Planning, Inc.	Matthew Casey, Lynette Gehring	(808) 596-4688	Matthew Casey and/Lynette Gehring act as the liaisons between the subcontractors and USA Environmental, Inc. Bob Nore will be notified of delays, changes, or any other issue affecting field work or sampling within 24 hours.
Laboratory data quality issues	Quality Control Chemist, Curtis & Tompkins, Ltd.	Carol Wortham	(518) 486-0900	All QA/QC issues with project field samples will be reported to Lynette Gehring, Project Chemist, within 24 hours via telephone or email.

QAPP Worksheet #7
Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Robert Nore	Project Manager	USA Environmental, Inc.	Coordinates with Navy and Senior Project Manager, provides overall project direction and guidance, prepares and maintains final work plan, identifies project problems or non-conformance and initiates corrective actions.	B.S.C.E., Civil Engineer, 32 yrs. experience
Derek Yasaka	Senior Manager	Wil Chee – Planning, Inc.	Coordinates with Project Manager, responsible for preparation of the QAPP, procurement of laboratory and data validators, field sampling, and preparation of portions of the Draft SI report.	B.A., Environmental Studies, 20 yrs. experience
Matthew Casey	Sampling Team Leader	Wil Chee – Planning, Inc.	Directs and oversees field sampling efforts, maintains field logbook, identifies problems or non-conformance.	B.S., Environmental Science, 4 yrs. experience

QAPP Worksheet #7
Personnel Responsibilities and Qualifications Table (continued)

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Lynette Gehring	Project Chemist	Wil Chee – Planning, Inc.	Assist in QAPP preparation. Perform onsite QC and assist in data analysis for SI Report preparation	B.S. Chemistry, 19 yrs. exp.
Carol Wortham	Quality Control Chemist	Curtis & Tompkins, Ltd.	Oversees chemical analysis of soil samples and generation of results	6 yrs experience with Curtis & Tomkins, Ltd.
Stella Cuenco	Project Manager	Laboratory Data Consultants, Inc.	Oversees analytical data validation, generates NEDD/NIRIS deliverables	B.S. Chemistry, 15 yrs. of experience

QAPP Worksheet #8
Special Personnel Training Requirements Table
UXO-Qualified Personnel

Project Function	Specialized Training – Title or Description of Course [1]	Training Provider[2]	Training Date[2]	Personnel/Groups Receiving Training[2]	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates[2]
Senior UXO Supervisor					Senior UXO Supervisor	USA Environmental, Oldsmar, Florida
UXO Safety Officer					UXO Safety Officer	USA Environmental, Oldsmar, Florida
UXO Quality Control Specialist					UXO Quality Control Specialist	USA Environmental, Oldsmar, Florida
UXO Technician III					UXO Technician III	USA Environmental, Oldsmar, Florida
UXO Technician II					UXO Technician II	USA Environmental, Oldsmar, Florida
UXO Technician I					UXO Technician I	USA Environmental, Oldsmar, Florida
UXO-Sweep Personnel					UXO-Sweep Personnel	USA Environmental, Oldsmar, Florida

[1] Refer to the DDESB TP-18 Table 4.1, Minimum Qualification Standards for the training, minimum experience, and special requirements for UXO personnel. All UXO personnel on this project will be affiliated with USA Environmental, Inc

[2] The USA Environmental personnel who will be working on this project have not yet been selected, so training certificates are not been included with the work plan, QAPP, or Health and Safety plan. The training records and certificates are currently located in the Document Control Center in the USA Environmental, Oldsmar, Florida office.

QAPP Worksheet #9
Project Scoping Session Participants Sheet

Project Name: Site Inspection of Waikane Valley Training Area, Munitions Response Program Site **Projected Date(s) of Sampling:** refer to Worksheet #16 **Project Manager:** Richard Hosokawa, RPM, NAVFAC Pacific	**Site Name:** Waikane Valley Training Area **Site Location:** Kaneohe, Hawaii

Date of Session: August 29, 2006
Scoping Session Purpose: Review project objectives, clarify questions, site visit

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Richard Hosokawa	Remedial Project Manager	NAVFAC Pacific	(808) 472-1423	cowan.azuma@navy.mil	Remedial Project Manager
Randall Hu	Installation Point of Contact	MCBH Kaneohe	(808) 257-6920 x232	randall.hu@usmc.mil	Activity/Installation Point of Contact
CWO Scott Murphy	EOD Specialist	MCBH Kaneohe			
Jeff Larson	Environmental Compliance	MCBH Kaneohe	(808) 257-6920 x234	jeff.larson@usmc.mil	Environmental oversight
Gordon Olayvar	Environmental / Law enforcement	MCBH Kaneohe	(808) 257-6920 x243	Gordon.olayvar@usmc.mil	Law enforcement
Diane Drigot	Natural Resource Specialist	MCBH Kaneohe	(808) 257-6920 x224	Diane.drigot@usmc.mil	Natural Resource Manager
Derek Yasaka	Senior Manager	Wil Chee – Planning, Inc.	(808) 596-4688	wcpderek@lava.net	Senior Manager
Robert Nore	Project Manager	USA Environmental, Inc.	(813) 343-6420	bnore@usatampa.com	Project Manager
Dan Paul	UXO Specialist	USA Environmental, Inc	(813) 695-4389		UXO Consultant

QAPP Worksheet #10
Problem Definition

PROBLEM DEFINITION: Waikane Valley Training Area is located in the Waiahole and Waikane Valley, on Oahu's windward side (Kaneohe, Hawaii) approximately 10 miles northwest of Kaneohe Bay. It was known as the Waiahole Training Area and managed by the U.S. Army as property of Fort Hase. WVTA military history dates back to the early 1940s when the Army leased over 2,000 acres in the Waiahole and Waikane Valleys for jungle training, field maneuvers and a bombing range for air-to-ground ordnance delivery practice. The area was later used for maneuvers, tactical problems, and small arms, artillery, and mortar firing.

Between 1943 and 1953, the Army leased this property for maneuvers, jungle training, and small arms, artillery, and mortar firing. The U.S. Marines leased 1061 acres of the training area in 1953 and continued the leases until 1976. Training consisted of small arms fire, 3.5-inch rockets and possibly medium artillery fire. The lease was terminated in 1976 and returned to the original owners who farmed and developed it. After the Marines re-investigated and conducted an ordnance clearance in 1976, they reported 187 acres of the WVTA would never be free of duds, practice ordnance, etc. In 1989, the government acquired title to the 187-acre ordnance contaminated area of the original WVTA. Fencing of the property was completed in 1992 and remains as government property due to it being deemed improbable that it can be cleared of all ordnance contamination. As such, munitions and explosives that remain at the site pose a potential explosive hazard to human health and the environment. Refer to Section 1 of the Project Work Plan for additional background information, physical characteristics and the conceptual site model for this site.

PROJECT DESCRIPTION: The objective for this project is to perform a Site Inspection (SI) with respect to past use of Munitions and Explosives of Concern (MEC) for a Munitions Response Area or Munitions Response Sites (MRA/S) at the Waikane Valley Training Area (WVTA), Kaneohe, Oahu, Hawaii. As used in this document, the term MEC includes Discarded Military Munitions (DMM) and Unexploded Ordnance (UXO), and Munitions Constituents (MC) in high enough concentrations to pose an explosive hazard.

The SI, as the second component of the overall site evaluation following the Preliminary Assessment (PA), is not intended as a full-scale study of the nature and extent of contamination or explosives hazards. The National Oil and Hazardous Substances Contingency Plan (NCP) identifies the SI as the on-site investigation to determine whether there is a release or potential release and the nature of the associated threats. Its purpose is to augment the data collected in the PA and to generate, if necessary, sampling and other field data to determine if further response action or remedial investigation is appropriate. The objective of performing the SI is to efficiently gather data necessary to make this determination.

The SI shall consist of a visual and detector-aided field inspection focused on identifying surface evidence of MEC contamination using, as a basis, available information from the PA, Archive Search Reports and other existing information previously collected for the MRA/S. This

QAPP Worksheet #10
Problem Definition (continued)

information shall be used to assess whether a release or potential release occurred in order to support the final recommendations.

As part of the field inspection, concurrent soil sampling for evidence of munitions constituents (MC) will be performed. Laboratory analytical data resulting from the soil sampling will be compared to the corresponding Hawaii Department of Health (HDOH) environmental action levels (EALs) and US EPA Region 9 residential preliminary remediation goals (PRGs) to determine if the soil contains MC above project action limits (refer to Worksheet #15).

PROJECT DECISION CONDITIONS:

Overall project: The findings of this SI will augment the data collected in the Preliminary Assessment and will provide a basis for determining if further response actions are necessary. The results of this SI will be the basis for recommendations on further actions at WVTA which will be presented in the SI Report.

- If the findings of the SI indicate that release or potential release occurred, and that it could pose potential or existing risk/hazard to human health or the environment, recommendations for further actions will be made..
- If the findings of the SI indicate that a release has not occurred, further actions will not be recommended.

For soil sampling analytical data only:

- If the soil samples contain MC at or above the applicable screening level (HDOH EALs revised February 2007 [not a drinking water source, < 150m to nearest surface water body] or US EPA Region 9 2004 residential PRGs, whichever is more stringent), then further action will be recommended.
- If the soil samples do not contain MC at or above the screening levels, the results of the visual and detector-aided field inspection will be used to determine if further actions will be recommended. If evidence of MEC is found during the field survey, further action will be recommended.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements

WHO WILL USE THE DATA? NAVFAC Pacific. USA Environmental, Inc. will also use the data to prepare the SI Report.

WHAT WILL THE DATA BE USED FOR? The data will be used to prepare the SI Report which will document the findings of the data collection efforts and field inspection. This data, along with data previously gathered, will be used to assess whether a release or potential release occurred at the site in order to support recommendations for further action at the site. If the findingsof the SI indicate that a relase or potential release occurred, recommendations for further actions will be made. The findings of this SI will also augment the data collected in the PA and will provide a basis for determining if further response actions are necessary.

WHAT TYPE OF DATA ARE NEEDED? Data requirements for this project includes the analytical data from soil samples and data from the visual and detector-aided MEC survey.

As noted in the *US Army Corps of Engineers Military Munitions Response Action Engineering Manual (EM 1110-1-4009)*, June 2006, "limited sampling to evaluate the presence of absence of MC contamination should be conducted during the SI phase of a munitions response project" and "analytical requirements for MC should be based on the anticipated MEC item composition". For this SI, soil samples will be collected and analyzed to determine the presence of absence of MC consisting of nitroaromatics, nitramines, and heavy metals (refer to Worksheet #15). These MC constituents have been selected because they are MC marker and indicator compounds as noted in the *US Navy Range Sustainability Environmental Program Assessment Policy Implementation Manual*, December 2003. Refer to Section 1.4.1.2 of the work plan for detailed information on the type of MC associated with the known or suspected munitions used at Waikane. Nitroaromatics and nitramines are included because of their use as the explosive components in MEC. These compounds are stable in soils but more easily dissolved in water. Several indicator metals will be analyzed for on this SI: aluminum, antimony, barium, chromium, copper, iron, lead, nickel, and zinc (subsequent investigations may include additional metals). These heavy metals are very stable in soils and do not easily dissolve in water.

Soil samples will be collected at various locations at WVTA (refer to Worksheet #17 and Figure A-1 in Attachment A). The soils samples will be analyzed at an off-site laboratory using EPA SW-846 Methods 8330 and 6010B. All analytical results will be reported as dry-weight corrected.

Location, terrain, and vegetation data will be recorded along the 5-foot wide reconnaissance transects during the MEC survey. A waypoint, brief description, and digital photograph will be electronically recorded for any MEC related items and significant metal detector responses. Locations and descriptions of ground scars, craters, vegetation, and terrain will also be recorded.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements (continued)

HOW GOOD DO DATA NEED TO BE? The quality of data collected during this SI must be able to support the recommendations for further action at WVTA that will be presented in the SI Report. The data must meet the Project Quantitation limits listed in Worksheet #15.

HOW MUCH DATA IS NEEDED? Approximately 144 acres will be inspected in 5-foot wide transects during the MEC survey. Up to 50 (45 primary and 5 QC) soil samples will be collected and analyzed at an off-site laboratory for nitroaromatics, nitromines, and heavy metals. Refer to Worksheet #17 for a discussion of the sampling design and rationale.

WHERE, WHEN, AND HOW WILL DATA BE COLLECTED/GENERATED? Soil samples will be collected at the WVTA by personnel from Wil Chee – Planning, Inc. during a three week period. Analytical data from soil sampling will be generated by the off-site laboratory, Curtis and Tompkins, Ltd., following field collection. The validation of the analytical data will be conducted by Laboratory Data Consultants, Inc. Soil samples will be collected as described in Procedure I-B-1, *Soil Sampling*, of the *Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific*, February 2007. Soil samples will be collected between 0 to 6 inches below ground surface (bgs) using disposable plastic scoops and, if needed, hand augers, spades, shovels, or a combination thereof. The sampling design, locations, and methodology are discussed in further detail on Worksheet #17.

As noted in Section 3.3 of the project work plan, five-foot wide search transects will be established within the boundary of the MEC survey area and the location of each transect end point and station will be located using the precision survey equipment. A team of MEC Reconnaissance personnel will be assigned to inspect separate five-foot wide transects. Each group will be equipped with a metal detector and a Personal Data Assistant (PDA)/DGPS tool to record required data and to ensure that teams stay on the correct bearing. Due to the sites heavy vegetative canopy, GPS will not be relied upon as a primary means of navigation. Each group will be equipped with site contour maps, compasses and range finders to aide in navigation while traversing the site. Guided by the topographical maps, a compass, and acquired GPS position along the transects, each team member will visually inspect the ground surface for evidence of munitions use. Data will be manually entered into the Trimble GeoXT until sufficient GPS coverage is available. For metal detection, the Minelab Explorer II hand-held metal detector will be used. Photographs will be taken using a standard digital camera.

QAPP Worksheet #11
Project Quality Objectives/Systematic Planning Process Statements (continued)

HOW WILL THE DATA BE REPORTED? The analytical laboratory will report analytical data as specified in their laboratory quality assurance plan, in accordance with the Attachment 1-A-7-1 of Procedure I-A-7, *Analytical Data Validation Planning and Coordination* of the *Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific*, February 2007, and Appendix A of the *Department of Defense Quality Systems Manual for Environmental Laboratories*, January 2006. The laboratory data will be sent to the data validation firm and will result in the generation of data validation reports produced in accordance with Procedure II-A, *Data Validation Presentation* of the *Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific*, February 2007. The analytical data will be reported as both printed data packages and electronic deliverables in the format noted in Attachment D. Upon completion of validation, the analytical data will be supplied to the Navy in Naval Electronic Data Deliverable (NEDD) format and subsequently downloaded into the Naval Installation Restoration Information Solution (NIRIS) database. Reduced data (e.g. data summary tables) will be presented in the SI Report that will be prepared by USA Environmental, Inc.

Data gathered from the visual and detector-aided field inspection will be presented in the SI Report. A detailed digital account of MEC encountered during operations will be maintained. This accounting will include the unique identifying number, location of the item, and a digital photograph as part of the official project record. It will also contain specific details regarding the items found to include, but not limited to, specific nomenclature, type of fuzing, condition, and external markings. This data will be stored in a digital dig sheet and the project digital database. Section 4.0 of the work plan details the geospatial information and electronic submittals that will used to perform mapping and GIS integration during the SI.

HOW WILL THE DATA BE ARCHIVED? Laboratory data record retention will be 5 years and consistent with the *Department of Defense Quality Systems Manual for Environmental Laboratories*, January 2006. Validated analytical data will be supplied to the Navy in Naval Electronic Data Deliverable (NEDD) format and subsequently downloaded into the Naval Installation Restoration Information Solution (NIRIS) database.

Project records generated during the MEC field inspection will be retained and archived indefinitely in the project files located in the Document Control Center in the USA Environmental, Oldsmar, Florida, office. All final document files and digital data sets will be delivered to NAVFAC Pacific in formats specified in Section 4.7 of the work plan.

QAPP Worksheet #12-1
Measurement Performance Criteria Table

Matrix	Soil
Analytical Group	Nitroaromatics and nitramines (Method 8330)
Concentration Level	Low

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria[3]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
S-3		Precision	RPD $\leq$ 100%	Co-located field duplicate	S & A
	L-1	Precision – Lab	RPD <30%	Matrix spike duplicates	A
	L-1	Accuracy/Bias - contamination	All target analytes <1/2 QL	Method Blank	A
	L-1	Accuracy/Bias - Lab	69-120%	Surrogate spike	A
	L-1	Accuracy/Bias - Lab	% recovery of individual analytes within C&T 8330 Soil QC Limits (Attachment C)	Laboratory control sample	A
	L-1	Accuracy/Bias - matrix	% recovery of individual analytes within C&T 8330 Soil QC Limits (Attachment C)	Matrix spike	A

QAPP Worksheet #12-1
Measurement Performance Criteria Table (continued)

Matrix	Soil
Analytical Group	Nitroaromatics and nitramines (Method 8330)
Concentration Level	Low

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria[3]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
	L-1 (same as the LCS)	Sensitivity	Detected to 200%	Laboratory fortified blank spiked at the corresponding QLs	A
	L-1	Sensitivity	MDL limits (see Worksheet #15)	MDL study dated 3/26/08	A
	L-1	Comparability	RPD ≤ 40%	Second column confirmation of positive results	A
	L-1	Completeness	> 90% sample collection, > 85% laboratory analysis	Data Completeness Check	S & A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
[3] The MPC for laboratory control samples will be within the control limits specified in the DoD QSM. These limits are also stated in Procedure III-A, *Laboratory QC Samples* of the Projects Procedures Manual.

NOTE: Given the limited scope of the soil sampling on this project, budget constraints, inherent difficulties with soil PE samples, and the results of a recent PT study of the analytical laboratory, a PT sample is not included on this project. Refer to Worksheet #20 for additional information.

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Soil
Analytical Group	Heavy Metals (Method 6010B)
Concentration Level	Medium

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria[3]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
S-3		Precision	RPD $\leq$ 100%	Co-located field duplicate	S & A
	L-2	Precision	RPD $\leq$ 20%	Matrix spike duplicate	A
	L-2	Precision – Lab	% recovery of individual analytes within C&T 6010B and 7471A Soil QC Limits (Attachment)	Laboratory duplicate	A
	L-2	Accuracy/Bias - contamination	All target analytes < ½ QL	Method Blank	A
	L-2	Accuracy/Bias- Lab	80-120% recovery	Laboratory control Sample	A
	L-2	Accuracy/Bias- matrix	% recovery of individual analytes within C&T 6010B and 7471A Soil QC Limits (Attachment D)	Matrix Spike	A

QAPP Worksheet #12-2
Measurement Performance Criteria Table (continued)

Matrix	Soil
Analytical Group	Heavy Metals (Method 6010B)
Concentration Level	Medium

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria[3]	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
	L-2	Sensitivity	MDL limits (see Worksheet #15)	MDL study dated 3/26/08	A
	L-2	Completeness	> 90% sample collection, > 85% laboratory analysis	Data Completeness Check	S & A

[1] Reference number from QAPP Worksheet #21.
[2] Reference number from QAPP Worksheet #23.
[3] The MPC for laboratory control samples will be within the control limits specified in the DoD QSM. These limits are also stated in Procedure III-A, *Laboratory QC Samples* of the Projects Procedures Manual.

NOTE: Given the limited scope of soil sampling on the project, budget constraints, inherent difficulties with soil PE samples, and the results of a recent PT study of the analytical laboratory, a PT sample is not included on this project. Refer to Worksheet #20 for additional information.

QAPP Worksheet #13
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/Collection Dates)	How Data Will Be Used	Limitations on Data Use
Site Survey and Initial OEW Risk Assessment	DERP-FUDS Inventory Project Report, Waikane Training Area, Island of Oahu, Hawaii, Site No. H09H1035400	Army Corps of Engineers, 1996	To provide historical information about the site.	Data is from a limited site survey conducted over ten years ago.
Preliminary Assessment (PA) Report	Preliminary Range Assessment and Archive Search Report for the Waikane Valley Training Area	Army Corps of Engineers, 1998	To provide historical information about the site.	Archives data search was extensive, but site survey was limited to cursory walk-over.
Background levels of metals in soil	Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, June 2006	Department of the Navy, NAVFAC Hawaii	As a reference	

QAPP Worksheet #14
Summary of Project Tasks

Field Inspection Tasks:
Visually assess the area to determine the safest way to proceed with the MEC survey.
Establish an instrument test area to evaluate the performance of survey instruments.
Perform the MEC inspection.

Soil Sampling Tasks:
Establish and mark the locations.
Conduct soil sampling with the oversight of a UXO Technician II/I.
Ship the soil samples to the analytical laboratory.

Analysis Tasks:
The analytical laboratory will prepare, process, and analyze the soil samples for the specified analytical groups and MC analytes as noted in Worksheet #12 and 15.
The results of the analytical data will be sent to the data validators.

Quality Control Tasks:
SOPs will be strictly adhered to during sample collection, packaging, and shipping tasks.
The QC samples noted in Worksheet #12 and #26 will be analyzed for each analytical group.

Secondary Data: Data from previous surveys and inspections (e.g., the PA noted in Worksheet #13) will be reviewed and evaluated for use in this project. Limitations in the use of the data will be noted.

Data Management Tasks:.
Soil sampling data - data will be provided by the analytical laboratory and data validating firm in hard copy and electronic format. Electronic data will be downloaded into the Navy NIRIS database. The analytical data will be summarized and included in the SI report.
Visual and detector-aided data – MEC field inspection reconnaissance data will be electronically recorded and downloaded to the project laptop computer. Data gathered from the visual and detector-aided field inspection will be presented in the SI Report.

QAPP Worksheet #14
Summary of Project Tasks (continued)

Documentation and Records:

Field logbooks will be maintained at the site at all times during field work and shall be used to document events of field work tasks.
All soil sampling locations will be documented in the field logbook.
MEC survey records will be sent to USA Environmental's Oldsmar, Florida office on a weekly basis.
Chain-of-custody forms and air freight bills will be used to track and document the shipment of soil samples to the analytical laboratory.
A copy of the work plan containing this QAPP will be available onsite at all times during field work activities.

Data Packages: Analytical data packages will consist of the information specified in Attachment D.

Assessment/Audit Tasks:

The off-site laboratory audit, if necessary, will be performed by NAVFAC.
Results of any field sampling audits will be maintained with project files.

Data Review Tasks:

Analytical data will be validated in accordance with Procedure II-A, *Data Validation Presentation,* of the *Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific*, February 2007..
Validated analytical data will be reviewed by the Project Chemist.
The results of soil sampling will be compared to the project limits.
Data usability will be assessed by the project team.
A peer review of the draft and final SI Report will be conducted by the project team prior to submittal.

QAPP Worksheet #15-1
Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Nitroaromatics and Nitramines
Concentration Level: Low

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method [1]		Achievable Laboratory Limits [2]	
				MDLs (mg/kg)	Method QLs (mg/kg)	MDLs (mg/kg)	QLs (mg/kg)
HMX	2691-41-0	0.21	0.2	n/a	2.2	0.081	0.2
RDX	121-82-4	0.41	0.2	n/a	1.0	0.085	0.2
1,3,5-trinitrobenzene	99-35-4	1,800	0.2	n/a	0.25	0.034	0.2
1,3-dinitrobenzene	99-65-0	0.2 [3]	0.1	n/a	0.25	0.036	0.2
Nitrobenzene	98-95-3	0.65	0.2	n/a	0.26	0.041	0.2
Tetryl (2,4,6-trinitrophenyl-n-methylnitramine)	479-45-8	5.8	0.2	n/a	0.65	0.075	0.2
2,4,6-trinitrotoluene	118-96-7	0.67	0.2	n/a	0.25	0.039	0.2
4-amino-2,6-dinitrotoluene	1946-51-0	0.2 [3]	0.1	n/a	n/a	0.072	0.2
2-amino-4,6-dinitrotoluene	35572-78-2	12	0.2	n/a	n/a	0.060	0.2
2,4-dinitrotoluene	121-14-2	0.33	0.1	n/a	0.25	0.022	0.2
2,6-dinitrotoluene	606-20-2	0.5	0.2	n/a	0.26	0.085	0.2
2-nitrotoluene	88-72-2	0.87	0.4	n/a	0.25	0.064	0.4
3-nitrotoluene	98-08-1	21	0.4	n/a	0.25	0.10	0.4
4-nitrotoluene	99-99-0	12	0.4	n/a	0.25	0.060	0.4

n/a – not available or not applicable
[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.
[3] The HDOH EALs for 1,3-dintrobenzene and 4-amino-2,6-dinitrotoluene are 0.095 mg/kg and 0.12 mg/kg respectively. Since these levels are below both the analytical method and laboratory QLs, the project action levels will be set at the laboratory QL of 0.2 mg/kg.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Heavy Metals
Concentration Level: Medium

Analyte	CAS Number	Project Action Limit[3] (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method[1]		Achievable Laboratory Limits[2]	
				MDLs (mg/kg)	Method QLs (mg/kg)	MDLs (mg/kg)	QLs (mg/kg)
Aluminum	7429-90-5	76,000[4]	10	n/a	n/a	0.38	10
Antimony	7440-36-0	20	3.0	n/a	n/a	0.087	3.0
Barium	7440-39-3	750	0.5	n/a	n/a	0.022	0.5
Chromium (total)	7440-47-3	210	0.50	n/a	n/a	0.029	0.50
Copper	7440-50-8	230	0.50	n/a	n/a	0.096	0.50
Iron	7439-89-6	23,000[4]	5.0	n/a	n/a	0.39	5.0
Lead	7439-92-1	200	0.15	n/a	n/a	0.092	0.15
Nickel	7440-02-0	150	1.0	n/a	n/a	0.024	1.0
Zinc	7440-66-6	600	1.0	n/a	n/a	0.036	1.0

n/a – not available or not applicable
[1]Analytical MDLs and QLs are those documented in validated methods.
[2]Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing a specific analytical method.
[3] HDOH EAL (not a drinking water source, <150m to nearest surface water body) unless otherwise noted
[4] EPA Region 9 residential PRG, no HDOH EAL exists

QAPP Worksheet #16
Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
	Refer to Section 5 of the work plan for the project dates				

QAPP Worksheet #17
Sampling Design and Rationale

This SI is not intended as a full-scale study of the nature and extent of contamination or explosives hazards. Its purpose is to augment the data collected in the PA and to generate sampling and other field data to determine if further response action or remedial investigation is appropriate. As such, the sampling design for this project has been based on the review of historical data including the PA, previous site inspections/surveys, and photographs; current site conditions; accepted sampling rationale using *Guidance on Choosing a Sampling Design for Environmental Data Collection (EPA QA-G5s);* MC sampling guidance in the *US Army Corps of Engineers Military Munitions Response Action Engineering Manual (EM 1110-1-4009)*, June 2006 and the *US Navy Range Sustainability Environmental Program Assessment Policy Implementation Manual*, December 2003; and professional judgment.

As noted in Chapter 10-2 of EM 1110-1-4009, "If MEC is present (or suspected) at a site and the presence of MC in environmental media in unknown, sampling is conducted to determine whether it exists. This type of investigation is typically biased to look at areas where contamination is suspected to be the worst case". At WVTA, the areas most likely to contain MEC and MC contamination deposited by erosion, burial, and former munitions activities are the lowland areas along and downslope of the north valley wall.

The design of the MEC field survey is discussed in detail in the project work plan. Given the topography of the site and expected depth of MC resulting from the type of munitions known to be used at the site, soil sampling for MC constituents at WVTA will consist of the following**:**

- 5 incremental samples collected within ravines situated along the north valley wall
- 30 incremental samples collected in the area downslope of the north valley wall ravines and scarps toward Waikane Stream and the valley floor
- Up to 10 discrete samples to be collected at surface MEC discoveries
- 5 quality control (QC) sample (10% of the total primary soil samples)

Incremental soil samples will be collected at 35 locations located throughout WVTA. Figure A-1 shows the proposed sampling locations. Due to the heavy vegetation, mountainous topography, and suspected presence of MEC at WVTA, systematic gridding to establish sampling nodes will not be possible. Instead, a central sampling node will be established at each of the 35 locations and an area of up to 50 feet in diameter will be sampled by collecting ten incremental soil samples. Using a disposable plastic scoop, one to two ounces of soil will be collected between 0 to 6 inches below ground surface at the center node and placed in a foil-lined mixing bowl. Eight additional soil samples will be collected at random locations radiating outwards between 10 and 50 feet from the center node.

QAPP Worksheet #17
Sampling Design and Rationale (continued)

Each soil increment will be placed in the bowl and thoroughly mixed using the plastic scoop and gloved hands until a consistent physical appearance is achieved. The incremental soil sample will then be transferred from the bowl to a sample container for shipment to the off-site analytical laboratory. A total of 35 primary and 4 QC soils samples will be collected from these areas.

Additional biased soil sampling will be employed during the field survey as surface MEC discoveries are made. Up to 10 discrete soil samples and 1 QC sample will be collected from these areas using disposable plastic scoops or, if necessary, hand augers or trowels. The first 10 discoveries will be sampled. Depending on the type, size, and depth of MEC found, these discrete soil samples will be collected between 0 to 6 inches below ground surface.

In order to differentiate between naturally-occurring background levels of MC constituents at WVTA and the Navy's remediation responsibilities, the analytical results for metals in the soil samples will also be compared to the 95th percentile background concentrations of metals from the *Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities*, Pacific Division, Naval Facilities Engineering Command.

Field QC soil samples will consist of co-located field duplicates collected and analyzed at a frequency of 10% of the primary soil samples (i.e., 1 QC sample for every 10 primary samples). A total of 5 co-located field duplicates will be collected: 4 from the 35 sampling locations below the north valley wall, and 1 from a discrete MEC discovery area. Co-located field samples will be acquired by collecting soil increments up to 0.5 feet from the original increment locations in the same manner as the primary soil samples.

QAPP Worksheet #18
Sampling Locations and Methods/SOP Requirements Table

Sampling Location/ID Number	Matrix	Depth (inches bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
Downslope of the north valley wall	Soil	0-6	Nitramines and nitroaromatics	Low	30 incremental and 3 duplicate	S-1 to S-6	Most likely locations for MEC and MC to be deposited or accumulate
Within ravines situated along the north valley wall.	Soil	0-6	Nitramines and nitroaromatics	Low	5 incremental and 1 duplicate	S-1 to S-6	Most likely locations for MEC and MC to be deposited or accumulate
Downslope of the north valley wall	Soil	0-6	Heavy metals	Medium	30 incremental and 1 duplicate	S-1 to S-6	Most likely locations for MEC and MC to be deposited or accumulate
Within ravines situated along the north valley wall.	Soil	0-6	Heavy metals	Medium	5 incremental and 1 duplicate	S-1 to S-6	Most likely locations for MEC and MC to be deposited or accumulate
Surface MEC discoveries	Soil	0-6	Nitramines and nitroaromatics	Low	10 discrete and 1 duplicate	S-1 to S-6	Areas with visual MEC articles
Surface MEC discoveries	Soil	0-6	Heavy metals	Medium	10 discrete and 1 duplicate	S-1 to S-6	Areas with visual MEC articles

[1]From the Project Sampling SOP References table (Worksheet #21).

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference[1]	Sample Volume	Containers (number, size, and type) [2]	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Soil	Nitramines and nitroaromatics	Low	L-1 / L-4 / L-6	50 grams	8-ounce amber jar	Light protected, 4° C	14 days to extraction, 40 days from extraction to analysis
Soil	Heavy metals	Medium	L-2 / L-5 / L-6	15 grams	8-ounce amber jar	None	180 days
Soil	% Solids (moisture)	n/a	L-3 / L-6	10 grams[3]	8-ounce amber jar	4° C	None

[1] From the Analytical SOP References table (Worksheet #23).
[2] One 8-ounce jar will contain enough soil to run all analytical methods.
[3] An aliquot of soil for % moisture will be taken from the 8-ounce jar.

QAPP Worksheet #20
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS	No. of Field Blanks	No. of Equip. Blanks [2]	No. of PT Samples [3]	Total No. of Samples to Lab
Soil	Nitramines and Nitro-aromatics	Low	L-1 / L-4 / L-6	45	5	3	None	None	None	50
Soil	Metals	Medium	L-2 / L-5 / L-6	45	5	3	None	None	None	50

[1] From the Analytical SOP References table (Worksheet #23).
[2] Due to the use of disposable plastic scoops to collect soil samples, no equipment blanks will be analyzed on this project.
[3] A Performance Testing (PT) sample was not included on this project for several reasons:

- According to the PACDIV IRP SOP III-G, "use of the soil matrix for PE samples is more difficult to interpret because of widely different soil types, which may affect contaminant extraction efficiency (unless soil from the site itself is effectively homogenized and spiked, and if field heterogeneity has been quantified. Non-native soils used for PE sample spiking may not mimic site soil physical characteristics)." Also, soils are more likely to cause matrix interference problems which could affect the comparability of results.
- As noted earlier, the purpose of this site inspection is to augment the data collected in the PA and to generate, if necessary, sampling and other field data to determine if further response action or remedial investigation is appropriate. The objective of performing the SI is to efficiently gather data necessary to make this determination. It is not intended as a full-scale study.
- The analytical laboratory, Curtis & Tompkins, participated in a soil PT study in March 2006 which included nitroaromatics, nitramines and heavy metals by Methods 8330 and 6010B. The results of the PT study for all compounds on this SI were deemed "acceptable". Copies of the PT study are available upon request.

Thus, given the limited scope of soil sampling on this project, budget constraints, inherent difficulties with soil PE samples, and the results of a recent PT study at Curtis and Tompkins, a PT sample has not been included on this project.

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
S-1	Standard Operating Procedure – MEC Avoidance	USA Environmental, Inc.	N/A	N	Safety precautions for working in areas known or suspected to contain MEC
S-2	Procedure I-B-1, Soil Sampling	Pacific Division, Naval Facilities Engineering Command	Disposable plastic scoops	N	
S-3	Procedure III-B, Field QC Samples	Pacific Division, Naval Facilities Engineering Command	N/A	N	
S-4	Procedure III-D, Logbooks	Pacific Division, Naval Facilities Engineering Command	N/A	N	
S-5	Procedure III-E, Record Keeping, Sample Labeling, and Chain-of-Custody Procedures	Pacific Division, Naval Facilities Engineering Command	N/A	N	
S-6	Procedure III-F, Sample Handling, Storage, and Shipping Procedures	Pacific Division, Naval Facilities Engineering Command	N/A	N	

Note: SOP S-1 is found in Attachment B. SOPs S-2 to S-6 are found in the *Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific* (February 2007) and have been incorporated by reference.

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table*

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
	This information can be found in Section 2.9.1 and 3.3.4 of the work plan.								

* The SOPs for operating and maintaining field equipment used in the MEC field inspection are presented in Section 3.3.4 of the project work plan. Section 2.9.1 of the work plan describes the Instrument Test Area.

QAPP Worksheet #23
Analytical SOP References Table

Reference Number[1]	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument[2]	Organization Performing Analysis	Modified for Project Work? (Y/N)
Analytical SOPs						
L-1	Curtis & Tomkins Standard Operating Procedure EPA 8330, Nitroaromatics and Nitramines Revision 0, 12 March 2004	Definitive	Nitramines and Nitroaromatics	HPLC with autosampler, Hewlett Packard Model 1090 Series 11/L	Curtis & Tompkins, Ltd.	N
L-2	Curtis & Tomkins Standard Operating Procedure EPA 6010B, Trace Metal Analysis using Instrument MET-08 Revision 0, 29 April 2005	Definitive	Heavy Metals	Perkin-Elmer Inductively Coupled Plasma (ICP) Model 4300 DV with autosampler	Curtis & Tompkins, Ltd.	N
L-3	Curtis & Tomkins Standard Operating Procedure Moisture (% Solids) in Soils and Sediment, US EPA CLP Method ILM04.0 Revision 4, 14 February 2003	Definitive	n/a	n/a	Curtis & Tompkins, Ltd.	N

Note: These Analytical SOPs are included in Attachment C.

QAPP Worksheet #23 (continued)
Analytical SOP References Table

Reference Number[1]	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument[2]	Organization Performing Analysis	Modified for Project Work? (Y/N)
Preparatory SOPs						
L-4	Sonication Bath Extraction (EPA 8330) of Soil Samples for EPA 8330, Nitroaromatics and Nitramines (Explosives) by HPLC Revision 0, 12 March 2004	n/a	Nitroaromatics and Nitramines	Sonicator (refer to the SOP in Attachment C for more information)	Curtis & Tompkins, Ltd.	N
L-5	Acid Digestions of Soil and Solid Samples for Total Metals Analysis by ICP-AES and ICP-MS EPA 3050B Revision 9, 12 September 2007	n/a	Metals	Miscellaneous (refer to the SOP in Attachment C for more information)	Curtis & Tompkins, Ltd.	N
L-6	Department of Defense Program Requirements based on QSM 3 Revision 4, 18 January 2008	n/a	All	n/a	Curtis & Tompkins, Ltd.	N

[1] These Analytical SOPs are included in Attachment D.
[2] Refer to the SOP for more information on the instruments and equipment used.

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
HPLC	Five-point initial calibration for all analytes	Initial calibration prior to sample analysis	Average response - average RSD for all analytes ≤20% with no individual analyte RSD >30% Linear – least squares regression $r \geq 0.99$ Non-linear – correlation coefficient $r \geq 0.99$ (6 points shall be used for second order)	Correct problem then repeat initial calibration	Curtis & Tompkins, Ltd.	L-1
HPLC	Second-source calibration verification for all analytes	Following five-point initial calibration	Each analyte within ±15% of expected value, or average of all within ±15%	Correct problem then repeat initial calibration	Curtis & Tompkins, Ltd.	L-1
HPLC	Retention time window calculated for each analyte	Each initial calibration and calibration verifications	± 3 times standard deviation for each analyte retention time from 72-hour study, or defaults listed in 8000B	Correct problem then reanalyze all samples analyzed since the last retention time check	Curtis & Tompkins, Ltd.	L-1

QAPP Worksheet #24
Analytical Instrument Calibration Table (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
HPLC	Calibration verification	At beginning of each sequence, after every 10 samples and at the end of the sequence	Each analyte within ±15% of expected value, or average of all within +15%	Correct problem then repeat initial calibration verification and reanalyze all samples since last successful calibration verification	Curtis & Tompkins, Ltd.	L-1
ICP	Five-point initial calibration for all analytes	Daily initial calibration prior to sample analysis	Linear regression correlation - coefficient $r > 0.995$	Correct problem then repeat initial calibration	Curtis & Tompkins, Ltd.	L-2
ICP	Initial calibration verification (ICV) (second source)	Daily after initial calibration	All analytes within ±10% of expected value	Correct problem then repeat initial calibration	Curtis & Tompkins, Ltd.	L-2
ICP	Calibration blank	After every calibration verification	No analytes detected ≥ QL	Correct problem then analyze calibration blank and previous 10 samples	Curtis & Tompkins, Ltd.	L-2
ICP	Continuing Calibration Verification (CCV) Standard	After every 10 samples and at the end of the analysis sequence	All analyte(s) within ±10% of expected value and RSD of replicate integrations <5%	Repeat calibration and reanalyze all samples since last successful calibration verification	Curtis & Tompkins, Ltd.	L-2

QAPP Worksheet #24
Analytical Instrument Calibration Table (continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
ICP	Interference check solution (ICS-AB)	At the beginning and end of an analytical run and every 8 hours	Within ±20% of expected value	Terminate analysis; correct problem; reanalyze ICS; reanalyze all affected samples	Curtis & Tompkins, Ltd.	L-2

[1]From the Analytical SOP References table (Worksheet #23). Also refer to the SOP titled *Department of Defense, Program Requirements based on QSM 3*,included in Attachment C.

The laboratory will calibrate laboratory equipment as specified by the analytical method used and as described in the *Department of Defense Quality Systems Manual for Environmental Laboratories*, January 2006.

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
HPLC	Degas the solvents	none	Fill reservoir, connect to instrument, turn on Degas knob for 15 minutes	Before use	See L-1	See L-1	Curtis & Tompkins, Ltd.	L-1
HPLC	Condition the system after Idle/Standby	none	Inject one or two high Nitramine or Nitroaromatic standards before starting	When the system has not been used for a few days	See L-1	See L-1	Curtis & Tompkins, Ltd.	L-1
HPLC	Equilibrate the column	none	Flush column with 50/50% water/ methanol for 2-3 hours. Set oven temp to 40 to 45°C. Analyze two solvent blanks and two CCVs.	If retention times drift or compounds elute in a shorter time than expected	See L-1	See L-1	Curtis & Tompkins, Ltd.	L-1
ICP	Replenish rinse water reservoir	none	Add water	Daily	See L-2	See L-2	Curtis & Tompkins, Ltd.	L-2

[1]From the Analytical SOP References table (Worksheet #23).

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (continued)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
ICP	Change pump windings for internal standard solution	none	Replace windings	Every one or two days	See L-2	See L-2	Curtis & Tompkins, Ltd.	L-2
ICP	Change sampling tube	none	Replace tubing	Every week or two or when bubbles appear	See L-2	See L-2	Curtis & Tompkins, Ltd.	L-2
ICP	The torch and injector should be changed and cleaned	none	Immerse the parts in aqua regia overnight	Whenever the torch alignment intensity drops by 20%	See L-2	See L-2	Curtis & Tompkins, Ltd.	L-2

[1]From the Analytical SOP References table (Worksheet #23).

The laboratory is responsible for inspecting and maintaining laboratory equipment as described in their laboratory quality assurance plan (as specified by the analytical method used) and as described in the *Department of Defense Quality Systems Manual for Environmental Laboratories*, January 2006.

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Matthew Casey, Wil Chee – Planning, Inc.
Sample Packaging (Personnel/Organization): Matthew Casey or Lynette Gehring, Wil Chee – Planning, Inc.
Coordination of Shipment (Personnel/Organization): Matthew Casey or Lynette Gehring, Wil Chee – Planning, Inc.
Type of Shipment/Carrier: Coolers/Federal Express
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Control/Curtis & Tompkins, Ltd.
Sample Custody and Storage (Personnel/Organization): Sample Control, Curtis & Tompkins, Ltd.
Sample Preparation (Personnel/Organization): Preparation Chemist/Curtis & Tompkins, Ltd.
Sample Determinative Analysis (Personnel/Organization): Analytical Chemist/Curtis & Tompkins, Ltd.
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 60
Sample Extract/Digestate Storage (No. of days from extraction/digestion): varies depending on analysis
Biological Sample Storage (No. of days from sample collection): N/A
SAMPLE DISPOSAL
Personnel/Organization: Sample Control, Curtis & Tompkins, Ltd.
Number of Days from Analysis: 60

QAPP Worksheet #27
Sample Custody Requirements

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): A field logbook will be maintained during the field inspection to provide a primary record of field activities. Entries will be made chronologically and in sufficient detail to allow the writer or knowledgeable reviewer to reconstruct the applicable events. Entries will include the time and location of each activity, descriptions of any general problem encountered and its resolution, requested changes in activity, and impacts to work schedule. The logbook will include the signature of the individual responsible for the entries contained in the logbook.

A unique sample number will be assigned to each sample to facilitate data tracking and storage. Field personnel will log individual samples onto chain-of-custody (COC) forms. Information required on these forms include sample number, matrix, date and time of collection, number of containers, analytical methods to be performed on the sample, and preservatives (if any). The COC form will accompany the samples from the field to the laboratory (additional details appear in the COC Procedures section below). The sampler will sign the COC form signifying that they were the person who collected the samples. The person delivering the samples to the airfreight company for transport to the laboratory will also sign and date the COC form.

A sample label with adhesive backing will be affixed to each individual sample container. The sample number, date and time of collection, sampler's initials, preservative (if applicable), and analysis to be performed on the sample will be recorded on each label with a waterproof marker. Clear tape will be placed over each label to prevent the label from tearing, falling off, smearing, and to otherwise prevent loss of information on the label.

After being labeled, all sample containers will be placed in insulated coolers. Cushioning material will be placed on the bottom and top (and optionally on the sides) of the inside of the cooler as needed. Empty space between sample containers will be filled with appropriate material. Glass sample containers will be wrapped with bubble wrap or other appropriate padding to prevent breakage during transport. Frozen gel packs or ice in double, sealed self-sealing bags will be placed in the coolers with samples that must be maintained at <6 degrees Celsius (°C). Prior to shipment to the analytical laboratory, the ice or cold packs in coolers will be replaced to allow samples to be maintained at <6 °C until received by the laboratory.

QAPP Worksheet #27
Sample Custody Requirements (continued)

When a cooler is ready for shipment to the laboratory, two copies of the COC form will be placed inside a self-sealing bag and taped to the inside of the cooler lid. The coolers will then be sealed with waterproof tape and any required labels attached.

Shipment of soil samples to continental United States from Hawaii is controlled by the United States Department of Agriculture (USDA) and is subject to their inspection and regulation. Documentation in the form of a "USDA Soil Import Permit" is required to prove that the receiving laboratory is certified by the USDA to receive and properly dispose of foreign soil. In Hawaii, soil sample shipments are typically brought to the air freight courier at the airport where a USDA representative is contacted by the courier to make an inspection. During the inspection, sample coolers are inspected, affixed with a label indicating that the coolers contain environmental samples, and the shipping forms stamped with approval. Alternatively, WCP has received approval from the USDA to ship soil samples from Hawaii and has received a stamp that is placed on the shipping paperwork to facilitate shipment. In this way, the USDA does not need to inspect each soil sample shipment, although they have the authority and option to do so.

Custody seals will be placed on the coolers. The seals will be placed in such a manner that they must be broken to open the coolers in order to enable detection of sample tampering. The custody seals will be labeled with the sampler's name or initials, and date and time that the sample/cooler was sealed.

The air freight bill, laboratory soil import permit, address labels, and soil import permit labels (optional), will be attached to the outside of the coolers. If a shipment is made up of multiple pieces (e.g., more than one cooler), the paperwork will be attached only to one cooler, if the courier agrees. However, all other coolers in the shipment will have an address label and custody seals affixed.

Copies of the COC(s) and air freight bill will be emailed or faxed to the laboratory to inform them of the pending shipment.

A sample custody seal and chain-of-custody form are presented in Attachment B.

QAPP Worksheet #27
Sample Custody Requirements (continued)

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal): A designated sample custodian will take custody of all samples upon their arrival at the Curtis & Tomkins analytical laboratory in Berkeley, California. The custodian will sign and retain copies of the airway bills and COC forms. The laboratory will email a copy of the signed COC to the Project Chemist. The custodian will inspect all sample labels and COC forms to ensure that the information is consistent, and that each is properly completed. The custodian will also measure the temperature of the samples in the coolers upon arrival. The custodian will also document if any of the following conditions:

- If the samples show signs of damage or tampering
- If the containers are broken or leaking
- If any sample holding times have been exceeded

The sample custodian will document all of the above information on the sample receipt sheet.

In the event that a sample container breaks in shipment, or if discrepancies are noted between the COC form, sample labels, or requested analysis, the laboratory sample custodian will immediately notify the Project Chemist. A non-conformance report will be completed within 24 hours. At the time of notification, appropriate corrective action will be determined. The sample custodian will enter the corrective action into the laboratory system, and a log-in confirmation sheet will be sent within 48 hours to the Project Chemist.

The custodian will then assign a unique laboratory number to each sample and distribute the samples to secured storage areas, including those samples that must be maintained at <6°C. The unique laboratory number for each sample, the client name, date and time received, analysis due date, and storage will also be manually logged onto a sample receipt record and later entered into the laboratory's computerized data management system.

Laboratory personnel will be responsible for the care and custody of samples from the time of their receipt at the laboratory through their exhaustion or disposal. Samples should be logged in and out on internal laboratory chain-of-custody forms each time they are removed from storage for extraction or analysis.

QAPP Worksheet #27
Sample Custody Requirements (continued)

Sample Identification Procedures: A sample number will be assigned to each sample to facilitate data tracking and storage as follows:

WVTyyy
where WVT refers to the Waikane Valley Training Area, and
yyy is a chronological number, starting with 001

For example, the sample number for the 30th sample would be WVT030. QC samples will be included in the chronological sequence.

A sample label with adhesive backing will be affixed to each individual sample container. Clear tape will be placed over each label to prevent the labels from tearing off, falling off, being smeared, and to prevent loss of information on the label.

Chain-of-custody Procedures: Field personnel will log individual samples onto COC forms. Completing a COC form initiates the documentation of the process of custody control, which includes possession of a sample from the time of its collection in the field to its receipt by the analytical laboratory. These forms may also serve as the request for analyses. Information required on the COC forms includes the sample number, matrix, date and time of collection, number of containers, analytical methods to be performed on the sample, and preservatives (if any).

The sampler will sign the COC form signifying that they were the person who collected the samples. The sampler will retain one copy of the COC form and the remaining copies of the COC form will be placed inside a self-sealing bag and taped to the inside of the cooler containing the samples. Each cooler will be associated with a unique COC form. When a transfer of custody takes place, both parties will sign and date the accompanying copy COC forms, and the individual relinquishing the samples will retain a copy of each form. One exception is when the samples are shipped; air freight courier personnel will not sign or receive a copy because they do not open the coolers. The laboratory will attach copies of the completed COC forms to the data packages containing the results of the analytical tests.

The original COC form will be submitted by the laboratory along with the data delivered. Any changes to the analytical requests that are required will be made in writing to the laboratory. A copy of this written change and the reason for the change will be included in the project files so that recurring problems can be easily identified. Following the completion of sampling activities, the COC forms will be transmitted to the Project Manager for storage in project files.

A Sample Custody Flow Diagram has been included in as Figure A-2 in Attachment A.

QAPP Worksheet #28-1
QC Samples Table

Matrix	Soil
Analytical Group	Nitramines and Nitroaromatics (Method 8330)
Concentration Level	Low
Sampling SOP	S-2, S-3
Analytical Method/ SOP Reference	L-1
Sampler's Name	Matthew Casey
Field Sampling Organization	Wil Chee – Planning, Inc.
Analytical Organization	Curtis & Tompkins, Ltd.
No. of Sample Locations	45

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Co-located field duplicates	10% of total field samples	RPD $\leq$ 100%	None, explain in narrative	Wil Chee – Planning, Inc.	Precision - Sampling	RPD $\leq$ 100%
Matrix spike duplicate	One per every 20 project samples	L-1	None, explain in narrative	Curtis & Tompkins, Ltd.	Precision	RPD < 30%
Method blank	1 per extraction batch (up to 20 samples)	L-1	Correct problem then reextract and reanalyze method blank and all samples in the affected batch	Curtis & Tompkins, Ltd.	Accuracy/Bias – contamination	All target analytes < ½ QL

QAPP Worksheet #28-1
QC Samples Table (continued)

Matrix	Soil
Analytical Group	Nitramines and Nitroaromatics (Method 8330)
Concentration Level	Low
Sampling SOP	S-2, S-3
Analytical Method/ SOP Reference	L-1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Surrogate spike	Every sample, spiked sample, standard and MS/MSD	L-1	Correct problem then reextract and reanalyze sample	Curtis & Tompkins, Ltd.	Accuracy/Bias - Lab	69-120%
Lab Control Sample (LCS)	1 per extraction batch (up to 20 samples)	L-1	Correct problem then reextract and reanalyze the LCS and all samples in the affected batch	Curtis & Tompkins, Ltd.	Accuracy/Bias	% recovery of individual analytes within C&T 8330 Soil QC Limits (Attachment C)
Matrix spike	One per every 20 project samples	L-1	None, explain in narrative	Curtis & Tompkins, Ltd.	Accuracy/Bias	% recovery of individual analytes within C&T 8330 Soil QC Limits (Attachment C)
Laboratory fortified blank	1 per extraction batch (up to 20 samples)	Detected to 200%	Reanalyze once then narrate	Curtis & Tompkins, Ltd.	Sensitivity	Detected to 200%
Second-column confirmation	100% for all positive results	L-1	Same as for initial or primary column analysis	Curtis & Tompkins, Ltd.	Comparability	RPD between columns $\leq$ 40%

QAPP Worksheet #28-2
QC Samples Table

Matrix	Soil
Analytical Group	Heavy Metals (Method 6010B)
Concentration Level	Medium
Sampling SOP	S-2, S-3
Analytical Method/ SOP Reference	L-2
Sampler's Name	Matthew Casey
Field Sampling Organization	Wil Chee – Planning, Inc.
Analytical Organization	Curtis & Tompkins, Ltd.
No. of Sample Locations	45

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Co-located field duplicate	10% of total field samples	RPD ≤ 100%	None, explain in narrative	Wil Chee – Planning, Inc.	Precision - Sampling	RPD ≤ 100%
Matrix spike duplicate	One per every 20 project samples	L-2	Correct problem then reprep and reanalyze the MSD and all samples in the affected batch	Curtis & Tompkins, Ltd.	Precision	RPD ≤ 20%
Laboratory duplicate	One per every 20 project samples	L-2	None, explain in narrative	Curtis & Tompkins, Ltd.	Precision	Antimony - RPD <21%, all others ≤ 20%

QAPP Worksheet #28-2
QC Samples Table (continued)

Matrix	Soil
Analytical Group	Heavy Metals (Method 6010B)
Concentration Level	Medium
Sampling SOP	S-2, S-3
Analytical Method/ SOP Reference	L-2

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	One per digestion batch	L-2	Correct problem then redigest and reanalyze method blank and all samples in the affected batch	Curtis & Tompkins, Ltd.	Accuracy/Bias – contamination	All target analytes < ½ QL
Laboratory control sample	One per digestion batch	L-2	Correct problem then reprep and reanalyze the MS and all samples in the affected batch	Curtis & Tompkins, Ltd.	Accuracy/Bias	80-120%
Matrix spike	One per every 20 project samples	L-2	None, explain in narrative	Curtis & Tompkins, Ltd.	Accuracy/Bias	% recovery of individual analytes within C&T 6010B Soil QC Limits (Attachment C)

QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records [a,b]	Data Assessment Documents and Records [a]	Other
Field logbook		Chain-of-custody records	Data validation reports[b]	N/A
Sampling notes and log		Sample receipt forms	Corrective action reports	
Chain-of-custody records		Laboratory case narrative	Telephone logs	
Airbills		Field sample results and forms	NEDD/NIRIS deliverables	
Documentation of any corrective actions taken		Results and forms for QC samples, standards, and blanks	QA report on deliverables	
Work plan including QAPP		Laboratory instrument calibration logs and forms	Field assessment report	
All other field documentation		Sample preparation and run logs		
		Electronic data deliverables		
		Telephone logs		
		Corrective action reports		

[a] Laboratory data record retention will be 5 years and consistent with the *Department of Defense Quality Systems Manual for Environmental Laboratories*, January 2006.
[b] Data will be reported and validated in accordance with the Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific. February 2007. 2007

Project records generated during the MEC field inspection will be retained and archived indefinitely in the project files located in the Document Control Center in the USA Environmental, Oldsmar, Florida, office.

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Locations/ID Numbers	Analytical SOP[1]	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	All	All	All	All	3 weeks	Curtis & Tompkins, Ltd. 2323 5th St. Berkeley, CA 94710 Carol Wortham (510) 486-0900	

[1] Reference number from QAPP Worksheet #23.

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Offsite Laboratory TSA	Once, prior to procure-ment of the laboratory *	External	Naval Facilities Engineering Service Center (NFESC)	NFESC	Laboratory Manager, Curtis & Tompkins, Ltd.	Laboratory Manager, Curtis & Tompkins, Ltd.	NFESC
Field Sampling TSA	Once at the start of sampling	Internal	Wil Chee-Planning, Inc.	Lynette Gehring, Project Chemist, Wil Chee - Planning, Inc.	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc.	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc.	Lynette Gehring, Project Chemist, Wil Chee - Planning, Inc.
Field logbook assessment	Once at the start of sampling	Internal	Wil Chee-Planning, Inc.	Lynette Gehring, Project Chemist, Wil Chee - Planning, Inc.	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc.	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc.	Lynette Gehring, Project Chemist, Wil Chee - Planning, Inc

* In a letter dated February 21, 2008, the Naval Facilities Engineering Service Center approved Curtis & Tompkins, Ltd., Berkeley to perform sample analysis for EPA Methods 8330 and 6010B.

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Field Sampling TSA	Written audit report	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc. Derek Yasaka, Senior Project Manager, Wil Chee - Planning, Inc.	24 hours after audit	Letter	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc. Derek Yasaka, Senior Project Manager, Wil Chee - Planning, Inc. Bob Nore, Project Manager, USA Environmental	24 hours after notification
Field logbook assessment	Memorandum	Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc. Derek Yasaka, Senior Project Manager, Wil Chee - Planning, Inc.	24 hours after assessment	Memorandum	Derek Yasaka, Senior Project Manager, Wil Chee - Planning, Inc. Matthew Casey, Sampling Team Leader, Wil Chee - Planning, Inc.	2 business days

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Offsite Laboratory TSA Report/Memo	Once, in conjunction with laboratory procurement	Completed February 21, 2008	NFESC	Richard Hosokawa, Remedial Project Manager, NAVFAC Pacific
Field Sampling TSA Report	Once at start of sampling	During the first week of field sampling	Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.	Derek Yasaka, Project Manager, Wil Chee – Planning, Inc. Matthew Casey, Sampling Team Leader, Wil Chee Planning, Inc.
Final Project SI Report	Once, after data validation is complete	Refer to Worksheet #16	Robert Nore, Project Manager, USA Environmental, Inc.	Richard Hosokawa, Program Manager, NAVFAC Pacific

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain of custody forms	Chain of custody (COC) forms will be reviewed internally upon their completion and verified against the packed sample coolers they represent. A copy of each COC will be placed in the project files. The original COC will be taped inside the cooler for shipment to the analytical laboratory.	Internal	Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.
Sampling Audit Reports	A copy of all audit reports will be placed in the project files. Copies of documented corrective action taken will be attached to the appropriate audit report. Upon completion of site work, the audit reports will be reviewed to ensure that all appropriate corrective actions have been taken and that corrective action reports are attached.	Internal	Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.
Field Notes	Field notes will be reviewed internally and placed in the project file. Copies of the field notes will be included in the final report as needed.	Internal	Matthew Casey, Sampling Team Leader and Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.
Sampling Analytical Data Package	All analytical data packages will be verified internally by the laboratory performing the work for completeness prior to submittal. All analytical data packages will be verified externally according to the data validation procedures specified in Worksheet #36.	Internal External	Carol Wortham, Curtis & Tompkins, Ltd. Laboratory Data Consultants

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Analytes	Determine whether all analytes specified in Worksheet #15 were analyzed and reported by the laboratory.	Lynette Gehring, Project Chemist, Wil Chee Planning, Inc.
IIa	Data Validation Report and Data Qualifiers	Summarize deviations from analytical methods, procedures or contract limits. Qualify analytical data and include an explanation of data qualifiers.	Laboratory Data Consultants
IIb	Sampling Plan	Determine whether the number and type of field samples specified in Worksheet #20 were collected and analyzed.	Lynette Gehring, Project Chemist, Wil Chee Planning, Inc.
IIb	Field QC Samples	Establish that the number of QC samples specified in Worksheet #20 were collected and analyzed.	Lynette Gehring, Project Chemist, Wil Chee Planning, Inc.
IIb	Project Quantitation Limits	Establish that sample results met the project quantitation limits	Laboratory Data Consultants

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	Soil	Nitroaromatics & Nitramines	Low	NAVFAC Pacific Standard Validation (PACDIV Level C) [a]	Laboratory Data Consultants
IIa	Soil	Metals (total)	Medium	NAVFAC Pacific Standard Validation (PACDIV Level C) [a]	Laboratory Data Consultants
IIb	Soil	Nitroaromatics & Nitramines	Low	QAPP Worksheet #12 and 15	Laboratory Data Consultants, Inc. and Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.
IIb	Soil	Metals (total)	Medium	QAPP Worksheet #12 and 15	Laboratory Data Consultants, Inc. and Lynette Gehring, Project Chemist, Wil Chee – Planning, Inc.

[a] As described in the Procedure II-A, *Data Validation Procedure*, of the Project Procedures Manual, U.S. Navy Environmental Restoration Program, NAVFAC Pacific (February 2007).

QAPP Worksheet #37
Usability Assessment

The purpose of this SI, as the second component of an overall site evaluation of the WVTA, is to augment the data collected in the PA and to generate sampling and other field data to determine if further response action or remedial investigation is appropriate. The data collected during this SI, along with data previously gathered, will be used to assess whether a release or potential release occurred at the site in order to support recommendations for further action. Data collected during the visual and detector-aided field inspection for MEC and the validated soil sampling analytical data for MC constituents, will be used to prepare the SI Report. The SI Report will document findings of data collection efforts and field inspection, present a refined conceptual site model, assess potential MEC and MC hazards, provide conclusions and recommendations as to future actions required at the site.

A usability assessment to determine how well the data collected on this project supports the project objective and decisions to be made will be performed by a team of personnel from USA Environmental Inc. and Wil Chee Planning. Bob Nore of USA Environmental and Derek Yasaka of Wil Chee - Planning, will be responsible for assigning task work to individual task members.

The usability of data collected during this SI will be assessed several ways. First, any deviations from the MEC field inspection and the soil sampling and handling procedures will be reviewed and their effect on data usability evaluated. Second, the analytical results of the soil sampling will be compared to the project quality objectives presented on Worksheet #12 to determine if the MPCs were met. Upon completion of verification and validation processes, the data quality indicators will be evaluated for each analytical group and, based on the results of this examination, conclusions regarding the validity and usability of data for each analytical group will be drawn. Third, the levels of MC constituents in the background samples will be compared to the levels of MC constituents found in the primary soil samples in order to determine if the results are naturally occurring or possibly the result of MEC presence. The SI Report will include discussions of conclusions drawn and any limitations on the use of project data as a result of this assessment.

ATTACHMENT A

FIGURES

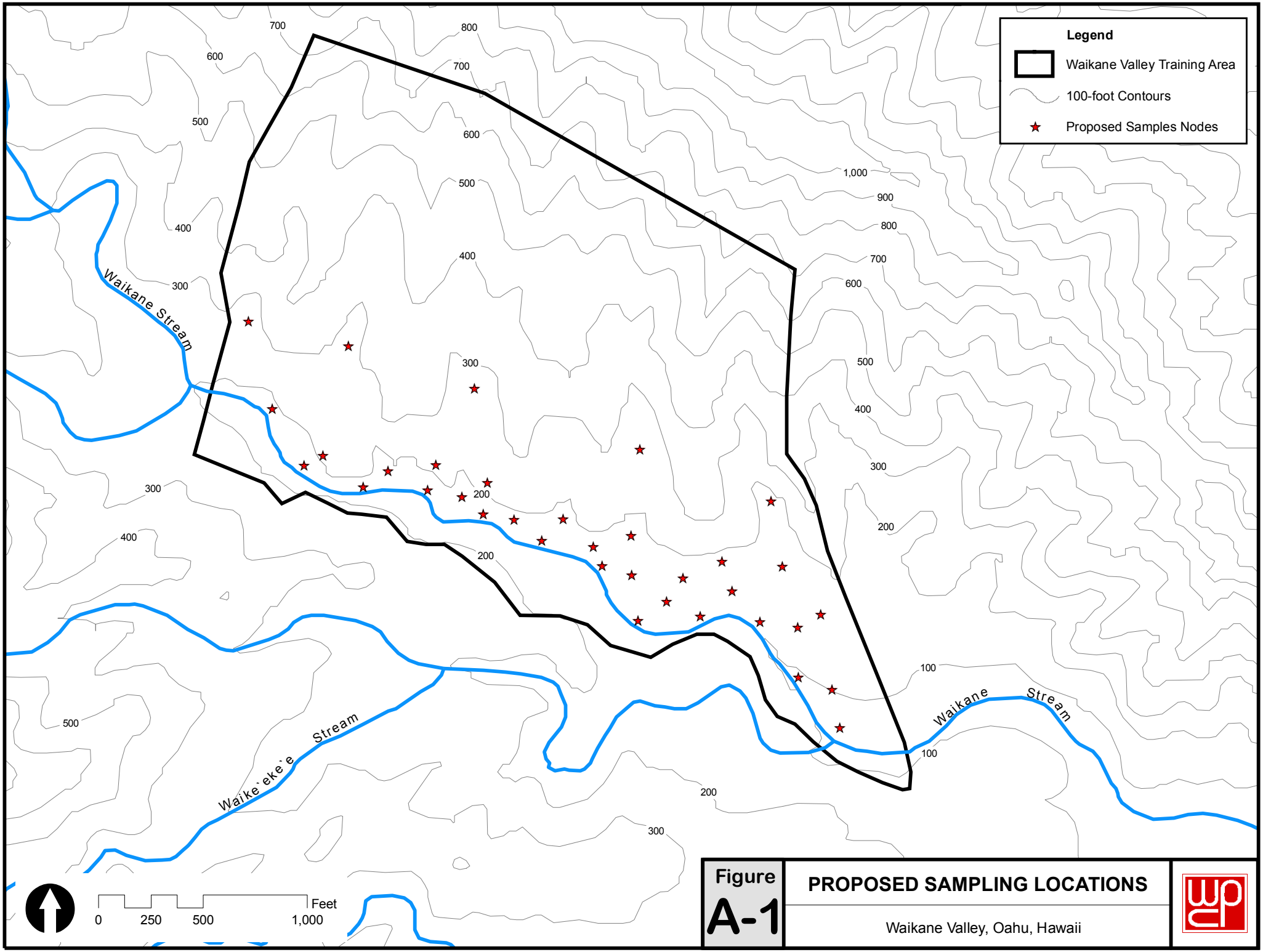
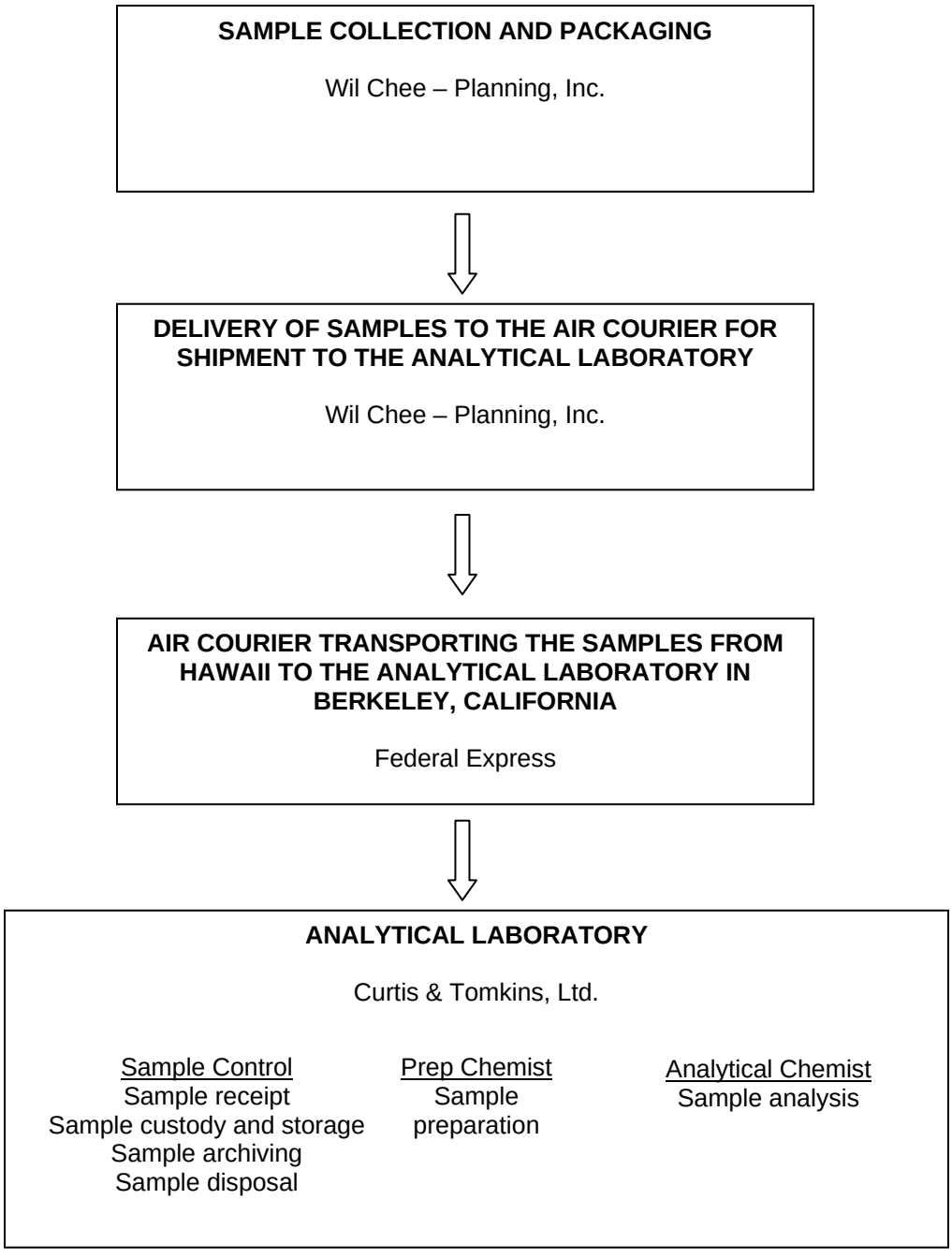


Figure A-1

PROPOSED SAMPLING LOCATIONS

Waikane Valley, Oahu, Hawaii

Figure A-2
SAMPLE CUSTODY FLOW DIAGRAM



OPERATING PROCEDURE NO. 102

102.0 MUNITIONS AND EXPLOSIVES OF CONCERN (MEC)

102.1 PURPOSE. This operating procedure provides basic safety precautions that are applicable to all non-nuclear munitions and explosives that are known, suspected, or inadvertently encountered at WCP project sites.

102.2 DEFINITIONS. Munitions and Explosives of Concern or MEC is an umbrella term to include anything related to munitions designed to cause damage to personnel or material through explosive force, incendiary action, or toxic effects. MEC, as defined in a Department of the Army technical bulletin (TB 5-890-1, Aug 93), includes the following types of materials:

- Bombs and warheads
- Guided and ballistic missiles
- Artillery, mortar, and rock ammunition
- Small arms ammunition
- Antipersonnel and antitank land mines
- Demolition charges
- Pyrotechnics
- Grenades
- TorpedMECs and depth charges
- Containerized or uncontainerized high explosives and propellants
- Chemical surety materials, i.e., unfired ordnance items that are still in use or in active stockpiles
- Depleted uranium projectiles
- Components of the above items that are explosive in nature or otherwise designed to cause damage to personnel or material (e.g., fuzes, boosters, bursters)
- Soils with explosive constituents in concentrations sufficient to present an imminent safety hazard

The above definition of MEC dMECs not include any improvised weapons or hazardous devices that might be used for terroristic action.

Unexploded Ordnance or UXO is an MEC item that has been primed, fuzed, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to friendly operations, installations, personnel, or material and remains unexploded either through malfunction or design or for any other cause.

102.3 TYPES OF MEC

102.3.1 EXPLOSIVE-LOADED MUNITIONS. Explosive-loaded ordnance includes high and low explosives of all countries. This includes shaped charge and high explosive antitank ordnance.

102.3.2 CHEMICAL-LOADED MUNITIONS. MEC may contain chemical material either as a main payload or as a significant component. Ordnance which may contain chemical agents include bombs, dispensers, clusters and launchers, projectiles, grenades, rockets, guided missiles, land mines, and miscellaneous explosive devices. Chemical materials include toxic chemical agents, riot control agents, and smokes.

Chemical loaded munitions quite often are distinguishable by distinctive markings. Never handle or otherwise touch any known or suspected chemical munition. Immediately evacuate the area if an MEC item that is colored **gray with green markings** is discovered.

102.3.3 PYROTECHNIC- AND INCENDIARY-LOADED MUNITIONS. Pyrotechnic mixtures are usually physical mixtures or blends of powdered chemicals which include fuels and oxidizers so that the mixture burns when ignited to produce light and/or colored displays for signaling purposes. Pyrotechnic loadings may be encountered in bombs, clusters and cluster adapters, projectiles, rockets, grenades, land mines, hand signaling devices, and all types of training munitions. Incendiary mixtures are usually of the hot metal (thermate) types, or of an oil base, such as napalm. Incendiary loadings may be encountered in any class of ordnance. Ordnance filled with incendiary or pyrotechnic mixtures is subject to deterioration, with resultant increase in ignition sensitivity if exposed to high temperatures. Some mixtures may ignite spontaneously if exposed to moisture.

102.3.4 SMOKE-LOADED MUNITIONS. Ordnance of this type consists of bursting smoke and screening smoke. It typically contains solid chemicals such as white phosphorous (WP) or plasticized white phosphorous (PWP) which burn when exposed to air. Vapors that may be present in high concentrations are irritating and poisonous if inhaled. Burns are deep, painful, and continuing, unless treated. These compounds are found in a wide variety of munitions and are used as screening smokes and/or incendiary agents. They are also used as igniters in certain types of incendiary munitions.

102.3.5 FUZES AND FUZING SYSTEMS. Fuzes contain, in a single unit, an explosive initiating charge and the means for initiating this charge. Fuzing systems divide these elements and functions among several units. Certain elements of fuzing systems closely resemble fuzes and should be treated similarly to fuzes. Pistols are normally inert items, which, when associated with an initiating explosive (detonator) become a fuzing system. Fuzes and fuzing systems are used in a wide variety of surface ordnance, including bombs, dispensers, clusters, launchers, projectiles, grenades, rockets, land mines, guided missiles, pyrotechnic devices, and some types of underwater ordnance. Fuzes and fuzing systems may be mechanical, pyrotechnic, chemical, electrical, electronic, or combinations of these as to their operation. They function in a variety of designated modes, such as impact, long delay, time after launch, and anti-disturbance.

102.4 MEC HAZARDS. Death, permanent disability, or injury to you and others are all possible consequences of incidents involving MEC. Never assume that an MEC item is inert based on its appearance. The contents of containers are neither obvious nor standardized worldwide, and levels of

hazard vary considerably. Containers and their components can be deteriorated to an unknown extent contributing to an item's instability. MEC dMECs not have to be abused to be lethal.

Practice rounds, dummy rounds, etc. are not inert. They may have spotting charges in them that are explosive, containing as much as 1.5 kilograms (approximately 3 pounds) of high explosive.

The presence of rust or structural damage dMECs not indicate that an MEC item can no longer function. To the contrary, it may be even more hazardous and likely to function if disturbed.

Explosives are not always located just in the center or warhead section of an MEC item. Other ordnance components in a weapon include fuzes, bursters, boosters, cutting charges, etc. These components may be located at either end or somewhere within the ordnance item.

Containerized MEC must necessarily be treated with extra caution and concern. First, the quantity of explosive material is naturally greater than if the items were found individually. And second, the container offers some heightened level of confinement which, in the case of an accidental detonation, contributes to increased pressure, more debris, and a greater chance for injury.

Less obvious, but nonetheless hazardous, conditions may be encountered during a site survey, particularly at ordnance manufacturing plants. Explosive residues may exist in pipes, building cracks and crevices, sumps, and wallboards.

102.5 SAFETY PRECAUTIONS. WCP personnel shall not, under any circumstances, knowingly enter a site that is known or suspected of containing MEC in the absence of a UXO specialist or U.S. Department of Defense Explosive Ordnance Disposal (EOD) technician. Personnel shall also not touch or otherwise handle any MEC item. If MEC is discovered, the PM and SSHO shall be immediately informed. If a UXO specialist or EOD technician is not nearby on-site when the discovery is made, all work shall cease and WCP personnel shall evacuate the site. When evacuating, re-trace the route taken when entering the site.

When a UXO specialist or EOD technician is present, that person shall take the lead on all sites known or suspected of containing MEC. Upon discovery of MEC, the UXO specialist or EOD technician must be consulted with by the PM and SSHO as to the dangers of further traversing the site. The SSHO shall, at his/her discretion and with the intent of protecting the health and safety of on-site personnel, call for the cessation of all work tasks at the site and immediate personnel evacuation.

When discovering an unknown type of MEC, treat it as:

- The most hazardous type that it could be
- The most hazardous features that it could contain
- The most hazardous condition that it could be in

Unless otherwise authorized to do so by the SSHO, following consultation with an on-site UXO specialist or EOD technician, the safety precautions described below must be complied with at sites known or suspected of containing MEC:

- Do not touch, directly or indirectly, any piece of ordnance at any time. Never spend more time near a suspected piece of ordnance than is absolutely necessary.
- Never attempt to remove anything from any piece of ordnance.
- Do not assume that the color code on an ordnance item is accurate.
- Immediately evacuate the area if an MEC item is colored **gray with green markings**. This identifies the item as a potential chemical munition. If you suspect chemical munitions to be present in the area, immediately halt all field operations. Notify the proper authorities for follow-up action.
- Always be alert for trip wires and booby trap devices.
- No smoking, matches, or other sources of fire or flame within 15 meters (50 feet) of an area in which MEC is present.
- Do not take magnetic tools or equipment near an unidentified object until it can be absolutely determined that the object is not magnetically functioned. Magnetically functioned explosive ordnance can be extremely sensitive to very small magnetic field changes.
- Do not approach MEC with any tool or metallic object that is not approved for use on magnetically actuated ordnance.
- Allow no movement of magnetic or ferrous material near MEC.
- Screen personnel for a magnetic signature with a field magnetometer, if available, before closely approaching MEC.
- Do not turn power lines, motors, or generators on or off in the area.
- Do not permit compasses, magnetic telephones, or other sources of magnetic-field producing equipment near MEC.
- Maintain maximum distance from magnetic sensors.
- Eddy currents, caused by movement of metallic material, can be reduced by moving such material very slowly.
- Do not operate vehicles in the immediate vicinity of suspected acoustic/seismic ordnance.
- Do not wear or carry loose equipment which may rattle, flap, or otherwise cause noise.
- Move with slow deliberate motions; avoid abrupt moves.
- Do not allow metal-to-metal contact, scraping, or scratching in the immediate vicinity of MEC. Use some form of cushioning, such as rubber or similar material, between tools.
- Avoid imparting vibration into the surrounding area.
- Refrain from throat clearing, coughing, and vocal emissions.
- Do not talk or create noise within 23 meters (75 feet) of MEC. Use full acoustic precautions within 9.1 meters (30.0 feet) of the ordnance by restricting necessary noise or vibration to a period of one second duration followed by a minimum period of three seconds of silence.

- Consider MEC that has been exposed to fire as extremely hazardous. Chemical and physical changes may have occurred to the contents that render it much more sensitive than it was in its original state.
- Do not enter a suspected mine field or grenade range.

102.6 MARKING AND OBSERVATIONS. MEC that has been discovered must be appropriately marked, preferably with brightly colored flagging, to ensure that emergency management, civil defense, police, or military EOD personnel can easily locate the item. Inform other on-site personnel that MEC was discovered and that an immediate hazard exists.

The following observations must be made and written notes taken on the approximate location of the MEC relative to:

- Roads
- Topographic features
- Inhabited areas
- Buildings/structures

The following shall also be noted:

- The types and number of buildings/structures
- Population density
- Site accessibility

102.7 NOTIFICATION. As soon as possible, notify the client of the discovery providing information on its approximate location, condition, and if known, type. Unless otherwise instructed, the client shall be responsible for notifying the proper authorities for MEC mitigation and disposal.

102.8 REFERENCES

Donaldson, Byron. 1992. Donaldson Enterprises, Inc.

Headquarters, Department of the Army. August 1993. *Technical Bulletin – Ordnance and Explosive Waste Engineering*. TB 5-890-1.

Pastorick, James. August 1993. "Detection, Retrieval, and Disposal of Buried Munitions." Talk presented during "Seminar on Technologies for Remediating Sites Contaminated with Explosive and Radioactive Wastes," United States Environmental Protection Agency, Office of Research and Development.

[LABORATORY]	SAMPLE NO.	DATE	SEAL BROKEN BY
	SIGNATURE		DATE
	PRINT NAME AND TITLE *(Inspector, Analyst, or Technician)*		

Figure 1

Sample Chain-of-Custody Seal

Chain-of-Custody

Control Number:

Date: _____ Page: ____ of ____

PROJECT MANAGER:	BILL TO:	SAMPLE DISPOSAL:
PROJECT NAME:	COMPANY:	SHIPMENT METHOD:
PROJECT NUMBER:	ADDRESS:	COMMENTS:
Deliver results to the address above or as stated in the contract		
COOLER NUMBER:		
QC LEVEL:		

Sample ID (EPA ID)	Sample ID (Navy IRP Use Only)	Date Collected	Time Collected	Lab ID	MATRIX / QC: Soil	Water	Other (drum, sludge, etc.)	Field Duplicate (MS/MSD)	TPH 8015B	CLP VOAs	CLP SVOAs	CLP Pesticides	CLP Metals	EPA 8082 (PCBs)	EPA 8240	EPA 8270	EPA 6010 (Total Lead)				EXTRA VOLUME MS/MSD	HOLD	TOTAL # OF CONTAINERS
CONTAINER # (water):																							
PRESERVATIVES:																							
TOTALS:																							

Samplers Signature:	Date:	Time:
Relinquished By:	Date:	Time:
Received By:	Date:	Time:
Relinquished By:	Date:	Time:
Received By (LAB):	Date:	Time:

Original (white), Lab Copy (yellow), Field Copy (pink)

For Lab Use

Lab No.:

Does COC match sample: Y or N

Broken containner: Y or N

Received within holding time: Y or N

COC seal intact: Y or N

Any other problems: Y or N

If problems, Client contacted: Y or N

Date contacted: _____

Temperature (°C): _____

Figure 2

Sample Chain-of-Custody / Analytical Request Form

OP-QC2 RECORD KEEPING, SAMPLE LABELING, AND CHAIN-OF-CUSTODY PROCEDURES

ATTACHMENT C

ANALYTICAL SOP's AND LABORATORY QC LIMITS

Curtis & Tompkins, Ltd.

Department of Defense
Program Requirements based on QSM 3

Approved by:

QA Director / Date	Operations Manager / Date

Read & Understood by:

Signature / Date	Signature / Date
Signature / Date	Signature / Date
Signature / Date	Signature / Date
Signature / Date	Signature / Date

Re-Approved by:

Signature / Date	Signature / Date

Curtis & Tompkins, Ltd.

Department of Defense
Program Requirements based on QSM 3

SCOPE: This document describes the requirements of the Department Of Defense (DoD) Quality Systems Manual (QSM) that are in addition to the requirements of the NELAC standards on which the QSM is based and that are different than C&T's standard procedures. These requirements should be applied to DoD projects that reference the QSM or do not have a Statement of Work (SOW), Quality Assurance Project Plan (QAPP), Sampling & Analysis plan (SAP), or other site-specific project plan. If there is a site-specific project plan, the requirements listed in that document supersede the requirements listed below.

REFERENCES:
Department of Defense (DoD) Quality Systems Manual (QSM), Final Version 3, Jan.2006
NELAC Quality Systems Standards, Chapter 5, June 2003

RESPONSIBILITIES:
The QA Director, QC Chemist, or laboratory Project Manager who is reviewing a project plan for an RFP (Request for Proposal) or RFQ (Request for Quote) must be familiar with the requirements listed below and include them, where applicable, in the project notes and when setting up projects in the LIMS "Rules" database. Any analytical outliers will then be flagged by LIMS and included in the report case narrative.

PROGRAM REQUIREMENTS:

Narrative:	Identify all samples & analytes that were manually integrated (include LIMS summary table) Identify which samples required dilution (include LIMS summary table) Identify any result where the lower of the two results was reported due to matrix interference (include LIMS summary table) Identify any C-flagged results (include LIMS summary table) Identify any samples run with bubbles in the VOA vial
All:	Full spike list for LCS and MS/MSD LCS and MS/MSD must use the LCS control limits Control method blanks to < ½ RL, except common contaminants to <RL
GC/HPLC:	Allows 8000C criteria of ICAL 20%RSD and ICV/CCV 20%D CCV's after every 10 samples, not on 12-hour clock 2nd column confirmation required down to MDL 72-hr RT window studies required each time a column is changed
8081:	Contact client if hit can't be confirmed due to matrix interference; Q-flag result if they want us to report the unconfirmed result instead of attempting further cleanup or dilution. Toxaphene must be used in batch QC spikes within each 2 year period.

Curtis & Tompkins, Ltd.

8082:	2nd column confirmation required; apply C-flag if RPD>40% between columns. Contact client if hit can't be confirmed due to matrix interference; Q-flag result if they want us to report the unconfirmed result instead of attempting further cleanup or dilution.
8260:	ICV ± 25%D, CCV ± 20%D
8270:	PEM: DDT breakdown < 20% ICV ± 25%D, CCV ± 20%D
Metals:	Serial dilution required for each batch with 90-110% recovery Post-spike required when serial dilution fails (PDS limits: 75-125%) ICB/CCB controlled to 2xMDL
6010/6020:	IDL every 3 months (IDL must be <MDL) ICB/CCB controlled to 2xMDL ICS-A non-spiked elements <2xMDL (except verified trace impurities)
Anions:	SDUP required for every 10 samples

NITROAROMATICS & NITRAMINES

EPA 8330

Approved:

Department Manager/ Date	QA Director/ Date

Read & Understood:

Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date

Re-Approved:

Department Manager/ Date	QA Director/ Date

EPA 8330 - NITROAROMATICS & NITRAMINES

SOP Table of Contents

EPA 8330 - NITROAROMATICS & NITRAMINES

SCOPE

This procedure describes the identification and quantitation of certain explosive Nitroaromatics and Nitramines in liquid and solid matrices (soil) that have previously been extracted into acetonitrile. Target compounds separated on an LC reverse phase column are reported from the UV Detector using the 254 nm signal. Presumptive positive results from one LC column are confirmed on a second LC column, which changes substantially the elution order of the target compounds. The two columns used are the LC-18 reverse phase column and the ABZ+PLUS AMIDE reverse phase column. High concentration aqueous samples may be diluted and analyzed without extraction.

Sample concentrations are reported in micrograms per liter (µg/L) for water samples or micrograms per kilogram (µg/Kg) for solid samples. See Appendix_6 for the compound list and reporting limits.

REFERENCES

Analytical Methods:

EPA 8330	Nitroaromatics and Nitramines by High Performance Liquid Chromatography, SW-846, September 1994, Revision 0
EPA 8330A	Nitroaromatics and Nitramines by High Performance Liquid Chromatography, SW-846, January 1998, Revision 1
EPA 8000B	Determinative Chromatographic Separations, SW-846 Update 3, Dec 1996

Extraction Methods:

EPA 8330	Nitroaromatics and Nitramines by High Performance Liquid Chromatography, SW-846, September 1994, Revision 0
EPA 3535	Solid Phase Extraction (SPE), SW-846, Revision 0, Dec 1996

Related C&T Procedures & Other Guidance Documents:

SVOC 7.2.1, *'8330 QC Acceptance Limits, Table-1'*
QA 1.4, *Balance Calibration Check & Maintenance*
QA 1.5, *Calibrating & Maintaining Temperature Controls*
QA 1.6, *Pipet Calibration Check Procedures*
QA 4.1, *Establishing Control Limits*
QA 4.4, *Determining Method Detection Limits (MDL)*
NELAC Chapter 5, Quality Systems, June 2000
DoD Quality Systems Manual, Version 2, June 2002
US ACOE "Shell" Document, EM 200-1-3, February 2001
Operator Manuals for Hewlett-Packard 1090 Series II/L Liquid Chromatograph

PRESERVATION & HOLDING TIME

Preservation:	Store at 4°C pH < 3 with HCl *
Holding Time:	7 days from collection to extraction 40 days from extraction to analysis

* *Method Modification:* 40CFR136.3 Table 2 and SW-846 Table 2-36 do not require acidification for this analysis, however C&T's standard compound list includes Tetryl, which should be acidified to obtain acceptable recovery (8330 Section 7.1.1.1.5). Since the sample is extracted directly from the sampling container and thorough acidification and homogenization of samples after collection is difficult, C&T supplies pre-preserved liter ambers. If client's target compound list does not include Tetryl, the samples do not have to be acidified.

SAFETY

The target compounds for this analysis include explosive compounds, their pre-cursors, and breakdown products. Samples and extracts should never be exposed to heat above ambient temperature. Always wear safety glasses and gloves when handling samples, extracts or standards.

QC REQUIREMENTS

A method blank (MB), laboratory control sample (LCS), matrix spike (MS) and matrix spike duplicate (MSD) are extracted and analyzed with each batch of twenty samples or less. A blank spike (BS) and blank spike duplicate (BSD) replace the LCS/ MS/ MSD if the client submitted insufficient sample volume for MS/MSD. One surrogate compounds (1,2-Dinitrobenzene) is added to every sample, method blank and spike to monitor the extraction and analysis, and to each standard to verify that the extract was injected correctly.

A multi-point initial calibration is performed to establish the working range of the instrument, using a minimum of five points for each compound. If the average calibration factor is used for quantitation, the %RSD for this initial calibration must be $\leq$ 20% for each target compound. If linear response is used for quantitation, the linear coefficient (r) must be $\geq$ 0.995 (r^2 then is $\geq$ 0.99). An initial calibration verification (ICV) standard obtained from a second source must be analyzed immediately following the initial calibration, with a %D $\leq$ 15% for each compound.

A continuing calibration verification (CCV) standard is analyzed at the beginning of each sequence, after every ten samples, and at the end of the analytical run. The %D for each compound must be $\leq$15% or instrument maintenance should be performed. All samples analyzed after the last passing CCV are reanalyzed following maintenance.

The surrogate and spike acceptance limits are generated semi-annually using control charts. See the associated SOP '8330 QC Acceptance Limits, Table-1' for current in-house limits. A method detection limit (MDL) study is performed annually by preparing and analyzing a minimum of seven replicates of a low-spiking-level laboratory control sample.

EQUIPMENT

HPLC with Autosampler, Hewlett Packard Model 1090 Series II/L

Analytical Columns:	250mm x 3.0mm I.D., 5 µm SUPELCOSIL LC-18, Supelco Cat. # 58298-C30 150mm x 4.6mm ID, 5 µm SUPELCOSIL ABZ+PLUS, Supelco Cat. #59196
Guard Columns:	2.0cm x 2.1mm I.D., 5 µm Supelguard LC-18, Supelco Cat. # 59613 2.0cm Supelguard ABZ+PLUS, Supelco Cat. #59535-U

Filter Vials: Whatman Mini-Uniprep, 0.45µm PTFE Filter, VWR Cat.# 28137-758

Data Acquisition & Processing Software: HP Chemstation

DAILY INSTRUMENT SEQUENCE

Each sequence should begin with an instrument blank followed by Continuing Calibration Verification (CCV) standard. Once the CCV has passed acceptance criteria (%D $\leq$ 15), sample extracts may be added to the instrument sequence. Additional CCV's must be analyzed after every ten samples, including batch QC samples, and at the end of the sequence. The concentration of the CCV 's must be varied within the calibration range, excluding the highest or lowest points.

Prepare a data system sequence for the analysis of a batch of samples. Verify that the dilution/ concentration factor is entered correctly and that the correct method file is selected. Sample sequences should be limited to no more than one batch, to keep data processing simple. A typical analytical sequence is:

Instrument Blank
Nitroaromatics and Nitramines CCV
Instrument Blank
Method Blank
LCS (If applicable)
Matrix Spike or Blank Spike
Matrix Spike Duplicate or Blank Spike Duplicate
Instrument Blank
6-7 Samples (depending on whether an LCS/MS/MSD or BS/BSD was analyzed)
Instrument Blank
Nitroaromatics and Nitramines CCV
Instrument Blank

The sequence must end with the analyses of a Nitroaromatics and Nitramines (NAN) CCV regardless of the number of samples analyzed.

If high levels of target analytes are known or suspected, analyze an instrument blank immediately following the sample to prevent possible carry-over into the next sample. If very high levels are detected in a sample and an instrument blank was not analyzed immediately after the high-level sample, examine the data of the subsequent samples to determine whether carry-over may have contributed to the sample results. If carry-over is suspected, reanalyze the sample to confirm the absence of carry-over contributions.

Although the current SW-846 methods allow up to twenty runs between CCV's, C&T runs CCV's after every ten samples to meet the additional SW-846 requirement that no more than 12 hours should elapse between CCV's and to reduce the number of reanalyses caused by failing CCV's.

Note: If the instrument will be running unattended or overnight, it is a good idea to load two CCV standards for each bracket, to reduce the number of samples that have to be reanalyzed due to an injection error.

A hard copy of this sequence must be posted into the GC sequence benchbook when the sequence is completed. The analyst's signature must cross both the pasted page and the benchbook page. Any comments associated with the sequence should be noted on this page.

File Naming Conventions
The first three characters of the data file name are the Julian day; the files are written to the G:\HPLC3\DATA\ subdirectory. The software method name is the name of the column being used; it is very important to select the correct method, as Chemstation controls the instrument.

1.) CCV (Continuing Calibration Verification):
A CCV (Continuing Calibration Verification) standard must be analyzed, and pass the 15%D acceptance criteria, prior to any sample extract analysis, to verify that the response of the instrument has not changed significantly and that the curve may still be used to quantitate sample results.

1.1) Decide what CCV standards to analyze, keeping in mind that the concentrations must be alternated across the mid-levels of the calibration curve (NELAC 5.9.4.2.2b requirement). CCV standards are prepared at three concentrations and are designated Low (L), Mid-level (M), and High (H).

Note: The USACE recommends that the ICAL standards be used as CCV's, in order more readily determine if problems are due to changing instrument conditions and are not due to differences between standards.

1.2) Load CCV standards after every ten samples and at the end of the sequence, including batch QC but excluding instrument blanks and other standards in the count.

If the instrument is running unattended or overnight, it is a good idea to load two CCV standards for each bracket, to reduce the number of samples that have to be reanalyzed due to an injection error. Type in the sequence with an "x" stype for the second CCV so that only the first CCV will automatically process.

1.3) Analyze the standards using the same data acquisition method as for the samples, typing "CCV," before the working standard number, so that LIMS will automatically generate and print a Form 7 (Continuing Calibration Verification summary), which compares the calculated concentrations from this run to the known concentrations of the standard.

1.4) Examine the CCV summary to verify that each %D is < 15%.

1.5) If the acceptance criteria are not met, examine the integration to verify that each peak was correctly integrated. Manual integrations must be consistently applied to

standards and samples. Scale and print the chromatogram so that the baseline corrections and integration flags are clearly visible; retain both the original and the reintegrated chromatograms in the sequence raw data. If manual integrations or baseline corrections are performed, resend the file to LIMS and generate a new CCV summary.

Unsubstantiated alteration of peak integration solely to pass calibration or QC criteria is illegal and is grounds for immediate termination.

1.6) If the acceptance criteria are not met, analyze another CCV standard. If the second analysis of the standard fails to meet the criteria, recalibrate and/or perform other instrument maintenance.

If two CCV's were analyzed, examine the first one against the acceptance criteria; if it fails, "x" out the first CCV, change the second to stype "CCV" and process the data from the second CCV. *Do not* "cherry pick" some compounds from the first CCV and others from the second CCV; if the second CCV is processed and used, all compounds must be taken from the second standard.

1.7) If the CCV's fail acceptance criteria, data may be reportable based on the following criteria:

a.) If the failing compound is not a target analyte for the associated samples, sample results should be reported without reanalysis.

b.) If the compound fails the %D criterion due to a high response but was not detected above the reporting limit in the associated samples, the sample results may be reported without reanalysis, as the high bias does not affect the sample results.

c.) If the compound fails the %D criterion due to a high response and *was* detected above the reporting limit in any of the associated samples, the samples must be reanalyzed.

d.) If the compound fails the %D criterion due to a low response and *was* detected (even below the reporting limit), the sample must be reanalyzed.

Load additional CCV's after every ten samples and at the end of the sequence. The standard concentration used for the CCV should be alternated over the course of the sequence. See Appendix_1 for calculation of %D.

2.) Update Retention Times:

The center of the retention time windows may need to be adjusted periodically in order for the data system to correctly identify all the compounds in the data. Update the retention times whenever a drift is noticed in the retention times of the continuing calibration verification (CCV) standards. *Do not* adjust the RT windows as these are determined from a 72-hour sequence.

2.1) For short sequences, use the retention times from the first CCV. For long sequences, use either a middle CCV or the average the retention times from the first and final CCV.

2.2) Enter the new midpoint RT's into the Chemstation Calibration Table. (See Appendix 11 for Chemstation procedures.)

Method Modification Note: SW-846 method 8000B suggests updating retention times daily. However the retention times are fairly stable and should not need daily updating. C&T updates retention times only when drifts are observed in the CCV retention times.

3.) Prepare the Sample and Batch QC Extracts for analysis

3.1) Remove the extracts from the extraction lab refrigerator and let the extracts warm to room temperature.

3.2) Collect sufficient push-filter vials for the batch and label each with a sample number.

3.3) Aliquot 500 µL of the extract and 500 µLMillipore DI water into an autosampler vial and mix well.

Method Modification: Since C&T uses Solid-Phase Extraction (SPE) instead of the salting-out procedure, the extracts and standards are diluted with DI water instead of the 5% $CaCl_2$ solution described in 8330.

3.4) Transfer the diluted extract into a push-filter vial and push down the top to filter.

3.5) Transfer approximately 200 µL of the filtered extract to a labelled autosampler vial with insert and seal with a crimp cap.

3.6) Return the undiluted, unfiltered extract to the refrigerator so that the remaining extract can be used for any reruns.

3.7) Repeat for each sample.

3.8) Place the samples on the autosampler tray beginning with the lightest colored extracts followed by more highly colored or viscous extracts.

3.9) Store the excess extract volumes, in the filter vials, to the refrigerator.

3.10) If dilutions are required, see Appendix 3 for instructions on preparing the dilutions.

QUALITATIVE ANALYSIS

4.) Peak Identification

Identification of compounds is based on comparison of the peak retention times in the sample to the retention times of the peaks in the mid-level initial calibration standard. For the standards, all compounds must fall within its retention time window and be automatically identified by the data system.

5.) Integration

Check the integration of the peaks as you examine the chromatogram. Peaks should be integrated from baseline to baseline unless there are obvious matrix interferences such as coelution. For problematic analytes, manual integrations must be consistently applied to ICAL, CCV, and sample integrations.

If peak identification or quantitation is prevented by the presence of interferences, a cleanup may be required. Discuss the chromatograms with the Department Manager to determine if cleanup is required.

Determine whether manual integration is necessary by examining the sample chromatogram. For samples in which no matrix interferences are present, the sample peaks should be integrated in the same fashion as the calibration standards. For samples in which interferences raise the baseline, integration of the target compounds should be done on a valley-to-valley basis, unless a nearby negative peak would contribute a positive bias to the reported result; if a negative peak is present, use a baseline event to extend the baseline horizontally across the dip. If manual integration is necessary there are a number of different baseline events to choose from. If no baseline events are chosen, Chemstation draws a baseline based solely on peak separation criteria. If a baseline event was used, Chemstation will flag the user report at the time of the baseline event; see Appendix 10 for a listing of these flags.

If manual integration is performed, include both the original and the reprocessed data in the raw data package. If the reason for the manual integration is not intuitive and obvious from the chromatogram, document the reason for the integration on the raw data, and date and initial the comment.

Warning: Unsubstantiated alteration of peak integrations solely to pass QC criteria (ie: calibration, surrogate) is ***illegal*** and is grounds for immediate termination of employment.

QUANTITATIVE ANALYSIS

Analyte quantitation is done using the external standard technique. Quantitation is based on comparison of the area of the target compound to the initial calibration curve for that compound, with adjustments for the sample preparation concentration factor and instrument dilution factor. See Appendix_1 for example calculations. Concentrations are expressed as micrograms per liter or kilogram (µg/L, µg/kg).

All results are reported on a wet-weight (“as received”) basis unless otherwise requested by the client. If the client requests ‘dry-weight’ corrections, the ‘wet-weight’ results in the results database are corrected for moisture by LIMS when producing the final report forms.

6.) Evaluate the Sample Results

A user report will be automatically generated once the run is complete. Review any batch QC sample data first to verify that samples from that batch can be reported, then review the sample results to identify any samples that need to be rerun, diluted, and/or run on the second column for target compound confirmation.

Verify that the target compounds are correctly integrated, then dtermine if any target compounds were detected above the reporting limit, or above the MDL for those clients that require J-flagged data. If any target compounds were detected at reportable levels, that extract must be reanalyzed on a second column to confirm the identity of the compound.

After the extracts have been run on both columns, where necessary, examine the results to determine how to report the data.

6.1) Determine if a result should be reported by reviewing the data from both columns. To be reported, the analyte must be detected on both channels. A hit is considered a false-positive and reported as 'ND' if:

a. a peak is present on one column but not on the other,

b. the peak on the confirmation column falls outside the Rt-window,

c. the result on the quantitation column is $\geq$2x the reporting limit but less than the reporting limit on the confirmation column, or

d. the result on the quantitation column is <2x the reporting limit but less than ½ the reporting limit on the confirmation column.

6.2) If an analyte is detected on both columns with an RPD of $\leq$ 40% between the two results, report the higher of the two concentrations.

Note: Client-submitted Quality Assurance Project Plans may specify that the lower of the two results be reported. For these jobs, make sure to narrate this as a client-specific requirement on the 'Data Review Checklist'.

6.3) If the RPD > 40% between the two columns, evaluate the chromatograms for any co-eluting contaminants that may be causing the high RPD.

a. If coelution is evident on one chromatogram, report the result from the other column or clean up the extract; narrate the coelution, and the fact that the lower result was reported, on the "Data Review Checklist".

b. If no coelution is evident, report the higher of the two results.

c. LIMS will apply a 'C'-flag to the reported result.

6.4) If the concentration of any analyte in the sample exceeds that of the highest concentration standard used in the ICAL curve for that compound, dilute the extract and reanalyze. See the "Dilutions" section below for further details.

7.) Dilutions

The UV-254 detector is a relatively selective detector, which means that although it can detected low levels of NAN or polyaromatic hydrocarbons in sample extracts, there may also be matrix effects upon the system that are not apparent in the sample chromatogram. If the extract is dark, oily & viscous, or opaque, make a dilution that will result in an extract that is a very light yellow in color. If black, oily, or viscous extracts are analyzed, back-pressure may cause the instrument to shut down. See Appendix 3 for preparing various dilutions.

If a sample is analyzed at multiple dilutions, compare the sample results across the various dilutions to verify that the dilutions were prepared correctly. Do the results make sense or is there a discrepancy between the runs? If there seems to be a discrepancy, reanalyze the sample to confirm the results.

8.) Surrogates

Surrogate compounds are chemically similar to the target analytes but are compounds not found in actual samples. These compounds are added, prior to extraction, to every sample, method blank, and spike to monitor the efficiency of the extraction for that sample. In-house Surrogate Acceptance Criteria are specified in the associated SOP '*8330 Laboratory Control Limits, Table-1*'. These limits are generated semi-annually, using control charts.

After each sample is analyzed, LIMS will automatically generate a user report with the surrogate criteria for that sample and flag any failing recoveries. Evaluate the surrogate recoveries for all samples, method blanks, and spikes on both columns. If the the extract was diluted by a factor of 10 or more, the surrogate is considered diluted out and LIMS will place a "DO" flag on the user report and final forms.

If a surrogate recovery is outside QC limits, verify that the prep information (LIMS WS#, amount, and concentration of surrogate added, sample weight/ volume, extract volume, and instrument dilution factors) is correct. If any of these are incorrect, fix the entry and reprocess the data. If the prep entry was correct, the sample must be reanalyzed to determine whether the problem was an extraction problem or an instrument injection problem. If the surrogates again fail, determine whether reanalysis is required using the following criteria:

a. If a high recovery is observed but no target analytes were detected above the reporting limit in the sample, note the failure on the 'Data Review Checklist' and report the data without reanalysis, since the possible high bias will not affect sample results.

b. If a high recovery is observed and target analytes were detected, and there is no obvious chromatographic interference, the sample must be reanalyzed. If the same surrogate(s) fails criteria upon reanalysis a Corrective Action report must be initiated and the sample must be re-extracted. If the same surrogate fails criteria after re-

extraction it is deemed to be matrix effect. Include both sets of data in the package and note the situation in the case narrative.

c. If a low recovery is observed for any surrogate and there is no obvious chromatographic interference, or documented historical site matrix interference, the sample must be reanalyzed. If the same surrogate(s) fails criteria upon reanalysis a Corrective Action report must be initiated and the sample must be re-extracted. If the same surrogate fails criteria after re-extraction it is deemed to be matrix effect. Include both sets of data in the package and note the situation in the case narrative.

If a sample must be re-extracted and the holding time has expired, the client's Project Manager must log the sample into LIMS as an alias and have the sample re-extracted as the new sample number. If the sample is still within holding time, the sample should be re-extracted under the original sample number.

If upon re-extraction, the surrogate recovery is again outside limits, note the matrix effect as "confirmed matrix interference" on the User Report and the Data Review Checklist, otherwise report the data with passing surrogate recovery.

Note: Project-specific quality assurance project plans (QAPPs) may require batch control based on different compounds and control limits, in which case the project requirements supersede this SOP for all samples related to that project.

9.) BATCH QC RESULTS

For every batch of 20 samples (or less) analyzed, a Method Blank (MB), a Laboratory Control Sample (LCS), a matrix spike (MS) and duplicate (MSD) are extracted and analyzed. If insufficient sample volume was submitted for matrix QC, a blank spike (BS) and blank spike duplicate (BSD) are extracted in place of the LCS/ MS/ MSD.

Note: Project-specific quality assurance project plans (QAPP's) may contain different requirements than those listed in this SOP. If so, the QAPP requirements supersede this SOP for all samples related to that project.

9.1) Method blank (MB):

A method blank is extracted with each batch of samples to verify that the extraction reagents and process are not contributing to the sample results. No compounds should be detected in the method blank at levels greater than ½ the reporting limit, however if a compound(s) is detected, reanalyze the method blank to confirm that the extract is contaminated and that the results are not due to instrument contamination. If the contamination is confirmed, initiate a Corrective Action Record (CAR) and immediately notify the Department Manager. Use the following steps to determine what corrective action is required:

a. If the concentration of the contaminant is below the reporting limit but above 1/2 of the reporting limit, document the contamination on the batch sequence summary and the data review checklist and report the data without reanalysis.

b. If the target compound(s) found in the method blank was not detected in the associated samples, the data may be reported and the problem narrated.

c. If the target compound(s) found the method blank was also detected in the associated samples, but the level in the samples is greater than 10x the level in the method blank, document the contamination on the batch sequence summary and the data review checklist and report the data without reanalysis.

d. If the target compounds detected in the method blank were also detected in the associated samples, but at levels less than 10x the level in the method blank, and reanalysis confirms the problem, the samples containing the contaminant must be re-batched and reanalyzed. Iinitiate a Corrective Action Report (CAR) immediately so that re-extraction can begin within the extraction holding time, if necessary.

9.2) Laboratory Control Sample (LCS) or Blank Spike/ Blank Spike Duplicate (BS/BSD):
Laboratory Control Samples are extracted with each batch of samples to demonstrate the performance of the extraction and analysis in the absence of matrix interferences. In-house Acceptance Criteria are specified in the associated SOP '*8330 Laboratory Control Limits, Table-1*'. These limits are generated semi-annually, using control charts.

After all of the samples in the batch have been run, the "reduced" LCS report can be generated to determine if the LCS passed acceptance criteria for all of the client-specified limits associated with the batch; this report will compare the recoveries (and RPD for BS/BSDs) for each compound to the tightest limits applicable to the jobs in that batch. To run this report:

1.) Open the LIMS Intranet page and go to the HPLC Instrument Page.

2.) Under "Recent Sequences", click on the instrument.

3.) Click on the sequence/ date.

4.) Click the "Reprint" reduced batch QC report button.

5.) Check the instrument's default printer for the report.

If any of the target compounds fail acceptance criteria, reanalyze the QC extracts. If the failure is confirmed upon reanalysis, initiate a Corrective Action Record and use the following criteria to determine the required corrective action:

a. If the samples are being analyzed for only a subset of the target compound list (ie: HMX & RDX only, or similar) and those compounds all pass acceptance criteria, the data may be reported without further corrective action.

b. If a high recovery is observed but that compounds was not detected in the associated samples, note the failure on the Data Review Checklist and report the

data without re-extraction, as the potential high bias does not affect the sample results.

c. If a high recovery is observed and the samples contain target compounds at levels above the reporting limits, the samples containing that compound must be re-extracted.

d. If a high RPD is observed but the recoveries are within acceptance limits and the samples do not contain that compound, note the failure on the Data Review Checklist and report the data without re-extraction, as the lack of good precision data does not affect ND samples.

e. If a high RPD is observed and the samples contain that compound at levels above the reporting limits, those samples containing that compound must be re-extracted.

f. If a low recovery is observed for the surrogate, the associated samples must be re-extracted.

If a sample must be re-extracted and the holding time has expired, the client's Project Manager should log the sample in as an alias and have the samples re-extracted as the new sample number. If the sample is still within holding time, re-extract and reanalyze the sample under the original sample number.

9.3) Matrix Spike/ Matrix Spike Duplicate (MS/MSD):

Matrix spikes are extracted with each batch of samples to demonstrate the accuracy (recovery) and precision (RPD) of the analysis in real-world samples. In-house Acceptance Criteria are specified in the associated SOP '*8330 Laboratory Control Limits, Table-1*'. These limits are generated semi-annually, using control charts.

Review the MS/MSD data. If either the recoveries or RPD fail criteria, determine whether or not the data can be reported based on the following:

a. If the concentration of a target compound in the sample is greater than the linear range and the sample needs to be rerun for just that compound, report the MS/MSD with a LIMS-flag of ">LR" on those recoveries without reanalysis.

b. If the concentration of a target compound in the sample is within linear range but the concentration in the matrix spikes is greater than the linear range, LIMS will apply a ">LR" flag to those recoveries. Report the data without reanalysis.

c. If the concentration of a target compound is greater than 4x the spiking level, LIMS will apply a "NM" (for "Not Meaningful") flag to those recoveries. Report the data without reanalysis.

Note: If the concentration of a target compound is greater than the spiking level, LIMS will flag and footnote that concentration for the client's attention.

d. If recoveries fail but the RPD is within acceptance limits, matrix interference is usually suspected. Narrate the failure and report the data without reanalysis (except for USACE, or other Level 3 or Level 4 projects that always require reanalysis).

e. If the recoveries fail due to obvious chromatographic interference (ie: coelution of other analytes with the spike compounds), narrate the failure on the Data Review Checklist and report the data without reanalysis.

f. If the recoveries are within limits but the RPD fails, and an isolated problem cannot be identified and documented, reanalyze the sample and matrix spikes.

After the batch QC samples have been reviewed and deemed acceptable, assemble the Batch QC folder and complete a Batch Review Checklist. Submit this package to the Department Manager or a QC Chemist for review and approval.

DOCUMENTATION & PEER REVIEW

Review the LIMS generated user reports, the data reduction quantitation reports, and the chromatograms to ensure that the correct dilution factors and results are reported. The user report must be initialed and dated by the analyst assembling and approving the data for that sample.

Complete and sign the "Data Package Review and Narrative" checklist. The completed data package consists of this checklist, C&T Job sheet, sample raw data, and QC package. The QC package includes the ICAL summary, CCV summaries, Method Blank summary, LCS/ MS/ MSD summaries, Extraction Batch sheets (including GPC or silica gel cleanup logs, if applicable), and sequence files, and any associated Corrective Action Reports.

Submit the data package to the Department Manager or QC Chemist for second-party review. Any changes made by the second-party reviewer must be individually initialed and dated by the reviewer. The second party reviewer must initial and date each user report, make any additional comments on the case narrative, and initial and date the completed checklist.

POLLUTION PREVENTION

Prepare only sufficient standard and reagent volumes to use within the shelf-life of the standard to reduce the volume of waste generated by the laboratory.

WASTE DISPOSAL

Reagent Waste: The methanol/water solvent is collected in a waste container and is then transferred to the ‘Mixed Solvent’ (WMDS# 628206) drum in the flammables cabinet located in the waste room.

Extracts: The autosampler vials are stored in the refrigerator at 4°C (+ 2°C) for at least 40 days after extraction. The vials are then transferred to a lidded storage bucket until the bucket is full. Vials are then transferred to the ‘Solvent/ Solid’ waste (WMDS# 858491) open-head drum in the waste room.

APPENDIX_1: CALCULATIONS

SAMPLE CALCULATIONS

Note: If a client requests results reported on a 'Dry Weight' basis, the concentration is divided by the 'solids', where the solids is (100-%moisture)/100.

Concentration of Aqueous Samples (ug/L) = (Ax * A *Vt * Df) / (Rf * Vi * Vs)

Where: Ax = Area response for the analyte in the sample
A = Amount (mass) of calibration standard injected in ng
As = Area response for the calibration standard
Vi = Volume of extract injected in uL
Df = Instrument Dilution Factor, if no Dilution D =1, dimensionless
Vt = Volume of Total Extract in uL.
Vs = Volume of Sample extracted in mL.

Concentration of non-Aqueous Samples (ug/Kg) = (Ax * A * Vt * Df) / (As * Vi * W)

Where: Ax = Area response for the analyte in the sample
A = Amount (mass) of calibration standard injected in ng
As = Area response for the calibration standard
Vi = Volume of extract injected in uL
Df = Instrument Dilution Factor, if no Dilution D =1, dimensionless
Vt = Volume of Total Extract in uL.
W = Mass of Sample extracted in grams.

PERCENT RELATIVE STANDARD DEVIATION (%RSD):

For initial calibrations, the %RSD is the quotient of the Standard Deviation of the calibration factors divided by the mean of the calibration factors, multiplied by 100.

%RSD = (Standard Deviation / Mean) x 100

Where the Standard Deviation (Sample Standard Deviation) is the square root of the quotient of the average-squared difference between the individual measurements and the mean of the measurements divided by the number of measurements minus one,

$$\text{Standard Deviation} = \text{SQRT}\left(\sum_{i=1}^{n} ((Rf_i - \text{avg } Rf)^2 / (n-1)) \right)$$

Response factor (Rf) = area of each peak divided by the concentration of that peak
= area of standard / Concentration of standard

PERCENT DIFFERENCE (%D):
For calibration verification standards, the %D is the difference between the true concentration of the standard and the calculated concentration of the standard, divided by the true concentration, multiplied by 100:

%D (Percent Difference) = ((Cws - Cf) / Cws) * 100

Where: Cws = true concentration of the spiking standard
Cf = final measured concentration in the spiked sample

Percent Recovery (%R):
The recovery is the measured concentration divided by the true concentration of the spike.

%Recovery = (Cf – Cs) / (Cws * Vws) *100

Where: Cf = final measured concentration in the spiked sample
Cs = measured concentration in the un-spiked aliquot of sample
Cws = concentration of the spiking standard
Vws = volume used, of the spiking standard

Relative Percent Difference (RPD):
The RPD is the absolute value of the difference in concentrations divided by the average of the concentrations.

%RPD = |(Cs - Cdup)| / ((Cs + Cdup)/2) * 100

Where: Cs = measured sample concentration
Cdup = measured concentration in the duplicate

APPENDIX_2: STANDARDS & REAGENTS

STANDARDS DOCUMENTATION

Source Standards

Enter all source standards into LIMS immediately upon receipt, using the Standards Menu "Source Standard Maintenance". The LIMS SS-name is unique to the vendor that the source is obtained from; if a source standard is obtained from a different vendor, a new SS-name must be assigned and the information entered in the "Source Standard Entry" table before the standard can be assigned an SS#. The standards listed below were those in use at the time this document was written, however standards may be purchased from different vendors so long as they are traceable through LIMS and the Standards Prep Logs.

Certificates of Analysis should be obtained from the vendor of each source standard; the certificates should be labeled with the LIMS ID and the date received and filed in the 3-ring binder. Source standards usually have an expiration date set by the manufacturer. If no expiration date is listed, the expiration date is one year from date received.

Working Standards

Document the preparation of all working standards in the standards prep benchbook and in the LIMS through the "Working Standards Maintenance" menu; LIMS will then assign a working standard number (WS#). The LIMS WS-name is not neccesarily unique to the source standard vendor but *is* unique to the compound list and concentrations contained in the working standard; if the concentration or compounds in the working standard changes, a new WS-name, compound list and concentrations must be entered in the "Working Standard Entry" table before the standard can be logged in and assigned a WS#. It it *very important* to enter this information correctly, as LIMS uses this information to calculate spike and surrogate recoveries.

The benchbook entry should include the prep date, LIMS SS# and concentration, volume of SS used, solvent name, solvent volume, solvent lot#, final volume and concentration of WS, expiration date of WS, and prep chemist's initials.

Working standards expire 30 days after preparation from the source standards unless any of the source standards expire before the 30 days. If any of the source standards expire before the 30 days, change the expiration date of the working standard to match the earliest expiration date of the stock standards. **The expiration date of the working standard *must not* exceed the expiration date of any of the source standards from which it was made**.

Reagents

For any reagents that are not used directly from the bottle but are prepared by a chemist, the preparation of all reagents, including dilutions into Millipore DI water, must be documented in the reagent prep benchbook. Each reagent must be assigned a unique ID, based on the manufacturer and the date prepared.

SOURCE STANDARDS

Label each vial with the contents, LIMS SS#, and expiration date. Store standards at 4°C (± 2°C) in Refrigerator #21 in the pesticides lab; standards may not be stored in a refrigerator containing samples or extracts.

Primary Source Standards

Analytes	Concentration (ug/mL)	Supplier & Catalog#	LIMS SS Name
8330 Calibration Mix # 1	1,000	Restek 31450-500	8330_CAL1
8330 Calibration Mix # 2	1,000	Restek 31451-500	8330_CAL2
8330 Surrogate Mix (1,2-Dinitrobenzene)	1,000	Restek 31453-500	8330_SURR

Secondary (ICV) Source Standards

Analytes	Concentration (ug/mL)	Supplier & Catalog#	LIMS SS Name
EPA 8330 MIX A	100	Supelco 4-7283	8330 MIX A
EPA 8330 MIX B	100	Supelco 4-7284	8330 MIX B

WORKING STANDARDS

Prepare working, or secondary, standards by diluting the source standard solutions in 50%:50% (v:v) acetonitrile:water.

Method Modification Note: Method 8330 calls for the calibration standards associated with water samples to be prepared in methanol, however C&T uses Solid Phase Extraction (SPE) method 3535 for extraction of water samples with acetonitrile as the final solvent. This also eliminates the need to dilute the samples and extracts with $CaCl_2$ solution and enables C&T to combine extracts from either matrix in the same analytical sequence.

Verify that the LIMS expiration date of the working standard does not exceed that of any of the source or intermediate standards used to make it. If any of the source standards expire before the 30 days (8330 section 5.4.2), change the expiration date of the working standard to match the earliest expiration date of the stock standards. **The expiration date of the working standard *must not* exceed the expiration date of any of the source standards from which it was made**.

Label the standards vials with the name & concentration (or calibration level) of the standard, LIMS WS# and the expiration date. Store these standards at 4°C (± 2°C) in Refrigerator #21 in the Pest/PCB Lab; do not store in a refrigerator containing samples or extracts.

8330 STANDARDS PREP TABLE

WS Standard & Conc. (µg/mL)	Final Volume (mL) in 1:1 Acetonitrile:H_2O	Using Standard	Add Vol (mL) Standard	LIMS WS Name

WS Standard & Conc. (µg/mL)	Final Volume (mL) in 1:1 Acetonitrile:H_2O	Using Standard	Add Vol (mL) Standard	LIMS WS Name
NAN at 10 ug/mL	10	8330_CAL1	0.10	NAN_10
		8330_CAL2	0.10	
		8330_SURR	0.25	
NAN at 5 ug/mL	10	7_8330	5.00	NAN_5
NAN at 2 ug/mL	10	6_8330	4.00	NAN_2
NAN at 1 ug/mL	10	7_8330	1.00	NAN_1
NAN at 0.5 ug/mL	10	6_8330	1.00	NAN_0.5
NAN at 0.1 ug/mL	10	4_8330	1.00	NAN_0.1
NAN at 0.05 ug/mL	10	3_8330	1.00	NAN_0.05
NAN ICV at 1 ug/mL	10	8330 MIX A	0.10	NAN_ICV
		8330 MIX B	0.10	
		8330_SURR	0.25	
CCV,L at 0.5 ug/mL	10	8330_CAL1	0.005	
		8330_CAL2	0.005	
		8330_SURR	0.025	
CCV,M at 1 ug/mL	10	8330_CAL1	0.010	
		8330_CAL2	0.010	
		8330_SURR	0.025	
CCV,H at 2 ug/mL	10	8330_CAL1	0.020	
		8330_CAL2	0.020	
		8330_SURR	0.025	

REAGENTS

Acetonitrile, EMD Omnisolve, VWR Catalog# AX0142-1
Store at room temperature in a Flammables cabinet for up to 6 months.

Methanol, EM Science, EMD Omni-Solv grade, VWR Cat# MX0488-1
Store at room temperature for up to 1 year.

APPENDIX_3: 8330 DILUTIONS

Dilutions should be prepared from the initial 1:1 dilution in acetonitrile/water and diluted with additional 1:1, so that the solvent ratios are consistent throughout all sample extracts and standards. Let the extracts warm to room temperature then prepare the dilution in acetonitrile, in either an autosampler vial or an insert. See table below for appropriate volumes. Shake the dilution and invert 3 times to mix.

Dilution Factor	Made In	Extract Volume (µL)	Acetonitrile:Water Volume (µL)
2x	Insert	100	100
	GC vial	500	500
3x	Insert	50	100
	GC vial	250	500
4x	Insert	50	150
	GC vial	250	750
5x	Insert	40	160
	GC vial	200	800
10x	Insert	20	180
	GC vial	100	900
20x	Insert	10	190
	GC vial	50	950
50x	GC vial	20	980
100x	GC vial	10	990

SERIAL DILUTIONS

If you need to make a >100x dilution, first make the 100x dilution listed above, then make further dilutions, using that as an intermediate.

Dilution Factor	Using Primary Dil'n	Made In	Extract Volume (µL)	Acetonitrile:Water Volume (µL)
200	100x	GC vial	100	100
500	100x	GC vial	40	160
1,000	100x	GC vial	20	180

APPENDIX_4: INSTRUMENT CONDITIONS

Column Commentary

EPA Method 8330A requires two column, one column for presumptive identification of target compounds (example: LC-18, reverse phase) and a second column for the confirmation of target compounds (example: LCCN, reverse phase), which changes the elution order of target compounds.

The LC-18 column can be used for elution and separation of the target compounds under such conditions as ambient temperature or 35°C and up to 25 µL injections without showing column overload and excessive adjacent peak coelution. Each target compound has an optimum wavelength for detection, however EPA Method 8330A requires use of the 254 nm signal.

The LC-CN column literature and specifications give optimum elution and separation of target compounds undersub-ambient column temperatures and injection volumes of 3 – 5 µL. In method 8330, the three target compounds 2-NT, 3-NT, and 4-NT are frequently not resolved into individual peaks. The quantitation for this composite peak using the LC-CN column will be the sum of the quantitations for these three target compounds using the LC-18 column. Also, the two target compounds 2-Amino-4,6-dinitrotoluene and 4-Amino-2,6-dinitrotoluene are frequently not resolved into individual peaks. The quantitation for this composite peak using the LC-CN column will be the sum of the quantitations for these two target compounds using the LC-18 column. The LC-CN column may be used for target compound confirmation when only a few target compounds are detected using another column.

The ABZ+PLUS amide column is used as a second column. The ABZ+PLUS amide column gives good separation of all target compounds at 35°C column temperature with a 25 µL injection while satisfying the method requirement for causing a substantial change in the target compound elution order compared to the other column in use.

Sample extracts that are ND for all target compounds screened with one column are not re-analyzed using the second column. There is no inherent reason for preferring either the LC-18 column or the ABZ+PLUS amide column for initial screening.

Instrument Conditions

The instrument conditions listed below are typical for this analysis but may be changed at the analysts' discretion to improve instrument performance. Refer to Instrument Maintenance Log for current flow parameters.

LC-18 Column
250mm x 3.0mm I.D., 5 micron SUPELCOSIL, Supelco Cat. # 58298-C30

Solvent Program	Time (min)	%Bottle A (Water)	%Bottle C (MeOH)
	0.0	67	33
	6.0	67	33
	14.0	71	29
	18.0	71	29
	26.0	67	33

Stop Time (min):	46
Post Time (min):	4
Flow Rate (mL/min):	0.50
Min Pressure (bar):	10
Max Pressure (bar):	400
Oven Temperature:	40°C
Injection Volume(µL):	25
UV Detector:	Signal A
Wavelength (nm):	254
Slit:	4
Reference Wavelength (nm):	Off
Reference Slit:	Off

ABZ+PLUS Amide Column
150mm x 4.6mm ID, 5 micron SUPELCOSIL, Supelco Cat. # 59196

Solvent Program	Time (min)	%Bottle A (Water)	%Bottle C (MeOH)
	0.00	62	38
	7.00	62	38
	7.01	52	48
	13.00	52	48
	13.01	62	38
	17.00	62	38
	25.00	58	42
	27.00	58	42
	27.01	62	38

Stop Time (min):	35
Post Time (min):	5
Flow Rate (mL/min):	0.50
Min Pressure (bar):	10
Max Pressure (bar):	400
Oven Temperature:	36°C
Injection Volume(µL):	25
UV Detector:	Signal A
Wavelength (nm):	254
Slit:	4
Reference Wavelength (nm):	Off
Reference Slit:	Off

Instrument Start Up:

1) Turn on the compressed air valve and the Helium valve on the wall.
2) Turn on the Helium inlet valve on the back of the HPLC. Helium should bubble through the solvent reservoirs within a minute.
3) Check that the Water and Methanol solvent reservoirs are full and that the waste container is empty. If solvent is added to the solvent reservoirs, purge the new solvent for 15 min at a Helium pressure of 40 psi and then turn the He pressure to 8 psi. *Note:* Do not change the flow rate while the instrument is running.
4) If the HPLC system is not on, turn the system on by pressing **System on** (see *Using Your HP 1090* manual, Chapters 2 & 4, for a discussion of system and parameter keys).
5) Once the HPLC has been turned on, load the Chemstation on-line session.
   a.) From the on-line session, select *INSTRUMENT*, then *PUMP SET UP*.
   b.) Enter 0.1 for the flow rate, then click *OK*.
   c.) Select *INSTRUMENT*, then *SYSTEM ON*.
   d.) Once solvent begins flowing into the waste reservoir, set flow for the column in use. It will take about 15 min. for the pressure to stabilize. The pressure should be less than 350; if it is >350, the guard column shoud be replaced. After the pressure has stabilized, the HPLC is OK for use.
6) Inject solvent blanks and if needed NAN-10's to condition the system. If the system has not been in use for several days, it may take 2 or 3 runs for the target compound RT's to stabilize. Watch the column oven temperature, as this has a great influence on the retention times - the temperature should be as constant as possible. It may be necessary to set the room temperature to 68°F when the weather is warm for the HPLC to control the initial oven temperature.
7) Once the system has been conditioned, load the extracts and run the Chemstation sequence. See Appendix_11 for instructions on writing and using Chemstation sequences.

Instrument Shut-Down:

1) Flush the HPLC column with 100% Methanol after the last run for one to two hours. This will help remove strongly adsorbed sample constituents.
2) Rinse the column with 50/50% water/methanol for 30 to 60 minutes after flushing with Methanol. **Always store the column in a 50% water/ 50% methanol mix**. If the column is not equilibrated with water, the retention times at the beginning of the next sequence will drift until the column is equilibrated. This may take several hours! See Appendix_5: Instrument Maintenance.
3) Turn off the UV detector and the pump by going to the Chemstation On-line Session. Select *INSTRUMENT*, then *SYSTEM OFF*.
4) Turn the HPLC system off (**Shift /System on**) by using the key board on the front of the HPLC.
5) Turn the solvent degassing off by first turning the Helium Inlet valve off on the back of the HPLC. ***Important* - if this valve is left open, solvent may be sucked back from the reservoirs into the Helium sparge manifold; this will corrode and block the manifold.**
6) Turn the Helium and compressed air valves off.

APPENDIX_5: MAINTENANCE & TROUBLE-SHOOTING

Any maintenance performed on the instrument (ie: MeOH or DI water added to reservior, changed column, changed conditions) must be documented in the Maintenance Benchbook. Each entry should include:

- reason the maintenance was necessary ('CCV failing', etc.),
- the date and analyst initials,
- maintenance steps performed ('cleaned detector'), and
- resolution ('ICAL passed', etc.) of the maintenance.

If maintenance is performed by an outside contractor, the contractor should provide documentation of what steps were taken and any parts replaced. This certificate or receipt should be kept on file in the 3-ring binder labelled 'Vendor Maintenance Receipts'.

Degasing the Solvents:
Solvents must be de-gased before using the HPLC or bubbles may form in the column during analysis, interfering with the flow and potentially damaging the column. Fill the reservoir, connect it to the instrument and turn on the "Degas" knob for 15 min.

Adding Solvent to the Reservoirs:
The water and Methanol solvent reservoirs can be refilled while the HPLC is in operation. Make sure that the solvent level when the bottle is dropped is above the pump intake then drop the solvent bottle (pull the lever to release the solvent bottle clamp). Fill a 100 mL volumetric flask with solvent (which has been purged with Helium on another HPLC) and add this to the solvent reservoir; repeat as necessary. If the new solvents have not been purged, pause the sequence and purge the new solvent for 15 min at a Helium pressure of 40 psi. Then turn the He pressure down to 8 psi for the remainder of the sequence.

Conditioning the System after Idle/Standby:
If the HPLC system has not been in use for a few days, the system should be conditioned with one or two injections of the high Nitroaromatics and Nitramines standard before starting a sequence. Use an outdated or previously injected standard for conditioning.

Instrument "Not Ready"
Under normal operating conditions this light may be lit when the Oven Temp is either higher or lower than the preset temperature.

Retention Time Drift:
If the compounds are eluting in a much shorter time than expected and the RT's drift up with each run, the HPLC column may not be equilibrated with water. Equilibrate by flushing the column with 50/50% H_2O/Methanol for two to three hours. Set the column oven temperature to 40 or 45°C to speed the equilibration then analyze two solvent blanks and two CCV's to determine if this has solved the problem. Remember to reset the column oven temperature to the correct initial temperature!

APPENDIX_6: C&T COMPOUND LIST & REPORTING LIMITS

Some sources may use differing nomenclature or abbreviations for target compounds. Two sets of abbreviations are given in the table, those often found on compound lists and those used in electronic databases and deliverables (valid values). Target compounds are uniquely identified by the CAS#, and it can be used to eliminate possible confusion about compound names and abbreviations.

CAS #	Target Compound	Common Abbreviation	LIMS Abbreviation
2691-41-0	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	HMX
121-82-4	Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	RDX
99-35-4	1,3,5-Trinitrobenzene	1,3,5-TNB	TNB135
99-65-0	1,3-Dinitrobenzene	1,3-DNB	DNBZ13
98-95-3	Nitrobenzene	NB	NO2BZ
479-45-8	Methyl-2,4,6-trinitrophenylnitramine	Tetryl	TETRYL
118-96-7	2,4,6-trinitrotoluene	2,4,6-TNT	TNT
35572-78-2	2-Amino-4,6-dinitrotoluene	2-Am-DNT	A2DNT46
1946-51-0	4-Amino-2,6-dinitrotoluene	4-Am-DNT	A4DNT26
121-14-2	2,4-Dinitrotoluene	2,4-DNT	DNT24
606-20-2	2,6-Dinitotoluene	2,6-DNT	DNT26
88-72-2	2-Nitrotoluene	2-NT	NBZME2
99-99-0	4-Nitrotoluene	4-NT	NBZME4
99-08-1	3-Nitrotoluene	3-NT	NBZME3

CAS #	Target Compound	Water RL (µg/L)	Soil RL (µg/Kg)
2691-41-0	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	1	200
121-82-4	Hexahydro-1,3,5-trinitro-1,3,5-triazine	1	200
99-35-4	1,3,5-Trinitrobenzene	1	200
99-65-0	1,3-Dinitrobenzene	1	200
98-95-3	Nitrobenzene	1	200
479-45-8	Methyl-2,4,6-trinitrophenylnitramine	1	200
118-96-7	2,4,6-trinitrotoluene	1	200
35572-78-2	2-Amino-4,6-dinitrotoluene	1	200
1946-51-0	4-Amino-2,6-dinitrotoluene	1	200
121-14-2	2,4-Dinitrotoluene	1	200
606-20-2	2,6-Dinitotoluene	1	200
88-72-2	2-Nitrotoluene	1	400
99-99-0	4-Nitrotoluene	1	400
99-08-1	3-Nitrotoluene	1	400
	Surrogate		
528-29-0	1,2-Dinitrobenzene		

C&T standard reporting limits are based on:

Waters:	Initial Volume = 1,000 mL	Final Extract Volume = 5 mL	Injection Vol = 25 uL
Soils:	Initial Weight = 5 g	Final Extract Volume = 10 mL	Injection Vol = 25 uL

APPENDIX_7: RETENTION TIMES & ELUTION ORDER

Retention Time (RT) Windows:
"RT Windows" are necessary because compounds may not elute at *exactly* the same time during each and every injection, due to slight variations in temperature, flow rate, or injection composition (sample viscosity, compound concentrations), etc. The RT-window is the length of time (width, in minutes, on the chromatogram) during which any peak eluting within the window is presumed to be the analyte of interest. "72-hour Study" is a term often used by auditors to describe statistical analysis of the retention times of standards injected over a 72 hour sequence; theoretically, the RT windows determined by this study can be used for routine analysis, however the studies that C&T has conducted in the past result in windows that are too narrow for routine use. C&T therefore uses the default retention time windows of $\pm$ 0.03 minutes as specified in EPA 8000B.

If a 72-hour RT study is required by a client or auditor, the RT windows are defined as plus or minus three times the standard deviation of the absolute retention times for each compound in the calibration standard mix as measured over the course of 72 hours. (*Note:* This procedure has historically (and consistently) produced rt-windows too tight for routine use.) In the event that a standard deviation is 0.00, then use the 0.03-minute window (see 8000B). However the experience of the analyst should weigh heavily in the interpretation of the chromatograms.

Absolute Retention Times:
The "absolute" retention time of any compound is the expected time of the compound is the center of the RT window. Use the retention time for each analyte from calibration standard mixtures injected during that 12 hour shift as the "absolute" retention time. Use the calibration standards analyzed during the sequence to evaluate retention time stability. If any of the standards fall outside their daily or preset fixed retention time windows, the system is out of control. Determine the cause of the problem and correct it.

Method Modification Note: EPA 8000B, Section 7.6.5 suggests updating the absolute retention times each time a new sequence is started. Because the retention times for these compounds are relatively stable, C&T has found it necessary to update the retention times only when performing the initial calibration.

Elution Order:
The order in which compounds elute is based on chemical composition of the stationary phase of the column and on the instrument conditions (flow rates, temperature programming, column length). Given a specific set of instrument conditions (flow rates, temperature program) the order in which compounds elute from a column should remain constant but may differ between different types of columns. See the table below for the expected elution order of the single-component analytes on columns LC-18 and ABZ+PLUS Amide.

LC-18	ABZ+PLUS Amide
HMX	HMX
RDX	1,3,5-Trinitrobenzene
1,3,5-Trinitrobenzene	RDX
1,2-Dinitrobenzene (surrogate)	1,3-Dinitrobenzene
1,3-Dinitrobenzene	1,2-Dinitrobenzene (surrogate)
Nitrobenzene	Nitrobenzene
Tetryl	TNT
TNT	Tetryl
2-Am-DNT	2,6-Dinitotoluene
4-Am-DNT	2,4-Dinitotoluene
2,4-Dinitrotoluene	2-Nitrotoluene
2,6-Dinitotoluene	4-Nitrotoluene
2-Nitrotoluene	3-Nitrotoluene
4-Nitrotoluene	4-Am-DNT
3-Nitrotoluene	2-Am-DNT

APPENDIX_8: INITIAL CALIBRATION
Procedure & Acceptance Criteria

REQUIREMENTS
An initial calibration curve must be analyzed whenever instrument conditions (temperature programs, flow rates, etc.) have been changed, or the detector has been cleaned. In general, a new calibration curve must be made whenever instrument conditions have been altered, or whenever the continuing calibration verification no longer passes acceptance criteria.

The instrument analytical range must be established by running a minimum of 5 calibration standards, containing all target compounds, at levels that bracket the quantitation range (see Appendix_2 for standard suppliers); the lowest standard must be at or below the reporting limit and the highest standard determines the upper end of the quantitation range. Unlike most other analyses, the 8330 ICAL standards must be analyzed in random order (EPA Method 8330, paragraph 7.3.2) of concentration. Points may be dropped so long as the following criteria are met:

- The highest concentration standard may be omitted so as long as there are at least five points remaining and the remaining highest point defines the top of the calibration range (any extracts which exceed this response must be diluted and reanalyzed).

- The lowest concentration standard may be omitted from curve if, *and only if*, the resulting lowest standard is at or below the reporting limit for samples and there are at least five points remaining.

- Mid-point standards may not be omitted simply to improve the RSD or linear correlation coefficient. They may, however, be reanalyzed if a poor injection is suspected. The reanalysis must occur immediately after the curve so long as no sample extracts were analyzed since the last calibration standard and all compounds are calibrated using the second run. Under no circumstances may a point in the middle of the curve be rejected in order to pass calibration criteria for a particular compound.

Use the average calibration factor, omitting the zero point, for each compound to generate the ICAL curve. The percent relative standard deviation (%RSD) of the calibration factors must be $\leq$20% for each analyte. See Appendix_1 for example calculations.

Note: Linear regression may be used in place of the average calibration factor and RSD to evaluate the multi-point calibration curve and determine the correlation coefficient, as detailed in Appendix_1. If the correlation coefficient (r) is 0.995 or greater, the multi-point (5 or more points) curve is acceptable.

The curve must be verified by analying an Initial Calibration Verification (ICV) standard comprised of standards obtained from a different manufacturer than those used to prepare the ICAL standards.

NITROAROMATICS and NITRAMINES Initial Calibration Levels (mg/L)

Compound	NAN_0.05 Level 1	NAN_0.1 Level 2	NAN_0.5 Level 3	NAN_1 Level 4	NAN_2 Level 5	NAN_5 Level 6	NAN_10 Level 7
HMX	0.05	0.10	0.50	1.00	2.00	5.00	10.0
RDX	0.05	0.10	0.50	1.00	2.00	5.00	10.0
1,3,5-Trinitrobenzene	0.05	0.10	0.50	1.00	2.00	5.00	10.0
1,3-Dinitrobenzene	0.05	0.10	0.50	1.00	2.00	5.00	10.0
Nitrobenzene	0.05	0.10	0.50	1.00	2.00	5.00	10.0
Tetryl	0.05	0.10	0.50	1.00	2.00	5.00	10.0
TNT	0.05	0.10	0.50	1.00	2.00	5.00	10.0
2-Am-DNT	0.05	0.10	0.50	1.00	2.00	5.00	10.0
4-Am-DNT	0.05	0.10	0.50	1.00	2.00	5.00	10.0
2,4-Dinitrotoluene	0.05	0.10	0.50	1.00	2.00	5.00	10.0
2,6-Dinitotoluene	0.05	0.10	0.50	1.00	2.00	5.00	10.0
2-Nitrotoluene	(0.05)	0.10	0.50	1.00	2.00	5.00	10.0
4-Nitrotoluene	(0.05)	0.10	0.50	1.00	2.00	5.00	10.0
3-Nitrotoluene	(0.05)	0.10	0.50	1.00	2.00	5.00	10.0
1,2-Dinitrobenzene (surrogate)	0.125	0.25	1.25	2.50	5.00	12.5	25.0

NOTE: Levels listed in parentheses are those below C&T standard report limits.

PROCEDURE

1.) Prepare the standards as described in Appendix 2.

2.) Prepare an Initial Calibration Verification (ICV) standard from source standards obtained from a different manufacturer than the ICAL standards.

3.) Perform any needed instrument maintenance and run an instrument blank. If any target compound is detected above the reporting limit, run another instrument blank.

4.) Load the calibration standards onto the autosampler tray in random order of concentration.

5.) Load the ICV after the instrument blank that follows the calibration standards. The ICV, prepared from standards obtained from a second manufacturer, must be analyzed to verify that the standards used to create the initial calibration curve were prepared correctly.

6.) Write the sequence as below, identifying the type of sample as initial calibration standards, the LIMS identification of the standards, and the applicable dilution factors. The “stype” and WS-number must be correctly entered into the sequence in a specific order for LIMS to be able to interpret the information and should be written into the sequence as follows:

ib
ICAL, WS#, NAN_<level #>
ICAL, WS#, NAN_<level #>
ICAL, WS#, NAN_<level #>

ICAL, WS#, NAN_<level #>
ICAL, WS#, NAN_<level #>
ICAL, WS#, NAN_<level #>
ICV, WS#,

Where:
WS# is the LIMS WS# of the standard used

7.) Use the same Chemstation method as used for samples (ie: ABZP-<julian date> or LC18-<julian date>).

8.) Make sure the "printing suppressed" box is checked then start the run.

ACCEPTANCE CRITERIA & DATA REVIEW

After the standards have run, "batch out" the runs, then examine the data to determine if the curve passes acceptance criteria.

9.) Verify that each compound was detected, identified, and integrated correctly in each of the standards.

Peaks should be integrated from baseline to baseline. Manual integrations of any kind must be substantiated and documented on the Initial Calibration Report. Manual integrations must be consistently applied to ICAL, CCS, and sample integrations. **Unsubstantiated alteration of peak integration solely to pass calibration criteria is illegal and is grounds for immediate termination.** Chemstation will identify any baseline events on the chromatogram (see Appendix_10 for flag definitions). If the reason for the integration is not intuitive and obvious, the analyst must document the reason on the data.

10.) Examine the retention times closely to make sure that the elution order is correct.

11.) Print the forms and send the files to LIMS.

12.) Generate the Chemstation ICAL summary on screen, verifying that the curve is linear and that the upper levels are not saturated.

13.) Verify that the calibration is useable by reviewing the results against the following criteria:

13.1) The Relative Standard Deviation (RSD) of the Calibration Factors for each compound should be less than or equal to 20%.

13.2) If the average response factors fail to meet the 20% RSD or mean RSD criteria, employ a linear regression or quadratic model. If linear regression is used, a minimum of five points is required with a correlation coefficient $r \geq 0.995$ If a quadratic fit is used, a minimum of six points is required with a coefficient of determination $r^2 \geq 0.990$.

13.3) For each compound:
- The low point may only be rejected for those compounds that have reporting limits greater than that level.
- The high point may be rejected for compounds that tend to saturate at high levels so long as there are at least 5 points remaining for each compound in the ICAL.
- If a single point in the curve is causing the failure, the standard may be reanalyzed, so long as it immediately follows the original curve and all compounds are calibrated using the second run. Under no circumstances may a point in the middle of the curve be rejected in order to pass calibration criteria for a particular compound.

13.4) If the curve does not meet these requirements, additional instrument maintenance should be performed and a new curve analyzed.

14.) Generate the LIMS ICAL summary and verify that they match the Chemstation report.

15.) Generate a summary report for the Initial Calibration Verification (ICV) standard, to verify that the calibration standards were prepared correctly and to highlight any discrepancies between the primary- and second-source standards. See Continuing Calibration Verification Section for the procedure to generate this form.

The ICV should meet the CCV criteria of $\leq$ 15%D. As in the verification of RSD for the initial calibration, if any analyte's percent difference or percent drift is >15%, examine the integration. If the first ICV does not meet the acceptance criteria, another ICV standard may be analyzed; “x” out the first ICV and process the data from the second ICV. ***Do not*** “cherry pick” some compounds from the first ICV and others from the second ICV; if the second ICV is processed and used, all compounds must be taken from the second standard.

16.) Assemble the data package for the initial calibration. Include the “GC & HPLC ICAL Review Checklist”, the calibration summary forms, the quant report and chromatogram for each ICAL point, and the ICV summary. Initial and date each of the forms, complete the review checklist, and turn the data in to the Department Manager or QC Chemist for review; the ICAL cannot be used to process final forms through LIMS until it has been reviewed and approved in LIMS.

Note: Any corrections to the ICAL must be done through Chemstation, then resent to LIMS and a new ICAL# created. Any data processed with the draft ICAL would then need to be reprocessed against the corrected, new ICAL#.

APPENDIX _9: CONTINUING CALIBRATION VERIFICATION (CCV)

REQUIREMENTS

A CCV (Continuing Calibration Verification) standard is analyzed at the beginning of each sequence, before any sample or batch QC extracts, to verify that the response of the instrument has not changed significantly and that the curve may still be used to quantitate sample results. Additional CCV's must be run after every 10 samples (or within 12 hours, whichever comes first), and at the end of the analytical sequence. The concentration of the CCV must be varied within the calibration range but should not be analyzed at either extreme (highest or lowest point) of the ICAL curve.

Note: If the instrument is running unattended or overnight, it is a good idea to load two CCV standards for each bracket, to reduce the number of samples that have to be reanalyzed due to an injection error. Type in the sequence with an "x" stype for the second CCV so that only the first CCV will automatically process.

If the first CCV does not meet the acceptance criteria, another CCV standard should be analyzed. If two CCV's were analyzed, examine the first one against the acceptance criteria; if it fails, "x" out the first CCV, change the second to stype "CCV" and process the data from the second CCV. *Do not* "cherry pick" some compounds from the first CCV and others from the second CCV; if the second CCV is processed and used, all compounds must be taken from the second standard.

If the second analysis of the standard also fails to meet these criteria and the analyst suspects that the CCV standard has degraded, a different CCV standard may be analyzed once. If this standard passes, discard the standard that has been degraded. If the different CCV standard also fails, instrument maintenance required and recalibration may be required if major instrument maintenance is performed.

See Appendix_8 for the Initial Calibration procedure and acceptance criteria. See Appendix_1 for calculation of %D and the calibration factor (CF).

ACCEPTANCE CRITERIA

Process the CCV through LIMS then examine the summary form against the following criteria to determine whether the CCV is acceptable:

1.) All compounds must fall within its retention time window and be automatically identified on both columns by the data system.

2.) All compound responses should be within 15% of the intial calibration (%D $\leq$ 15%).

3.) If the %D for an individual compound fails acceptance criteria, data may be reportable based on the following criteria:

   a.) If the failing compound is not a target analyte for the associated samples, sample results should be reported without reanalysis.

b.) If the compound fails the %D criterion due to a high response but was not detected above the reporting limit in the associated samples, the sample results may be reported without reanalysis, as the high bias does not affect the sample results.

c.) If the compound fails the %D criterion due to a high response and *was* detected above the reporting limit in any of the associated samples, the samples should be reanalyzed.

d.) If the compound fails the %D criterion due to a low response and *was* detected (even below the reporting limit), the sample should be reanalyzed.

If any of the above criteria are not met, examine the integration to verify that each peak was correctly integrated. Manual integrations must be consistently applied to ICAL, CCV, and sample integrations. If manual integrations are performed, the file should be resent to LIMS so that a new CCV summary form can be generated.

WARNING: **Unsubstantiated alteration of peak integration solely to pass calibration or QC criteria is illegal and is grounds for immediate termination.**

APPENDIX_10: CHEMSTATION BASELINE EVENTS

For each peak identified by the data system, a qualifier flag will appear under the 'Type' heading on the user report. The first letter describes the baseline at the start of the peak and the second describes the baseline at the end of the peak. The baseline codes are as follows:

A	Peak integration was aborted.
B	Peak started or stopped on the baseline.
H	Peak started or stopped on a horizontal baseline.
P	Peak started or stopped while the baseline was penetrated.
S	Integrator recognized the peak as a solvent peak.
T	Tangent skim was enabled.
V	Peak started or stopped with a valley dropline.
+	Peak was included as part of a cluster of summed peaks.
M	Peak was manually integrated.
F	Peak was forced by manual integration. If a peak occurs before the manually integrated peak and the end changes because of the manual integration, the peak is classified as forced.
R	A solvent peak has been affected by manual integration, such as tangent skim and is classified as a re-calculated peak.
Fsho	Front shoulder.
Rsho	Rear shoulder.
O	Over-range peak.

Manual integration may be required if there are co-eluting peaks or matrix interferences. Use the *Draw Baseline* function to manually integrate any peaks that are incompletely or incorrectly integrated by the data system. If manual integration is performed, the data system will print the new area directly on the chromatogram at a 45° angle, next to the affected peak. If manual integrations are performed, both the original chromatogram and the reprocessed chromatogram must be included in the final data package. If the reason for any manual integration is not obvious and intuitive from the hardcopy chromatograms, further explanation should be provided, accompanied by your initials and the date.

APPENDIX_11: USING CHEMSTATION

Chemstation Nomenclature:

Data files (.D files) contain the information collected from the UV Detector and is written to the network directory G:\HPLC2\DATA\ and are identified by an 8 digit number. The first three digits represent the Julian date and the following five digits identify the data files incrementally, beginning with 00001.

Sequence files (.S files) are written to the network directory F:\HPLC2\SEQUENCE\ and are identified by MMDDYY (ex: March 6, 2000 sequence is 030600.s).

Batch files (.B files) are written to the network directory G:\HPLC2\BATCH\ and are identified by MMDDYY (ex: March 6, 2000 sequence is 030600.b). Batch files with manual integrations will be identified with a "P" prior to the dot (ex: 030600p.b).

Method files (.M files) contain all instrument parameters to acquire data for samples to be analyzed and all integration parameters for identifying and quantitating target compounds. Methods are identified by the particular column in use and the Julian date. Examples are method LC18-315 and method ABZP-317. The first four characters in the method name identify the column in use (LC18 for the LC-18 column and ABZP for the ABZ+PLUS amide column). The three digits following the dash give the Julian date that the method was created.

RT (retention time) updates use the Julian date of the RT update (example: Feb.1 update will be method name LC18-032 for the LC-18 column).

Prepare an HPLC Auto-Injector Sequence on the On-line Session:

From the on-line session,

1) Select *SEQUENCE*.
2) Select *SEQUENCE PARAMETERS*.
3) Enter your initials into the 'Operator Name' field(default is HPL) and the sequence prefix (Julian date) into the prefix field.
4) Click *OK*.
5) Select *SEQUENCE*.
6) Select *SEQUENCE TABLE*.
7) For each extract in the sequence, enter the vial#, sample number, method name, number of injections per vial (1), multiplier (prep dilution factor), and dilution (instrument dilution factor).
8) Enter all of the sequence information then click *OK*.
9) Select *SEQUENCE*.
10) Select *SAVE SEQUENCE AS* and save the sequence with the current date (see *Nomenclature* above).
11) Click *OK.*
12) Select *RUN CONTROLS*.
13) Select *RUN SEQUENCE* to start the auto-sequence.

Updating Absolute Retention Times:

Update the absolute retention time (not RT window) by opening a Chemstation session, then:

1) Select the *DATA ANALYSIS* menu.
2) Select the *CALIBRATION TABLE*.
3) For each compound, type the updated retention time into the box labeled *RT.*
4) When finished, click *OK*.
5) Select *FILE* from the main menu.
6) Select *SAVE AS*, then *METHOD*, and type in the name of the updated analytical method (use the Julian date of the RT update. For example, Feb.1 update will be method name LC18-032.).
7) Type annotation 'RT updated' in the message block along with operator initials and date. Click *OK.*

EPA 6010B - TRACE METALS ANALYSIS

Using Instrument MET-08

Perkin-Elmer 4300-DV
Inductively Coupled Plasma (ICP-AE)

Approved by:

Metals Group Leader / Date	QA Director/ Date

Read & Understood by:

Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date

Re-Approved by:

Metals Group Leader / Date	QA Director/ Date

EPA 6010B - Trace Metals Analysis
Using Instrument MET-08
SOP Table of Contents

EPA 6010B - Trace Metal Analysis
Using Instrument MET-08
Perkin-Elmer 4300-DV
Inductively Coupled Plasma (ICP-AE)

SCOPE

This procedure describes the determination of metals in filtrates and acidic digestates of water, soil, air, and leachates using the Perkin-Elmer Model 4300-DV ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectrometer).

REFERENCES

Analytical Method:
EPA 6010B, Inductively Coupled Plasma AE Spectrometry, SW-846 Update 3, Dec.1996

Sample Prep Methods:
EPA 3010A, Acid Digestion of Aqueous Samples, SW-846 Update 3, Dec.1996
EPA 3050B, Acid Digestions of Sediments, Sludges, and Soils, SW-846 Update 3, Dec.1996

Additional SOP's and Guidance Documents:
EPA 6010C, Inductively Coupled Plasma AE Spectrometry, SW-846 Draft Update 4, 1998
NELAC Chapter 5, Quality Systems, June 2003
DoD Quality Systems Manual, Version 2, June 2002
US ACOE "Shell" Document, EM 200-1-3, February 2001
C&T SOP QA 1.4, *Balance Calibration Check & Maintenance*
C&T SOP QA 1.5, *Calibrating & Maintaining Temperature Controls*
C&T SOP QA 1.6, *Pipet Calibration Check Procedures*
C&T SOP QA 4.1, *Establishing Control Limits*
C&T SOP QA 4.4, *Determining Method Detection Limits (MDL)*

EQUIPMENT

Perkin-Elmer ICP, Model 4300 DV
Perkin-Elmer Autosampler, Model AS-93Plus
WinLab 32, Perkin-Elmer Data Acquisition Software, Version 3.0

SAMPLE HANDLING & SAFETY

Digests should be at room temperature when analyzed. Digests may be stored at room temperature for up to 6 months prior to analysis.

Assume all samples, reagents and standards contain hazardous and/ or toxic material and take necessary precautions. Sample digests contain highly concentrated acids and should be handled with caution.

QC REQUIREMENTS

a.) Initial Calibration:
An initial calibration (ICAL) curve consisting of a calibration blank and at least three standards must be established daily, prior to sample analysis. The lowest concentration standard must be at or below the reporting limit (see Appendix_3 for reporting limits) and the highest standard defines the top of the quantitation range. The correlation coefficient of this curve must be $\geq$ 0.995; if the calibration coefficient criterion is not met, the instrument must be recalibrated.

b.) Calibration Verification:
An initial calibration verification (ICV) standard obtained from a second supplier and initial calibration blank (ICB) verification must be run at the beginning of each analytical run. A continuing calibration verification (CCV) standard and continuing calibration blank (CCB) verification must be analyzed after every 10 analytical samples, including batch QC samples, and at the end of the sequence. The concentration of the CCV must be varied within the calibration range, over the course of the sequence, with %D $\leq$ 10% (recoveries between 90-110%). Target elements must not be detected in the CCB's at any level above the RL.

Note: The USACE recommends that an ICAL standard, or a standard from the same manufacturer as the ICAL standards, be used for the CCVs, to more readily identify problems that are due to changing instrument conditions and are not due to differences between standards.

c.) Interference Check Standard A (ICSA):
An interference check standard (ICS-A) containing only common interferents standard should be analyzed at the beginning of each sequence, after the calibration standards and verifications, to demonstrate that high levels of interferents are not significantly biasing sample results, in either a positive or negative fashion. The determined concentration of the non-interferent should be no more than $\pm$RL in either direction.

d.) Interference Check Standard A-B (ICSAB):

An interference check standard (ICS-AB) containing both common interferents and low-level target analytes standard should be analyzed at the beginning of each sequence, after the calibration standards and verifications, to demonstrate that the interference corrections are effective and are correctly applied. The ICS-AB should also be analyzed at the end of the sequence to demonstrate that instrument conditions have not significantly changed over the course of the sequence - see *Note* below. The ICS-AB standard should contain interferent elements at concentrations greater than 100 ppm and the elements of interest at concentrations between 0.5 to 1.0 ppm. The recovery for each element should be within 80-120% of the true value or subsequent sample results for that element cannot be reported.

Note: Although EPA 6010B does not require analysis of an ICS-AB at the end of the sequence, most Department of Defense (Army, Navy, etc) project plans include this requirement, so it is always a good idea to close the sequence with this standard.

e.) Batch QC:

The following quality control (QC) samples must be prepared in the same manner as the analytical samples at a rate of once per twenty or less samples. C&T in-house acceptance limits are updated semi-annually; based on control charts of the previous year's data. See the associated SOP '*6010B QC Limits, Table-1'* for the current limits.

Method Blank (BLANK): The purpose of the method blank is to ensure that the digestion and analysis process does not in any way contaminate the analytical samples. Deionized water is carried through the entire digestion process and analyzed. The results for the preparation blank should be <1/2 RL and must be < RL for all target elements.

Blank Spike (BS) and Blank Spike Duplicate (BSD): The purpose of the blank spikes is to demonstrate that the sample preparation and analysis procedures are accurate (recovery) and precise (RPD) in the absence of matrix interferences. A known concentration of each element is added to deionized water and carried through the entire digestion and analysis process. The recoveries and RPD should fall within C&T in-house limits, or the samples associated with it should be redigested and reanalyzed.

Matrix Spike (MS) and Matrix Spike Duplicate (MSD): The purpose of the matrix spikes is to demonstrate that the sample preparation and analysis procedures are accurate (recovery) and precise (RPD) in the possible presence of matrix interferences. A known concentration of each element is added to a real-world sample and carried through the entire digestion and analysis process. If C&T recovery limits are not met, an acceptable explanation and narration, or redigestion of samples is required. If the concentration of any element in the spiked sample is greater than four times the spiking level, the recovery is considered 'Not Meaningful' and LIMS will place an "NM" flag on the report.

Note: For Arizona samples, the RPD criteria is < 20% for all matrices.

Sample Duplicate (SDUP): For leachates or other samples known to contain high levels of target analytes, a sample duplicate and sample spike may be analyzed in place of the MS/MSD. The selected sample is prepared and analyzed in duplicate to determine the precision of the sample preparation and analysis process in the presence of potential matrix interferences. If the RPD exceeds C&T RPD limits for a majority of the analytes of interest, the source of the error must be identified and narrated or the affected samples redigested.

Note: For Arizona samples, the RPD criteria is < 20% for all matrices.

Sample Spike (SSPIKE): A second aliquot of a sample is spiked with a known concentration of elements to determine the accuracy of the sample preparation and analytical process in the presence of potential matrix interferences. If C&T recovery limits are not met, an acceptable explanation and narration, or redigestion of samples is required. If the concentration of any element in the spiked sample is greater than four times the spiking level, the recovery is considered 'Not Meaningful' and LIMS will place an "NM" flag on the report.

Note: Project-specific quality assurance plans may have different criteria. If so, those requirements supercede this SOP for all samples related to that project.

f.) Sample Interference Verifications:

The method recommends that whenever a new or unusual matrix is encountered, a series of tests be performed to ensure that neither positive nor negative interferences are distorting the accuracy of the reported values. These are optional steps that should be implemented for any batch containing "Level 3" or Level 4" samples, as nearly all Department of Defense project plans include this requirement. These should also be analyzed whenever the analyst suspects that sample viscosity, salt content, or other matrix interferences are likely.

Serial Dilutions: Analysis of a 5x dilution should agree within $\pm$ 10% (90-110% recovery) of the original determination if the concentration of the element in diluted aliquot is greater than the reporting limit. If not a chemical or physical interference should be suspected.

Post Digest Spikes: An analyte spike added to a portion of a prepared sample digest, or its dilution, should be recovered to within 75-125% of the known value. The spike addition should produce a minimum level of 10 times and a maximum level of 100 times the instrumental detection limit. If the spike is not recovered within the specified limits a matrix effect should be suspected.

Note: These interference verifications are required for all Army Corp of Engineers projects.

g.) Multi-Spectral Fitting (MSF):

MSF is a method of correcting for spectral overlap of interferents with the analyte of interest by collecting spectra of a blank, analyte, and individual solutions of each interferent. In MSF models, all components are assumed to be linearly independent and the MSF is then

independent of concentration or plasma effects. This method cannot be used if the spectra of two analytes directly overlap, but is the preferred method for those analytes whose spectra are even slightly offset.

h.) Inter-Element correction (IEC) factors:
An IEC is a method of correcting for the spectral overlap of high levels of interfering elements, upon the analyte of interest, in those instances where Multi-Spectral Fitting cannot be applied. Mathematical correction factors are applied to the emission intensities. IEC's are limited in that the interfering element must be within the linear range and the plasma conditions must not be changed. The IEC's are determined through analysis of single-element standards and examination of the resulting data against the intensities collected at the remaining wavelengths to determine what other elements may be affected by a high level of that element. Any IEC's must be applied where needed and updated every six months or when an instrument change occurs in the torch, nebulizer, injector, optics, or plasma condition.

i.) Method Detection Limit (MDL):
MDL studies must be performed annually for each instrument and matrix, in order to demonstrate that the sample preparation and analysis procedures are adequate to meet required reporting limits. The MDL is determined by digesting and analyzing at least 7 replicates of a low-level blank spike, determining the standard deviation for each element, and applying a multiplier. See the QA SOP "Determining MDLs" for details.

j.) Instrument Detection Limit (IDL):
The Navy requires that IDL, as well as MDL, studies be performed annually for each instrument. The IDL is determined by analyzing seven replicate standards that have *not* been digested, on three non-consecutive days. The standard deviation of the calculated concentrations is determined for each day; the IDL is the sum of the three standard deviations.

DAILY MAINTENANCE

- Replenish the rinse-water reservoir daily with 2% HNO_3 - 2% HCl.
- Change the pump windings for the internal standard solution every day or two.
- Change the sample tubing every 1 to 2 weeks, or whenever bubbles appear in the lines.

DAILY INSTRUMENT SEQUENCE

1) Turn the ICP on and allow the instrument to stabilize for about 30 minutes, or longer (up to 90 minutes) when the pump windings have been changed. See Appendix 8 for instrument start-up procedures.

2) Verify that the lamp is correctly aligned, as described in Appendix 8.

3) Calibrate the ICP by running a calibration blank followed by at least three calibration standards, in increasing order of concentration, at levels that bracket the quantitation range; the lowest standard must be at or below the reporting limit and the highest standard determines the upper end of the quantitation range (see Appendix 2).

4) Send the calibration data files to LIMS, as described in Appendix 8.

5) Review the ICAL summary to determine if the sequence can be continued:

   - The percent RSD should be ≤ 5% for the three replicate exposures of each standard. See Appendix_7 for software instructions.

   - The correlation coefficient for each element must be ≥ 0.995.

   - The highest concentration standard may be omitted so as long as there are at least three points remaining and the remaining highest point defines the top of the calibration range (any digests which exceed this concentration must be diluted and reanalyzed).

   - The lowest concentration standard may be omitted from curve if, *and only if*, the resulting lowest standard is at or below the reporting limit for samples and there are at least three points remaining.

   - Mid-point standards may not be omitted simply to improve the correlation coefficient. They may, however, be reanalyzed if poor aspiration is suspected. The reanalysis must occur immediately after the curve so long as no sample digests were analyzed since the last calibration standard and all elements are calibrated using the second run. Under no circumstances may a point in the middle of the curve be rejected in order to pass calibration criteria for a particular element.

6) Verify the calibration curve by running an ICV standard (obtained from a different manufacturer from the calibration standard) for all elements of interest. The ICV %D's must be ≤ 10% (within 90-110% percent of the true values) for the elements of interest before analysis can proceed. See Appendix_2 for the concentrations in this standard.

7) Analyze an Instrument Calibration Blank (ICB), consisting of deionized water acidified with 5% HCl and 5% HNO_3. The ICB result must be <RL for the elements of interest.

8) Analyze the ICS-A to demonstrate that high levels of interferents are not biasing low-level quantitation. The determined concentration of the non-interferent should be ≤RL in either direction (+/-), except for those elements that are considered by the manufacturer to be 'trace' contaminants of the high level elements and are listed on the Certificate of Analysis. If this standard fails acceptance criteria, check the interference corrections (MSF); update the MSF if necessary and reprocess the sequence to that point.

9) Analyze the ICS-AB to demonstrate that quantitation in the presence of high-level interferents is acceptably accurate. The results for the non-interferent elements in the ICSAB must be within ± 20% of the true values. If this standard does not meet the acceptance criteria, the analysis must be terminated, the method corrected for the interference, and the analysis restarted from calibration.

10) Now after all this QC, actual samples may be run. Collect the digestates, job sheets, LIMS prep sheet, and copy of the benchbook page from the prep chemists. Sign the “Received by” line on the LIMS prep sheet to maintain internal chain-of-custody of the digestates.

11) Decant the digestates into labeled autosampler tubes.

Note: Analyze leachates at a 10x dilution so the high salt content of the leaching fluid will not ‘salt out’ in the aspirator and clog the injection system.

12) After ten samples are analyzed, and at the end of the analytical run, the calibration curve must be re-verified by running a Continuing Calibration Verification (CCV) and a Continuing Calibration Blank (CCB). Note that the ICS-A and ICS-AB are considered analytical samples in the first group of ten samples.

See Appendix_7 for instructions on setting up an autosampler sequence. A typical analytical sequence is shown below:

Calibration Blank
Calibration Standard, low level
Calibration Standard, mid-level
Calibration Standard, high level
Instrument Blank
Initial Calibration Verification (ICV)
Initial Calibration Blank (ICB)
Interference Check Standard A (ICSA)
Interference Check Standard A+B (ICSAB)
Method Blank
Blank Spike
Blank Spike Duplicate
Sample Duplicate
Sample Spike
.. 3 more samples ..
Continuing Calibration Verification Standard (CCV)
Continuing Calibration Blank (CCB)
.. 10 samples ..
Continuing Calibration Verification Standard (CCV)
Continuing Calibration Blank (CCB)
.. 10 samples ..
Interference Check Standard A+B (ICSAB)
Continuing Calibration Verification Standard (CCV)
Continuing Calibration Blank (CCB)

The sequence must end with a CCV and CCB, regardless of the number of samples that have been analyzed.

Note: Although EPA 6010B does not require analysis of an ICS-AB at the end of the sequence, most Department of Defense (Army, Navy, etc) project plans include this

requirement, so it is always a good idea to close the sequence with this standard. If an element does not fall within 80% - 120% all samples analyzed for that element must be reanalyzed.

13) Paste a signed copy of the sequence in the instrument sequence log and initial and date across the border between the benchbook and sequence log.

QUANTITATIVE ANALYSIS

The Perkin-Elmer ICP automatically adds internal standard (Yttrium), which helps compensate for viscosity and transport interferences. The sample is then transported through the nebulizer and vaporized in the plasma. The spectrometer measures the changing intensity of the selected wavelength either radially (across the radius of the plasma) or axially (along the radius of the plasma). For all samples and standards, the instrument collects information for three exposures and reports the average intensity of these exposures, along with the %RSD between the exposures.

Quantitation is based on comparison of the intensity of the target element and internal standard to the initial calibration curve for that element, with adjustments for the sample preparation concentration factor and instrument dilution factor. See Appendix_1 for example calculations. Concentrations are expressed as micrograms per liter (µg/L) or milligrams per kilogram (mg/kg).

All results are reported on a wet-weight ("as received") basis unless otherwise requested by the client. If the client requests 'dry-weight' corrections, the 'wet-weight' results in the results database are corrected for moisture by LIMS when producing the final report forms.

1.) Evaluate the Internal Standard Recoveries

The Yttrium internal standard recovery should be between 30-200% for all standards and samples, or that data should be considered suspect and those standards or digestates rerun. If the affected run is a CCV or CCB, all samples bracketed by that run should also be rerun.

Note: The 30-200% limits specified above are C&T's in-house limits, as EPA 6010B does not specify internal standard recovery limits.

2.) Evaluate the CCV's

Target elements must not be detected in the calibration blank at any level greater than the reporting limit. The concentration of the CCV must be varied within the calibration range, over the course of the sequence, with %D $\leq$ 10% (recoveries between 90-110%). If the %D for any element is outside this acceptance window, LIMS will use the following to determine if the associated results are reportable:

- If the failing element is not a target analyte for the associated samples, sample results should be reported without reanalysis.

- If the compound fails the %D criterion due to a high response but was not detected above the reporting limit in the associated samples, the sample results may be reported without reanalysis, as the high bias does not affect the sample results.

- If the compound fails the %D criterion due to a high response and *was* detected above the reporting limit in any of the associated samples, the samples must be reanalyzed.

- If the compound fails the %D criterion due to a low response, the sample must be reanalyzed as the low bias may result in false negatives or misquantitation.

Reported sample and batch QC results must be bracketed by acceptable calibration verification standards and blanks.

3.) Evaluate the Batch QC Results

- **Prep Blank:** The results for the preparation blank should be <1/2RL and must be <RL for all target elements. If reanalysis confirms the contamination, use the following steps to determine if the sample results may be reported:

  a. If the concentration of the contaminant is below the reporting limit but above 1/2 of the reporting limit, document the contamination on the batch sequence summary and the data review checklist and report the data without reanalysis.

  b. If the target element(s) found in the blank was not detected in the associated samples, the data may be reported and the problem narrated.

  c. If the target element(s) found the method blank was also detected in the associated samples, but the level in the samples is greater than 10x the level in the blank, document the contamination on the batch sequence summary and the data review checklist and report the data without reanalysis.

  d. If the target element(s) detected in the blank were also detected in the associated samples, but at levels less than 10x the level in the blank, and reanalysis confirms the problem, the samples containing the contaminant must be re-batched and reanalyzed. Initiate a Corrective Action Report (CAR) immediately so that re-digestion can begin within the clients requested turn-around time, if necessary.

- **Blank Spike (BS) and Blank Spike Duplicate (BSD):** The recoveries and RPD should fall within C&T in-house limits, or the samples associated with it may need to be redigested and reanalyzed. Use the following steps to determine if the sample results may be reported:

  a. If the samples are being analyzed for only a subset of the target element list (ie: lead only, LUFT 5, etc.) and those elements all pass acceptance criteria, the data may be reported without further corrective action.

b. If a high recovery is observed but that element was not detected in the associated samples, note the failure on the Data Review Checklist and report the data without re-digestion, as the potential high bias does not affect the sample results.

c. If a high recovery is observed and the samples contain that element at levels above the reporting limits, the samples containing that element must be re-digested.

d. If a high RPD is observed but the recoveries are within acceptance limits and the samples do not contain that element, note the failure on the Data Review Checklist and report the data without re-digestion, as the lack of good precision data does not affect ND samples.

e. If a high RPD is observed and the samples contain that element at levels above the reporting limits, those samples containing that element must be re-extracted.

- **Matrix QC (SSPIKE/SDUP or MS/MSD):** The recoveries and RPD should fall within C&T in-house limits, or the samples associated with it may need to be redigested and reanalyzed. Use the following steps to determine any necessary corrective action:

a. If the concentration of a target element in the sample is greater than the linear range and the sample needs to be rerun for just that compound, report the MS/MSD with a LIMS-flag of ">LR" on those recoveries, without reanalysis.

b. If the concentration of a target element in the sample is within linear range but the concentration in the matrix spikes is greater than the linear range, LIMS will apply a ">LR" flag to those recoveries. Report the data without reanalysis.

c. If the concentration of a target element is greater than 4x the spiking level, LIMS will apply a "NM" (for "Not Meaningful") flag to those recoveries. Report the data without reanalysis.

Note: If the concentration of a target compound is greater than the spiking level, LIMS will flag and footnote that concentration for the client's attention.

d. If recoveries fail but the RPD is within acceptance limits, matrix interference is usually suspected. Narrate the failure and report the data without reanalysis (except for USACE, or other Level 3 or Level 4 projects that always require reanalysis).

e. If the recoveries are within limits but the RPD fails, and an isolated problem cannot be identified and documented, reanalyze the sample and matrix spikes.

4.) Evaluate the Sample Results

Review any batch QC sample data first to verify that samples from that batch can be reported, then review the sample results to identify any samples that need to be rerun and/ or diluted.

Examine the sample results to verify that all results are within the linear range. If the concentration of any requested target element is greater than the highest calibration standard for that element, use volumetric pipettes to prepare a dilution of the digestate so that the highest target element is in the upper half of the calibration range. If a sample is analyzed at multiple dilutions, compare the sample results across the various dilutions to verify that the dilutions were prepared correctly. Do the results make sense or is there a discrepancy between the runs? If there seems to be a discrepancy, reanalyze the sample to confirm the results.

Examine the sample results to verify that the RSD between exposures is less than 20%. Any sample result with a duplicate exposure RSD greater than 20% must be reanalyzed. If the RSD is still greater than 20%, report the exposure with the lower %RSD. Any sample with requested element concentrations above the linear range must be diluted and reanalyzed.

Note: The USACE requires that the RSD be ≤10% for concentrations for samples with concentrations equal to or greater than ten times MDL and ≤ 20% for samples with concentrations less than ten times MDL's.

5.) Assemble the Data Package

After all samples and necessary dilutions have been analyzed, print the final report forms on "page 2" letter head paper. Review these forms to make sure that the correct results were reported and that there are no elements marked "N/A" (results "not available"). Verify that the prep sheets are complete and signed, that all necessary sample information is present (see section below for details), then complete and sign the "Data Review Checklist". Submit the data package to the Department Manager or QC Chemist for second-party review. Any changes made by the second-party reviewer must be individually initialed and dated by the reviewer. The second party reviewer must initial and date each user report, make any additional comments on the case narrative, and initial and date the completed checklist.

DOCUMENTATION & PEER REVIEW

The raw ICP data must be labeled with the analysts name, the date analyzed, the instrument units, and the batch ID. The ICP raw data, a copy of the sequence log, LIMS calibration summaries, and copies of the prep logs should be clipped together and filed in the department's data files.

a.) **Sample Prep Documentation**

A copy of the digestion benchbook page for the sample digestion must be included with the reported data. The digestion benchbook entries should include:

- C&T sample ID's and unique container identifier,
- date of sample digestion, initial volume or weight of sample, and final digestate volume,
- identity of QC samples (spikes, duplicates & LCS),
- amount of spikes added and LIMS identification numbers of all spiking solutions,
- a list of all reagents used (C&T ID or manufacturer and lot number),
- indication of whether or not the digests were filtered after digestion,
- any unusual occurrences observed during the digestion procedure

b.) **"Level 2" Data Package**
A complete data package for a "Level 2" report includes the following:

- "Inorganics Data Review" checklist,
- C&T Job sheet,
- Final reports for samples and batch QC
- Sample LIMS user reports,
- Batch QC LIMS user reports,
- Sequence logs,
- LIMS prep log,
- Digestion log,
- Any associated Corrective Action Report.

c.) **"Level 3" Data Package**
A complete data package for a "Level 3" report includes all of the items contained in a "Level 2" report plus the following:

- Metals "reporting grid" - showing which element was reported from which run,
- Serial Dilution LIMS user report,
- Post-Digestion Spike LIMS user report (if necessary),
- Reporting Grid
- ICAL summary,
- ICV/ICB and CCV/CCB summaries

d.) **"Level 4" Data Package**
A complete data package for a "Level 4" report includes all of the items contained in a "Level 3" report plus the instrument raw data printouts for all standards, batch QC, and samples.

POLLUTION PREVENTION
Prepare only sufficient standard and reagent volume to use within the shelf-life of the standard to reduce the volume of waste generated by the laboratory.

WASTE DISPOSAL
All digests are kept for at least 6 months prior to disposal; after 6 months, the digests are included in the 'Corrosives' waste stream. Instrument waste is collected in a polyethylene carboy and discarded into the 'Corrosives' waste stream.

APPENDIX_1: CALCULATIONS

Sample Concentration via Linear Regression with Internal Standard
Concentration (ug/L or ug/Kg) = (a0 + a1 * (Ax * Cis / Ais)) * PDF * IDF

Where: a0 = Y-intercept of regression equation
a1 = slope of regression equation
Ax = Area response for the analyte in the sample
Cis = Amount (mass) of Internal standard added in ng
Ais = Area response for the internal standard
IDF = Instrument Dilution Factor
PDF = Prep Dilution Factor (Vf/Vi or Vf/Wi),
Where Vf = digestate final volume,
Vi = initial volume of liquid sample
Wi = initial weight of solid sample

Moisture Corrected Results
Dry Weight Concentration (ug/Kg) = "As Received" Conc. / ((100 - %moisture)/100)

BATCH QC CALCULATIONS

Percent Recovery (%R):
The recovery is the measured concentration divided by the true concentration of the spike.

$$\%Recovery = (Cf - Cs) / (Cws * Vws / S) * 100$$

Where: Cf = final measured concentration in the spiked sample
Cs = measured concentration in the un-spiked aliquot of sample
Cws = concentration of the spiking standard
Vws = volume used, of the spiking standard
S = Sample weight or volume

Relative Percent Difference (RPD):
The RPD is the absolute value of the difference in concentrations divided by the average of the concentrations.

$$\%RPD = |(Cs - Cdup)| / ((Cs + Cdup)/2) * 100$$

Where: Cs = measured sample concentration
Cdup = measured concentration in the duplicate

For soil MS/MSD's where the sample weights are not weight-targetted, the expected concentrations will vary with sample weight (because the same volume of spike standard is being added to different weights of sample) and must be accounted for when calculating RPD:

$$\%RPD = |((Wms/Wmsd)*Cms - Cmsd)| / (((Wms/Wmsd) * Cms + Cmsd)/2) * 100$$

CALIBRATION EQUATIONS

Response Factors using Internal Standards:

Response Factor (RF) = (Ax * Cis) / (Ais * Cx)

Where: Ax = Area of the characteristic ion for the compound being measured
Ais = Area of the characteristic ion for the specific internal standard
Cis = Concentration of the specific internal standard
Cx = Concentration of the compound being measured

Correlation Coefficient (or "Coefficient of Determination" for non-linear curves):

For each element, the correlation coefficient for the initial calibration curve is calculated by:

$$\text{Correlation coefficient} = \frac{\sum_{i=1}^{n} (Yobs - Ymean)^2 - ((n-1)/(n-p)) * \sum_{i=1}^{n} (Yobs - Yi)^2}{\sum_{i=1}^{n} (Yobs - Ymean)^2}$$

Where: Yobs = observed response (area or absorbance) for each ICAL std conc.
Ymean = mean observed response from the ICAL standards
Yi = calculated (or predicted) response for each ICAL std conc.
n = total number of ICAL points
p = number of adjustable parameters in equation (linear= 1, quadratic= 2)

Percent Difference (%D)

Used for calibration curves or calibration factor verification. If the response of any analyte varies from the predicted response by more than 10%, the instrument's calibration status is questionable and corrective action must be taken. Calibration specifications are based on %D acceptance criteria calculated as follows:

$$\%D = ((Rf_1 - Rf_2) / Rf_1) * 100$$

Where: Rf_1 = Calibration Factor from first analysis or average from the ICAL
Rf_2 = Calibration Factor from succeeding analysis

APPENDIX_2: REAGENTS & STANDARDS
For the Perkin-Elmer ICP (MET-08)

REAGENTS

The preparation of all liquid or solid reagents, including dilutions into DI water, must be documented in the reagent prep benchbook. Each reagent is assigned a unique ID, based on the manufacturer and the date prepared. This ID is then recorded in the digestion benchbook each time the reagent is used.

Label each reagent with the reagent ID, concentration, prep date, and expiration date. All reagents should be prepared and stored in freshly cleaned glassware. Expired, discolored, or contaminated reagents should be discarded and the bottle cleaned before reuse.

Argon, Purity: 99.99%
Air, C&T house compressed air

Deionized water, ASTM Type II (ASTM D1193)

Aqua Regia: *prepare daily*
Prepare immediately before use in a glass bottle by adding 3 volumes of concentrated HCl to one volume HNO_3, typically preparing about 125mL aqua regia per batch (32mL HCl + 96mL HNO_3 => 128mL total). Aqua Regia must be prepared daily.

Nitric Acid (HNO_3), concentrated, InstraAnalyzed grade
JT Baker catalog # 7697-37-2
Store unopened bottles in the corrosives cabinet and open bottles under the fume hood for up to ten years.

Hydrochloric Acid (HCl), concentrated, InstraAnalyzed grade
JT Baker catalog # 7647-01-0
Store unopened bottles in the corrosives cabinet and open bottles under the fume hood for up to ten years.

STANDARDS

All source standards must be documented in LIMS upon receipt, through the Standards Menu". The LIMS S-name is unique to the vendor that the source is obtained from; if a source standard is obtained from a different vendor, a new S-name must be assigned and the information entered in the "Standard Entry" table before the standard can be assigned a unique S# (standard number).

The LIMS Standard Maintenance database includes the catalog#, lot#, expiration date, and concentration of the standards as they are received from the vendor. Write the S# and the date received on both the standard vial and on the 'Certificate of Analysis' that accompanied the standard. If the supplier did not provide a certificate, call and request that a copy be faxed. The Certificate of Analysis must be kept on file in the appropriate binder.

Prepare working standards by diluting source standards to volume in a Class-A volumetric flask. Document the preparation in the standards benchbook. Enter the prep information into LIMS through the "Standard Maintenance" menu; LIMS will then assign a unique S# to that standard. Write the LIMS S# and expiration date in the benchbook along with the prep information. Label the standard vial with the contents, the LIMS S#, the expiration date of the standard, and the prep chemist's initials.

Store standards at room temperature, away from light (to prevent photo-induced precipitation of silver). If the Certificate of Analysis or bottle label did not include an expiration date, assign an expiration date of one year from the date received.

Note: Prepare calibration Blanks (ICB/CCB) by adding 5.0 mL concentrated HNO_3 and 5.0 mL concentrated HCl to DI water and diluting to 100 mL.

~1 mg/L Manganese standard, used to verify lamp alignment
Dilute approximately 10µL of 10,000 mg/L Manganese standard (CPI# S4400-10M321) to 100mL in acidified (5% HCl, 5% HNO_3) deionized water. Store at room temperature for up to 1 year.

30ppm Yttrium, Internal Standard Solution
Dilute 3.0 mL of 10,000 mg/L Yttrium (Inorganic Ventures # CGY10-5) into 1L of acidified (5% HNO3, 5% HCl) deionized water. Store at room temperature for up to one year. *Note:* Because the instrument is calibrated daily, the Yttrium source standard may be used past the manufacturer's expiration date, so long as the entire sequence is analyzed using the same, freshly prepared, internal standard solution.

Calibration Standards for the 4300DV ICP (MET-08)

	Element	CRI08 (mg/L)	CS100 (mg/L)	CS1K (mg/L)	CS10K (mg/L)	CS100K (mg/L)	Axial or Radial
Sb	Antimony	0.005	0.100	1.00	10.0	- -	A
As	Arsenic	0.005	0.100	1.00	10.0	- -	A
Ba	Barium	0.010	0.100	1.00	10.0	- -	A
Be	Beryllium	0.002	0.100	1.00	- -	- -	A
Cd	Cadmium	0.005	0.100	1.00	10.0	- -	A
Cr	Chromium	0.005	0.100	1.00	10.0	- -	A
Co	Cobalt	0.005	0.100	1.00	10.0	- -	A
Cu	Copper	0.005	0.100	1.00	10.0	- -	A
Pb	Lead	0.003	0.100	1.00	10.0	- -	A
Mo	Molybdenum	0.005	0.100	1.00	10.0	- -	A
Ni	Nickel	0.005	0.100	1.00	10.0	- -	A
Se	Selenium	0.005	0.100	1.00	10.0	- -	A
Ag	Silver	0.005	0.100	1.00	2.0	- -	A
Tl	Thallium	0.005	0.100	1.00	10.0	- -	A
V	Vanadium	0.005	0.100	1.00	10.0	- -	A
Zn	Zinc	0.005	0.100	1.00	10.0	- -	A
Al	Aluminum	0.100	- -	1.00	10.0	100.	R
Ca	Calcium	0.200	- -	1.00	10.0	100.	R
Fe	Iron	0.100	- -	1.00	10.0	100.	R
Mg	Magnesium	0.200	- -	1.00	10.0	100.	R
Mn	Manganese	0.005	0.100	1.00	10.0	- -	R
K	Potassium	0.500	- -	1.00	10.0	100.	R
Na	Sodium	0.500	- -	1.00	10.0	100.	R
B	Boron	0.100	- -	1.00	10.0	- -	A
Sn	Tin	0.040	0.100	1.00	10.0	- -	A
Ti	Titanium	0.010	0.100	1.00	10.0	- -	A

Calibration Verification and Interference Check Standards Solutions for MET-08

Element	ICV VERT (mg/L)	CCV VERT (mg/L)	ICSA08 (mg/L)	ICSAB-T (mg/L)
Ag	5.0	5.0	- -	1.0
As	5.0	5.0	- -	0.5
Al	20.	20.	500	500
B	5.0	5.0	- -	- -
Ba	5.0	5.0	- -	0.5
Be	5.0	5.0	- -	0.5
Ca	20.	20.	500	500
Cd	5.0	5.0	- -	1.0
Co	5.0	5.0	- -	0.5
Cr	5.0	5.0	20	0.5
Cu	5.0	5.0	20	0.5
Fe	20.	20.	200	200
K	20.	20.	- -	- -
Mg	20.	20.	500	500
Mn	5.0	5.0	20	0.5
Mo	5.0	5.0	- -	0.5
Na	20.	20.	- -	- -
Ni	5.0	5.0	20	1.0
Pb	5.0	5.0	- -	1.0
Sb	5.0	5.0	- -	0.5
Se	5.0	5.0	- -	0.5
Sn	5.0	5.0	- -	- -
Ti	5.0	5.0	20	20
Tl	5.0	5.0	- -	0.5
V	5.0	5.0	20	0.5
Zn	5.0	5.0	- -	1.0

APPENDIX_3: TARGET ELEMENTS & STANDARD REPORTING LIMITS

	Element	Water Reporting Limit (ug/L)	Soil Reporting Limit (mg/Kg)
Sb	Antimony	60.	3.0
As	Arsenic	5.0	0.25
Ba	Barium	10.	0.50
Be	Beryllium	2.0	0.10
Cd	Cadmium	5.0	0.25
Cr	Chromium	10.	0.50
Co	Cobalt	20.	1.0
Cu	Copper	10.	0.50
Pb	Lead	3.0	0.15
Mo	Molybdenum	20.	1.0
Ni	Nickel	20.	1.0
Se	Selenium	5.0	0.25
Ag	Silver	5.0	0.25
Tl	Thallium	5.0	0.25
V	Vanadium	10.	0.50
Zn	Zinc	20.	1.0
Al	Aluminum	100	10.
Ca	Calcium	500	25
Fe	Iron	100	5.0
Mg	Magnesium	500	25
Mn	Manganese	10.	0.50
K	Potassium	500	25
Na	Sodium	500	25
B	Boron	20.	1.0
P	Phosphorous	100	5.0
Si	Silicon	200	10.
Sn	Tin	40.	2.0
Ti	Titanium	10.	0.50

APPENDIX_4: SPIKING LEVELS (BS, BSD, MS, MSD & SSPIKE)

Blank spike/ blank spike duplicates and sample spikes (or matrix spike/ matrix spike duplicates) should be spiked at the following levels:

	Element	Water Spiking Level (ug/L)	Soil Spiking Level (mg/Kg)
Sb	Antimony	500	100
As	Arsenic	100	50
Ba	Barium	2,000	100
Be	Beryllium	50	2.5
Cd	Cadmium	50	10.
Cr	Chromium	2,000	100
Co	Cobalt	500	25
Cu	Copper	250	12.5
Pb	Lead	100	100
Mo	Molybdenum	400	20
Ni	Nickel	500	25
Se	Selenium	100	50
Ag	Silver	50	10
Tl	Thallium	100	50
V	Vanadium	500	25
Zn	Zinc	500	25
Al	Aluminum	2,000	1,000
Ca	Calcium	20,000	1,000
Fe	Iron	1,000	1,000
Mg	Magnesium	20,000	1,000
Mn	Manganese	500	25
K	Potassium	10,000	500
Na	Sodium	20,000	1,000

APPENDIX_5: INSTRUMENT OPERATING CONDITIONS

AXIAL / RADIAL ICP (Perkin Elmer Model 4300 DV) _____ MET-08

Argon	Purity	99.99%
	Max Pressure	60 psi
	Min Pressure	25 psi *
Flow Rates	Plasma	17 L/min
	Auxiliary	0.4 L/min
	Nebulizer	0.55 L/min
Peristaltic Pump	Rate	1.75 mL/min
Nebulizer	Concentric Glass	Meinhard, Type A
Injector	Alumina	2.0mm
Torch	Type	Quartz
Rf Power		1450 Watts
Water Cooler	Temperature	20°C
	Pressure	30 – 60 psi
	Flow Rate	400 mL/min

**Note:* Call South Bay Welding to order an Argon delivery when the outside tank pressure is around 25-30 inches.

APPENDIX_6: EQUIPMENT & MAINTENANCE
For MET-08

Any maintenance performed on the instrument must be documented in the instrument maintenance logbook. Whenever preventative or trouble-shooting maintenance is performed, document 1.) the reason the maintenance was necessary, 2.) the action taken, and 3.) the resolution of the maintenance ("passed CRI", "RSD's OK", etc.).

Perkin-Elmer's online catalog (Optima 4X00 DV heading) can be accessed at their website: http://las.perkinelmer.com/catalog/Category.aspx?CategoryName=ICP+Optical+Emission+Spectrometry+Consumables+for+Instruments or by phone at (800)-762-4000.

Tubing & Pump Windings should be replaced frequently, whenever air bubbles are present in the tubing or, for the internal standard tubing, the internal standard readings become unstable. The type of tubing can be identified by the color-coded tags at each end of the piece. Order replacement tubing from Perkin-Elmer or CPI and keep at least one spare set on-hand.

Internal Standard	Orange-Red, 0.19mm ID	P/E # N0695476
Sample Tubing	Black-Black, 2 stop	CPI # 4062-430
Drain Tubing	Red-Red, 2 stop	CPI # 4062-445

The **torch** and **injector** should be changed and cleaned whenever the torch alignment intensity drops by 20%. Immerse the parts in aqua regia over night, at minimum. Replacements can be ordered from Perkin-Elmer or CPI.

Torch:	P/E # N0770338
Copper Foil:	P/E # N0775297
Injector (2.0 mm):	P/E # N0582184

If the **nebulizer** becomes plugged, see the Operator Manual for detailed instructions.

Nebulizer (Type A):	P/E # 00472020

The **vacuum pump oil** should be changed if the pressure gauge reads 10 microns Hg or above. It typically takes 1-2 days after the oil change to pump the vacuum back down and remove all traces of oil from the system. See the Operator's Manual for the procedure.

Lubricate the autosampler tracks approximately every six months by wiping the tracks with a Kim-Wipe saturated with 1-in-3 or clear oil.

APPENDIX_7: USING THE WINLAB-32 SOFTWARE
For the Axial/Radial ICP (MET-08)

Start MET-08 from Overnight Standby Mode:

1.) Fill the autosampler rinsate bottle with acidified (2% HNO3, 2% HCl) DI water.
2.) Replace the pump tubing in the channel around the top of the pump then close the platen (clamp), making sure the tubing is not twisted and is centered in the clamp.
3.) Place the end of the sample uptake ("sipper") tube into a fresh aliquot of DI water.
4.) Place the end of the internal standard uptake tube into a fresh aliquot of internal standard solution.
5.) Turn on the peristaltic pump so that it rotates counterclockwise.
6.) On the computer monitor, maximize the WinLab32 window.
7.) From the main menu, select the 'File' pull-down menu, then Open, Open_Method, and click on the most recent instrument method (ex: 6010IS).
8.) Click the PLASMA icon to open the Plasma Control screen.
9.) Click ON to turn on the Plasma and automatically adjust the instrument settings to the parameters that are specified in the selected method.
10.) Allow the instrument approximately 1 hour to equilibrate.

"Profile" the Spectrometer

After the instrument has equilibrated, follow these steps to optimize the optics settings before calibration or analysis:

1.) From the main menu, select the 'Tools' pull-down menu, then Spectrometer_Control.
2.) Click 'Hg Realign' to check the axial alignment of the mercury lamp, across the diameter of the lamp.
3.) Place the sipper tube in the 1 mg/L Manganese solution.
4.) On the Spectrometer_Control window, click 'Align View'.
5.) Open the Spectra_Display to verify that the Manganese signal is getting to the detector.
6.) Verify that the 'Select Analyte' box reads [Mn 257.610]. *Note:* Manganese is used because it is a mid-range wavelength.
7.) Click ON. Instrument will then scan the response across the lamp.
8.) Check the 'Results' page to verify that lamp is properly aligned and the x-position for the maximum response is at or near 0.00.
9.) On the Spectrometer_Control window, change the Manual Settings from Axial to Radial.
10.) Click 'Align View'.
11.) Click 'ON'.
12.) From the main menu, select File, Print, Active_Window.
13.) Close 'Results'.
14.) Close 'Spectrometer Control'.
15.) Write the positions & intensities in the instrument maintenance log.
16.) Move the sipper tube to the rinse DI and allow the system to rinse for about 1 minute while you start writing the sequence.

Set Up a Sequence

1.) In the online session, open METHOD_EDITOR.
    a.) Open the method you want to use.
    b.) Verify that the LIMS WS# is correct for each standard.
    c.) Close the Method Editor.
2.) Click the SamInfo icon and enter the sample information under the 'Parameters that Vary by Sample' heading.
    a.) For samples (or batch QC), the first A/S Location will be 11, because spots 1 through 10 are always used for the standards.
    b.) The standards are not entered into the sequence because the identities and frequencies are specified in the software method.
    c.) In the 'Sample ID' column, enter sample information in the format:
        Sample #, batch#, IDF
        MB, QC#, batch#, IDF
        LCS, QC#, batch#, IDF
        MS, QC#, batch#, IDF
        Etc…
            Where:
            Samplenum is the LIMS sample number (ie: 160961-005)
            QC# is the LIMS ID of the batch QC sample (ie: QC16935)
            Batch# is the LIMS batch number (ie: 95687)
            IDF is the instrument dilution factor for the sample, written as "5" or similar
    d.) To insert instrument blanks (rinses), set the A/S Location to '0' (zero) and the sample ID to 'rinse' or IB.
    e.) When your sequence is complete, pull-down the File menu, and select Save_As, Sample Info File, and name the file with the day's date (ex: 092404.sif). *Important!* Make sure to save the Sample Info File as an SIF, *not* as the method!
    f.) From the File pull-down menu, select Print, Active_Window to print the sequence.
    g.) Close the Sample Info File window.
3.) Load the autosampler.
4.) Verify the sample locations in the autosampler tray against the sequence.
5.) Start the sequence.
    a.) From the main menu, click the AUTO icon (to use the autosampler locations).
    b.) In the SetUp sheet, call up the most recent Sample Info File.
    c.) "Results Data Set Name".
    d.) Type in the date as MMDDYY (ex: 092404).
    e.) Make sure the following are checked for use:
        Use Sample Info Save Data
        Print Log during analysis <don't check "Auto export">
        Auto Wavelength Realign (every 60 seconds)
    f.) Verify that the correct method and sample info file have been called up.
    g.) Choose which type of run you need to start:
        CALIBRATE - will only run the beginning calibration standards
        ANALYZE ALL - will run the whole sequence
        ANALYZE SAMPLES - will run only the samples after the initial calibration standards

h.) Click OK.

6.) Leave the window open so you can verify the status of the sequence as it is running. This window can be minimized if you are working in another window, but don't close it or the instrument will immediately stop running the sequence!

Send Data to LIMS

1.) Click the DATA MANAGER icon on the desktop.
2.) Enter the current sequence name into the 'Result Name' field.
3.) Click the EXPORT button at the top of the screen.
4.) Select 'Create', then 'Browse'.
5.) Find the LIMS.xpt file and 'Open' the file.
6.) Click the FINISH button at the bottom of the screen.
7.) Then EXPORT and FINISH sending the data to LIMS.

Edit a Sequence

If you need to add samples to the sequence, you must stop the instrument run and edit the sequence through the SamInfo screen, *then* go to the 'Analyze' sheet and 'Rebuild List'. Print the active window to print the modified sequence.

Use the Priority button on the 'Analyze' sheet to do immediate reanalysis of the sample. The software will automatically reposition the CCV & CCB, as the methods specify the frequency of their analysis.

Reprocess Data

Use the offline session to reprocess old data files, when needed.

1.) Maximize the 'WinLab32 Offline' window.
2.) Verify that the method named in the upper right corner, next to the "Method' label, is the method that you want to use. If not, open the correct method.
3.) Click REPROC.
4.) Select the Data Set to be reprocessed and save it with an '-R' suffix.

APPENDIX_8: INTERFERENCES

Matrix interferences may cause inaccuracies in the determined element concentrations. These interferences generally fall into three categories: spectral interferences, chemical interferences, and physical interferences.

Spectral interferences may include:

1.) The overlap of the spectral line of one element with another, which can be minimized through use of interelement correction (IEC) factors. The IEC factors are determined annually. High levels of aluminum, calcium, iron, and magnesium are often responsible for this type of interference. The daily ICSAB standard is used verify the correction factors for contributions from high levels of these elements.

2.) Unresolved overlap of molecular spectra, which may require selection of an alternate wavelength for measurement or dilution and reanalysis of the sample.

3.) Background contributions from continuous or recombination phenomena, or from the emissions of elements present at high concentrations. Background correction can compensate for these effects by measuring the emissions adjacent to the analyte line.

Chemical interferences are characterized by molecular compound formation, ionization effects, and vaporization effects. These types of interferences are highly matrix dependent and are not often seen in the ICP analysis, since the plasma will dissociate most compounds.

Physical interferences are typically those occurring during the digestion, nebulization, and transport. Common physical interferences include:

1.) Loss of volatile elements (antimony) during the digestion process if the digestate is superheated or allowed to go dry during heating.

2.) Precipitation of certain elements (silver) during the digestion process if present in relatively high levels.

3.) Zinc contamination due to dusty surroundings.

4.) Differences in sample viscosity and surface tension due to high levels of dissolved solids. Serial dilutions may be used to identify this type of interference, which may clog the nebulizer and tubing.

MOISTURE (% Solids)

In SOILS & SEDIMENT

US-EPA CLP Method ILM04.0

Approved:

Inorganics Group Leader/ Date	QA Director/ Date

Read & Understood:

Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date

Re-Approved:

Inorganics Group Leader/ Date	QA Director/ Date

MOISTURE (% Solids) IN SOILS & SEDIMENT

CLP Method ILM04.0

SCOPE

Percent solids is defined as the residue left after drying a 5-10 gram aliquot of the sample at 103-105 °C. Samples are weighed to the nearest 0.0001 g so that variations in moisture can be detected to 0.1% level or better and sample results for other analyses can be "dry-weight" corrected.

The results from this analysis are used to "correct" the results from other analyses so that those results can be reported on a "dry-weight" basis, therefore it is very important to take a representative aliquot from the sample.

REFERENCE

US-EPA CLP Inorganics Statement of work ILM04.0, Exhibit D, Section 4, Part F

PRESERVATION & HOLDING TIME

Preservation: Store at 4 °C.
Holding Time: None stated in the regulations.

SAFETY

Assume that all samples contain potentially hazardous and/ or toxic material and should be handled with care. Safety glasses, gloves, and a lab coat should be worn whenever handling samples, reagents, or standards.

QC REQUIREMENTS

One duplicate and one blank per batch of twenty samples or less must be prepared and analyzed. The RPD for the SDUP %Solids must be $\leq$ 15% or the entire batch must be reprepared and reanalyzed.

INTERFERENCES

If the sample is an oily matrix, a constant weight may not be acheivable; document the problem in the benchbook and initiate a Corrective Action Record.

PROCEDURE

1.) Verify that oven temperature is within acceptance criteria (103 - 105 °C) and document the temperature in the Moisture benchbook.

2.) Each of the aluminum weighing dish has a number on the lip written with a sharpie marker. Verify that there sufficient clean, dry dishes with readable numbers and that there are no duplicate numbers in the set you are going to use. If you need to renumber a dish do it now. Place the dishes in the oven with lids on the bottom for at least 1 hour before going to the next step.

3.) Check the samples out of the cold room and allow them to come to room temperature. Arrange samples in numerical order to speed the weighing and recording process. Record the sample numbers and container letters in the Moisture benchbook.

4.) Calibrate the balance and record the event in the balance calibration benchbook.

5.) Carefully remove the dishes from the oven using gloves, so that no oil transfers from your skin, and place in a desiccator and allow the dishes to cool for about 5 minutes. Transport the desicator and the pans to the balance area where the samples are lined up.

6.) Carefully remove an aluminum dish from the desiccator and place it on the balance pan. Weigh the dish and the lid and record the ***tare*** weight (weight of the pan) with the corresponding pan number in your sample data benchbook.

7.) Write the sample number and container letter in the moisture benchbook, then open the sample container and use a spatula to place between 5 and 10 grams of samples into the pan. Record the exact ***initial*** weight (to at least 0.01g) of the pan plus the sample in the benchbook.

8.) Take the pan with sample off the balance and place on a ***clean*** countertop. Continue to weigh out all samples in this manner, repeating steps 6 and 7.

9.) Select a sample for duplicate analysis and prepare a second aliquot of this sample, recording its sample number clearly in the Moisture benchbook.

10.) After all samples have been weighed out, place samples in pans into the oven. Record the date and time in the Moisture benchbook.

11.) Leave samples in oven overnight, not less than 12 or more than 24 hours. Record the date and time samples were removed from the oven and the oven temperature at time of removal.

12.) When removing samples from the oven after drying, carefully place them in the desiccator and put the pan lids on. Use gloves throughout the procedure to avoid getting oils from your skin on the weighing pans and lids. Skin oils will increase the final weight and thus the moisture values. Let weighing pans and lids sit in the desiccator for about 1 minute to cool down before weighing to determine ***final*** weight of pan and dried sample.

13.) Enter data (tare weight, initial weight, final weight) into LIMS; LIMS will then calculate the %Solids, %Moisture and RPD of duplicate.

14.) Print the LIMS result sheet for the batch.

15.) Review that data against the benchbook entries to make sure there are no typographical errors & that the data makes sense (ie: if the soil was fairly dry, does the %moisture reflect that or does it imply that the sample was mostly water).

16.) Verify that the SDUP %Solids RPD is $\leq$ 15%. If the RPD is >15%, inform the Department Manager and start a Corrective Action Record; the entire batch will need to be re-prepared and reanalyzed.

Submit the LIMS result sheet and benchbook to a peer for review and signature, then turn the data in to the Department Manager.

QUICK ANALYSIS

If you can't wait overnight for moisture data use the following quickie technique:

1.) Perform steps 1-10 above, but remove samples after they have been in the oven for 4 hours.

2.) Place pan with sample in a dedicator until they're cool.

3.) Weigh, record the first ***final*** weight and place the sample & pan back in the oven.

4.) One hour after the recording the fist final weight, weigh the sample again.

5.) If the second ***final*** weight for the same sample agrees to within 0.01 grams of the first ***final*** weight, when weighed one hour apart, then the longer drying time is not required and the data may be used from either weighing event.

CALCULATIONS

LIMS calculates the %solids and %moisture, using the following equations:

$$\%\text{Solids} = \frac{\text{Dry weight of sample}}{\text{Wet weight of sample}} \times 100 = \frac{B - D}{A - D} \times 100$$

$$\%\text{Moisture} = \frac{\text{Wet weight of sample - Dry Weight of Sample}}{\text{Wet weight of sample}} \times 100 = \frac{A - B}{C} \times 100$$

A = initial (wet) weight of pan plus sample
B = final (dry) weight of pan plus sample
C = initial (wet) weight of sample = (A-D)
D = tare weight of pan

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SOP Volume: Metals
Section: 2.4
Page: 1 of 13
Revision: 9 Number: 1 of 2
Effective: 12 September 2007
Filename: F:\qc\sop\metals\3050b_icp_rv9.doc

ACID DIGESTION OF SOIL & SOLID SAMPLES

For Total Metals Analysis by ICP-AES and ICP-MS

EPA 3050B

Approved by:

Department Manager/ Date

QA Director/ Date

Read & Understood by:

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Signature/ Date

Re-Approved by:

Signature / Date

Signature / Date

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ACID DIGESTION OF SOIL & SOLID SAMPLES
For Total Metals Analysis by ICP-AES and ICP-MS
EPA 3050B

SCOPE

This procedure describes the acid digestion of solid samples for later analysis by ICP-AES and ICP-MS. This procedure is not applicable to the analysis of mercury (see EPA 7470 and 7471 for the mercury procedures). This procedure is *not* a total digestion technique but is a very strong acid digestion that will dissolve almost all elements that could become "environmentally available".

In this procedure, the sample is digested with nitric acid and hydrogen peroxide under heated conditions. This digestate is then refluxed with hydrochloric acid. This digestion procedure reduces interferences due to organic matter and converts metals that are adsorbed onto particulate matter into a form that can be determined by atomic absorption (flame AA) or inductively-coupled plasma spectroscopy (ICP). See the ICP and ICP-MS analysis SOPs for reporting limits.

Method Modification Note: Curtis & Tompkins uses the same procedure for both ICP and ICP-MS based on recommendation from the ICP-MS instrument manufacturer (Agilent). This procedure uses HCl to improve solubility of antimony, barium, lead, and silver. The ICP-MS instrument software includes correction factors for chloride and common chloride interferences.

REFERENCES

Sample Preparation:
EPA 3050B, *Acid Digestion of Sediments, Sludges, and Soils,* SW-846, Update 3, Dec.1996
CS SOP 2.3, Subsampling & Compositing
ASTM D 6323-98, Standard Guide for Laboratory Subsampling of Media Related to Waste Management Activities (Reapproved 2003)

Subsequent Analytical Method:
EPA 6010B, *Inductively Coupled Plasma-Atomic Emission*, SW-846 Update 3, Dec 1996
EPA 6020, *Inductively Coupled Plasma-Mass Spectrometry*, SW-846 Update 3, Dec 1996

Additional SOPs and Guidance Documents:
NELAC Chapter 5, Quality Systems, June 2003
DoD Quality Systems Manual, Version 3, June 2006
DoE Quality Systems Manual, Version 2.2, Oct.2006
C&T SOP QA 1.4, *Balance Calibration Check & Maintenance*
C&T SOP QA 1.6, *Pipet Calibration Check Procedures*
C&T SOP QA 4.1, *Establishing Control Limits*
C&T SOP QA 4.4, *Determining Method Detection Limits (MDL)*
C&T SOP QA 8.4, *State Program Requirements*
C&T SOP QA 8.5, *Federal Program Requirements*

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PRESERVATION & HOLDING TIME

Preservation: Store at 4°C
Holding Time: 6 months

SAFETY

This procedure involves the use of strong acids and reagents that *will* cause injury if allowed to contact skin or eyes. Assume that all samples contain hazardous and/ or toxic chemicals. Wear a lab coat, gloves, and safety glasses whenever handling samples, standards, or reagents.

EQUIPMENT

Disposable 50 mL digestion tubes, SPC Science Catalog# 010-500-261
(or 250 mL beaker with watch glasses sized to fit the beakers)
Auto-pipette, adjustable to 0.5mL
Thermometer, Range 0-220°C
Digestion Block - adjustable and capable of maintaining a temperature of 90-95°C
Glass Funnels
Whatman # 541 Filter paper
(# 541 is “ashless”, specifically for trace metals, & reduces sodium contamination)
50mL graduated plastic centrifuge tubes, VWR cat#21008-973

INTERFERENCES

Lead and zinc are common contaminants present in everyday dust; keeping the sample prep area clean and dusted will reduce these contaminants, as will loosely covering the digestates during the heating steps. Soils containing high levels of carbonates may foam when acid is added; add the acid slowly or use a smaller sample size.

Volatile elements (particularly antimony) may be lost during the digestion process if the digestate is superheated or allowed to go dry during heating. Silver may precipitate during the digestion process if present in relatively high levels; samples submitted by photo-processing or reclamation clients (Dean X-Ray, Safety Kleen, etc.) should not be digested prior to analysis for silver. Standards should be stored away from light to prevent photo-induced precipitation of silver.

QC REQUIREMENTS

A preparation blank (BLANK), blank spike (BS), blank spike duplicate (BS), sample spike (SSPIKE), and sample duplicate (SDUP) are digested and analyzed with each batch of 20 samples or less. If a client requests that a matrix spike (MS) and matrix spike duplicate (MSD) be analyzed on their sample, these should be analyzed in place of the SSPIKE and SDUP.

Purchase Class-A disposable digestion tubes; keep the certificate of analysis on file for each lot of tubes received. If Class-A tubes are not available, the calibration of the disposable digestion tubes must be verified, to within 3%, for each lot received. The temperature setting for the hot block & DigiProbe must be verified, and documented, at least annually. A method detection limit

study will be conducted annually by digesting and analyzing seven aliquots of a low-concentration laboratory control sample.

BATCH QC DEFINITIONS

The following samples must be prepared with every batch of 20 or fewer samples.

1.) Prep Blank (BLANK): A method or prep blank is an aliquot of deionized water that is carried through the entire digestion and analysis procedure to demonstrate that the process is free of *contamination* and is not contributing to the detected sample concentrations. If elements of interest are detected in the prep blank at levels greater than the reporting limits, the batch must be re-digested and reanalyzed for that element.

2.) Blank Spike (BS) and Blank Spike Duplicate (BSD):
Blank spikes are aliquots of deionized water that are carried through the digestion and analysis procedure to demonstrate the accuracy (recovery) and precision (RPD) of the process in the absence of matrix interferences. If the recovery or RPD of any element of interest fails the QC limits, the entire batch must be re-digested and reanalyzed for that element.

3.) Sample Duplicate (SDUP):
Sample duplicates are aliquots of a real-world sample that are digested and analyzed with each batch to demonstrate the precision of the process in samples that may contain or cause matrix interferences. If the RPD of an element of interest fails the QC limits, the spikes may need to be re-digested and re-analyzed.

4.) Sample Spike (SSPIKE):
Sample spikes are aliquots of a real-world sample that are digested and analyzed with each batch to demonstrate the accuracy of the process in samples that may contain or cause matrix interferences. If the recovery of an element of interest fails the QC limits, the spikes may need to be re-digested and re-analyzed.

PROCEDURE

1.) Calibrate the autopipette and document the results in the pipette benchbook.

2.) Calibrate the balance and document the results in the balance calibration benchbook.

3.) Turn on the digestion block. Place a digestion tube containing 50mL DI water in the block and place the “DigiProbe” temperature probe into this digestion tube. Allow the block to heat until the DigiProbe reads 95°C (usually takes 20 - 30 minutes).

4.) While the block is heating, check samples out of the coldroom and allow them to come to room temperature.

5.) Write the sample number and bottle *letter* of each sample in the digestion log.

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6.) Label disposable digestion tubes with the sample numbers, including a MB, BS, BSD, SSPIKE, and SDUP (or MS and MSD if needed).

7.) Clean the spatula prior to use, using DI water and clean Kimwipes.

8.) Discard the top ~1cm of sample, to ensure that the aliquot used was not contaminated by the field equipment.

Note: Discard any leaves, twigs, large stones, etc and take a visually representative aliquot of each sample. Document your observations and actions (ie: "discarded leaves & twigs") in the prep log.

9.) Using the same spatula, thoroughly homogenize the next several cm of sample, to achieve homogeneity then weigh 1g (± 0.1g) of sample into the disposable digestion tube labeled with that sample number. Record the weight of sample (to 0.01g) in digestion benchbook.

Note: If a client requests that C&T "composite" the samples, see Appendix 3 for instructions.

10.) Wipe off the spatula with a Kimwipe, then rinse it in clean DI water and dry it with another clean Kimwipe. Thorough cleaning between samples ensures that elements present in one sample are not carried into the next sample and so do not create false positives or a high bias on the reported results.

11.) For the Method Blank (MB), start with the empty tube and add only reagents throughout digestion.

12.) For the Blank Spike (BS), use a calibrated autopipette to add 0.5 mL of Solution_A and 0.5 mL Solution_B (see Appendix 2) to the empty digestion tube labeled "BS".

13.) Repeat, with the tube labeled "BSD", for the Blank Spike Duplicate (BSD). Record the volume added and the LIMS SS# of the spike in the digestion log.

14.) Review the job sheets to determine if any of the clients in the batch requested that matrix QC be done on their sample. If so, use that sample for the SSPIKE and SDUP (or MS/ MSD), otherwise choose a sample for batch QC so that matrix QC is rotated throughout the laboratory's clients and so that no one client's samples predominate over a period of time.

15.) Thoroughly homogenize about 10g of the sample selected as the batch QC sample, before taking any aliquots.

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16.) For the sample spike (SSPIKE), weigh a second 1g (± 0.1g) aliquot of the sample chosen for batch QC into the labeled digestion tube. Record the weight in the benchbook, then use a calibrated autopipette to add 0.5 mL of Solution_A and 0.5 mL Solution_B.

17.) For the SDUP, weigh a third 1g aliquot of the sample chosen for batch QC into the digestion tube labeled "SDUP".

Note: If a client requests an MS/MSD on their sample, prepare two aliquots of the SSPIKE (and call them "MS" and "MSD" respectively) in place of the SSPIKE and SDUP.

18.) Add 5 mL of 1:1 nitric acid (HNO_3) to each tube. Record the C&T ID of the nitric acid in the digestion benchbook.

19.) Place the tubes in the 90-95°C digestion block for 10-15 minutes *without boiling*, then remove from block and allow to cool to room temperature.

20.) Add 2.5 mL concentrated nitric acid, return to the digestion block and reflux for 30 minutes. If brown fumes persist, repeat this step until no further brown fumes are produced.

21.) While the samples are digesting, record the C&T reagent ID of the 1:1 HNO_3, the manufacturer and lot# of the nitric acid in the digestion benchbook.

22.) Reduce the volume to about 5 mL without boiling or allowing it to go to dryness.

Note: If the sample volume will not reduce to 5 mL, digest for an additional 2 hours, then continue with the steps below.

23.) Remove the test tubes from the block digester and cool to room temperature.

24.) Using a calibrated autopipette, add 1 mL water and 1.5 mL of 30% (as purchased) hydrogen peroxide and swirl tube. Record the C&T ID of the peroxide in the benchbook.

25.) Return to digestion block and warm until effervescence subsides.

Note: If the sample foams over on additional of hydrogen peroxide, re-digest the sample using a smaller sample weight and note the problem in the digestion log.

26.) Continue adding 0.5 mL portions of 30% hydrogen peroxide and heating until sample appearance is does not change (do not exceed 5 mL).

27.) Reduce the sample volume to 5 mL again, without boiling or allowing it to go dry.

28.) Add 5mL concentrated HCl and swirl tube to mix thoroughly. Record the HCl manufacturer and lot# in the benchbook.

29.) Return the tubes to the digestion block and heat at 95°C for 15 minutes.

30.) Remove the tubes from the digestion block and cool to room temperature.

31.) Cool and bring to 50 mL volume with deionized water.

Method Modification Note: C&T uses a digestion block in place of the hot plate digestion discussed in 3050B because the block provides better temperature control and uniform heating across the samples. The final volume by this procedure is 50mL instead of 100mL as discussed in 3050b, because using the 50mL disposable digestion tubes for the entire process provides a complete digestion while eliminating potential cross-contamination. The reagent volumes have been adjusted for the 1g sample weight and lower final volume.

32.) Cap, invert and shake tube several times to ensure good mixing.

33.) Label clean, dry 50 mL disposable centrifuge tubes with the sample IDs.

34.) Filter the sample through Whatman # 541 filter paper into the appropriate centrifuge tube, or allow sample to settle and then decant the top portion (excluding any settled matter) into the centrifuge tube.

Note: If any of the samples are filtered, the batch QC must also be filtered and the filtration must be documented in the digestion benchbook.

35.) Complete benchbook entries, enter batch data into LIMS, and have the benchbook and LIMS prep entry sheet peer-reviewed.

36.) Transfer custody of the samples to the analyst.

DELIVERABLES AND DOCUMENTATION REQUIREMENTS

A copy of the preparation log page where the samples were digested must accompany the paperwork for these samples. The benchbook entries must include:

Date sample digestion
C&T sample ID's (including container letter), initial and final volumes digested
Identity of QC Samples (spikes, duplicates & LCS) amount of spikes added
Record of whether or not the digests were filtered
LIMS numbers of all spiking solutions
ID of all reagents used
Any unusual occurrences during digestion.

POLLUTION PREVENTION

The digestion should be performed in a fume hood. No other pollution prevention measures are currently applicable to this analysis, except for the proper disposal of the samples.

WASTE DISPOSAL

All digests are kept for at least 6 months prior to disposal. After 6 months, the digests are included in the 'Corrosives' waste stream.

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APPENDIX_1:

ICP or ICP-MS
SOIL DIGESTION SUMMARY
EPA 3050B

Sample Weight:	1g (± 0.1g)
Spike:	0.5 mL each of SS2A1 and SS2B1
1:1 Digestion:	+ 5 mL 1:1 HNO_3 95 °C 10-15 minutes
Conc. HNO_3 Digestion:	+ 2.5 mL concentrated HNO_3 95 °C 30 minutes repeat until no brown fumes are produced reduce volume to < 5mL (or digest for 2 hours)
H_2O_2 Digestion:	+ 1.0 mL DI water and 1.5 mL 30% H_2O_2 95 °C add 0.5 mL 30% H_2O_2 until no effervescence and appearance is stable reduce volume to < 5mL (or digest for 2 hours)
HCl Digestion:	+ 5mL concentrated HCl 95 °C 15 minutes
Final Volume:	50 mL
Filtration:	if particulates present in sample Whatman # 541 filter QC samples if any sample filtered

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APPENDIX_2: REAGENTS & STANDARDS

Alternate supplies may be used so long as they are of equivalent quality and all other quality control, and traceability requirements are met.

REAGENTS

Those reagents that are used as purchased should be labeled with the date opened & initials of chemist who opened it and the expiration date. If an aliquot of a reagent is decanted into another bottle (to reduce changes of contamination, for example), that bottle must be labeled with the contents, concentration, date on which it was decanted, prep chemist's initials, and expiration date of the original reagent.

For those reagents that require additional preparation, including dilutions into DI water, the prep must be documented in the reagent prep benchbook. Assign each reagent a unique ID, based on the manufacturer and the date prepared. Any reagents that are not prepared daily should be labeled with the contents, reagent ID, concentration, date prepared, prep chemist's initials, and expiration date.

Each reagent lot should be checked prior to analysis to verify that the levels of impurities are within acceptable levels. Place a copy of the vendor's Certificate of Analysis in the reagents benchbook.

Nitric acid (HNO_3), concentrated, Instra-Analyze (trace metals) grade,
JT Baker, VWR catalog # JT9598-34
Store at room temperature for up to 1 year.

1:1 Nitric acid (HNO_3) *Warning:* Always add acid to water, as reversing the process may cause hot acid to splatter and cause chemical burns.

Partially fill an empty HCl bottle with 500mL of DI water. Slowly add 500mL of concentrated HCl to the deionized water. Cap tightly then carefully invert 3 times to mix.
Store at room temperature for up to 1 year.

Hydrochloric acid (HCl), concentrated, Instra-Analyze (trace metals) grade,
JT Baker, VWR catalog # JT9530-33
Store at room temperature for up to 1 year.

30% Hydrogen Peroxide (H_2O_2) as received,
VWR, 500mL, catalog # VW3690-1
Store at room temperature for up to 1 year.

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SOURCE STANDARDS

Source standards are those purchased from a chemical manufacturer or vendor, and should be NIST traceable. For source standards, the LIMS S-name is unique to both the composition (compound list) of the standard *and* to the vendor of that standard. A new S-name must be assigned whenever the composition is changed or when the standard is obtained from a different vendor; the information must then be entered in the "Standard Definitions" table before the new standard is assigned an S#. If you need more details, log into the LIMS browser; follow the 'LAB MENU' link and click on the "New Standards System (March 2005)" link for details on the system.

Certificates of Analysis should be obtained from the vendor of each source standard; each standard should be traceable to NIST. Source standards usually have an expiration date set by the manufacturer. If no expiration date is listed, the expiration date is **1 year** from the date received, or sooner if comparison with check standards indicates a problem.

Enter the lot#, date received, and expiration date of each source standard into LIMS immediately upon receipt, using the Standards Menu "Standard Inventory".

Write the S# and the date received on the 'Certificate of Analysis' that accompanied the standard; if the supplier did not provide a certificate, call and request that a copy be faxed. The Certificate of Analysis must be kept on file in the appropriate 3-ring binder.

Store source standards at room temperature, away from light (to prevent photo-induced precipitation of silver). If the Certificate of Analysis or bottle label did not include an expiration date, assign an expiration date of one year from the date received.

Spiking Solutions are purchased as custom standards from CPI and used without an intermediate dilution.

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Spiking Solution A *LIMS S-Name:* **SS2A1**

Element	Concentration (µg/mL)	Element	Concentration (µg/mL)	Element	Concentration (µg/mL)
Aluminum	2,000	Cobalt	50	Selenium	100
Arsenic	100	Copper	25	Silver	20
Beryllium	5	Iron	2,000	Sodium	2,000
Boron	100	Magnesium	2,000	Thallium	100
Cadmium	20	Manganese	50	Vanadium	50
Calcium	2,000	Nickel	50	Zinc	50
Chromium	200	Potassium	1,000		

Spiking Solution B *LIMS S-Name:* **SS2B1**

Element	Concentration (µg/mL)	Element	Concentration (µg/mL)
Antimony	200	Molybdenum	40
Barium	200	Tin	100
Lead	200	Titanium	100

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APPENDIX_3: COMPOSITING SOIL SAMPLES

Clients may ask C&T to "composite" samples during preparation, to yield an average result instead of running each sample as a discrete sample. If a composite is requested, use the following steps to create a representative sample and document the composite:

1.) Verify that the balance has been calibrated earlier in the day. If it has not, calibrate it before continuing. Use a minimum of 1g of each sample being added to the composite, as we need to take subsamples that are representative of the entire contents of each core or bottle.

2.) Group the samples to be included in the composite and determine what size container will be needed to create more than enough of the composite for all of the analyses needed.

3.) Label a pre-cleaned container with the C&T sample number of the composite.

4.) Place the container on the scale and tare the scale.

5.) Using a clean spatula or equivalent tool, remove and discard the top ~1cm from the first sample sleeve. Discard any leaves, twigs, large stones, etc and take a visually representative aliquot of each sample. Document your observations and actions (ie: "discarded leaves & twigs") in the prep log.

6.) Using the same spatula, thoroughly homogenize the next several cm of sample then weigh the necessary aliquot out of this homogenized fraction.

7.) Clean the spatula or tool between samples using deionized water and a clean paper towel, to ensure that there is no contamination between the discrete samples.

8.) Repeat Steps 5-7 for each of the remaining samples to be included in the composite, using exactly the same weight for each aliquot.

9.) In the appropriate analysis or Soil Aliquot benchbook, write the C&T sample number of the composite, along with the sample numbers, bottle letters, and weight used from each of the discrete samples being included in the composite.

Example: 162689-001 comp -001 A-D, 15.0g of each
172014-001 comp -1A, -2A, -3A, 20.0g of each

Note: When using composites that have been previously prepared, write "premade comp", "xlab comp", etc. under the Comments/Observations heading.

Curtis & Tompkins, Ltd.

Sonication Bath Extraction (EPA 8330) of Soil Samples for

EPA 8330

Nitroaromatics & Nitroamines (Explosives) By HPLC

Approved by:

Department Manager/ Date

QA Director/ Date

Extraction Lab Supervisor/ Date

Re-approved by:

~~Extraction Lab Supervisor/~~ Date

QA Director/ Date

Read & Understood by:

Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
Signature/ Date	Signature/ Date
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Sonication Bath Extraction of Soil Samples for
EPA 8330 – Nitroaromatics & Nitroamines (Explosives) by HPLC

SCOPE:
This document describes the procedure for the extraction, cleanup, and concentration of selected explosive compounds from solid (soil or sludge) samples by ultrasonic bath extraction. No further concentration step is involved, as the target compounds are very sensitive to heat and should not be exposed to temperatures above normal ambient temperatures.

The reporting limits for this procedure range from 500 µg/Kg for all target analytes execept for Nitrotoluenes, which are at 1,000 µg/Kg.

REFERENCES:
EPA 3500B, Organic Extraction and Sample Preparation, SW-846 Update 3, Dec.1996
EPA 8330, Nitroaromatics and Nitramines by HPLC, SW-846 Update 3, Sep. 1994
EPA 8330A, Nitroaromatics & Nitroamines by HPLC, SW-846 Update 3, Jan. 1998

Related C&T SOP's:
QA 1.4, Balance Calibration Check & Maintenance
QA 1.5, Calibrating & Maintaining Temperature Controls
QA 1.6, Pipet Calibration Check Procedures
QA 4.1, Establishing Control Limits
QA 4.4, Determining Method Detection Limits (MDL)

SAMPLE PRESERVATION & HOLDING TIME:

Preservation:	Store at 4°C.
Holding Time:	14 days from sample collection until extraction.
	40 days from extraction until analysis.

EQUIPMENT:
Mortor & pestle
Dessicator
Cooled sonic bath

SAFETY:
Standard precautionary measures used for handling other organic compounds should be sufficient for the safe handling of the analytes targeted by Method 8330. The only extra caution that should be taken is if handling the analytical standard neat material for the explosives themselves and in rare cases where soil or waste samples are highly contaminated with the explosives. If little site information is known, it is advisable to screen soil or waste samples using Method 8515 to determine whether high concentrations of explosives are present. Soil samples containing as much as 2% of 2,4,6-TNT have been safely ground. Samples containing higher concentrations should not be ground in the mortar and pestle. Lumps of material that have a chemical appearance should be suspect and not ground. Explosives are generally a very finely

ground grayish-white material. All of the target compounds are either used in the manufacture of explosives or are the degradation products of explosive compounds. When making stock solutions and handling samples, use caution; wear safety glasses, gloves, and a lab whenever handling samples, standards, or reagents.

INTERFERENCES

Any sticks, leaves, rocks, or other objects must be removed as they are not part of the extraction matrix and their presence will interfere with the sample being ground to pass through a 30-mesh sieve. Water is also a potential interference as its presence decreases the extraction solvent's ability to retain target analytes. Any water layer should be decanted from the sample and the sample must be dry so that is can be ground properly.

QC REQUIREMENTS:

A Method Blank (MB), Laboratory Control Sample (LCS), Matrix Spike (MS), and Matrix Spike Duplicate (MSD) must be prepared for each batch of 20 or fewer samples. If insufficient sample was submitted to extract an MS/MSD, a Blank Spike (BS) and Blank Spike Duplicate (BSD) may be substituted for the LCS/MS/MSD.

Surrogate compounds are added to each sample, method blank, and spike prior to extraction. If the surrogate recoveries for any sample fail recovery limits, that sample must be re-extracted. If the surrogate recoveries for the method blank, blank spike, blank spike duplicate, or laboratory control sample fail recovery limits, the entire batch must be re-extracted.

A method detection limit (MDL) study will be conducted annually, by extracting a minimum of seven aliquots of a low-level laboratory control sample. Control limits are updated semi-annually based on control charts.

QC DEFINITIONS:

A.) Method Blank (MB):
A method blank is extracted and analyzed with every batch, to demonstrate that the extraction and analysis procedures have not contributed to any detected sample results. If any target compounds are detected in the method blank, the entire batch must be re-extracted.

B.) Laboratory Control Sample (LCS), or Blank Spike (BS)/ Blank Spike Duplicate(BSD):
An LCS is extracted and analyzed with every batch, to demonstrate that the extraction and analysis procedures are effective in the absence of matrix interferences. If the recovery of any of the spike compounds is outside the acceptance limits, the entire batch must be re-extracted.

Note: If insufficient sample was submitted to extract an MS/MSD, extract a duplicate LCS, labeling the first "BS" and the duplicate "BSD". This method of labeling is used by LIMS to determine if there is a duplicate or only one LCS.

C.) Matrix Spike/ Matrix Spike Duplicate: A matrix spike and matrix spike duplicate are extracted and analyzed with every batch, to demonstrate the effectiveness of the procedure in real-world samples which may include matrix interferences. If the recovery or RPD of any spike compound is outside acceptance limits, the batch may need to be re-extracted.

Note: The MS and MSD should be concentrated to the same final volume as the matrix spike sample (MSS).

D.) Surrogate:
A surrogate is a compound (or compounds) that is added to every sample prior to extraction in order to monitor the accuracy of the extraction and analysis. These are compounds that are not normally found in environmental samples but are chemically related to the compounds of interest, and so behave in a similar fashion. Surrogate recovery failure indicates a problem with the process; any sample that demonstrates recovery failure must be re-extracted.

SAMPLE PREPARATION:

1.) For the method blank and laboratory control sample (or BS/BSD), weigh out 5 ± 0.2g of kiln-fired Ottawa sand into a solvent-rinsed and labelled Petri dish. Place in the desiccator overnight.

2.) For the samples, decant and discard any water layer. Discard objects such as sticks, leaves and rocks. Then take the most visually representative aliquot from the sample possible; if the sample is visibly non-homogenous, record this observation in the benchbook. Weigh out approximately 10g into a solvent-rinsed and labelled Petri dish. Place in the desiccator overnight.

Note: **DO NOT DRY SAMPLES AT ELEVATED TEMPERATURES!**

3.) If any sample appears to be wet after drying overnight in the desiccator, dry sample for another night.

4.) For the matrix spike and matrix spike duplicate, review the job sheets to determine if any of the clients requested an MS/MSD on their sample. If not, select a sample so that matrix QC is rotated throughout the laboratory's clients, so that no one client's samples predominate over a period of time.

a.) Weigh out just over 30g of sample into a pre-cleaned, solvent-rinsed 16 oz wide mouth glass jar. Place in the desiccator overnight.

b.) When dry, *thoroughly* and carefully homogenize the sample, then weigh out three 5g (± 0.2g) portions into separate Petri dishes labeled with the sample number and "MSS", "MS", and "MSD" respectively. Record the sample weights to 0.01g.

5.) Grind and homogenize each dried sample, including QC thoroughly in an acetonitrile-rinsed mortar to pass a 30-mesh sieve.

Note: Soil samples containing as much as 2% of 2,4,6-TNT have been safely ground. Samples containing higher concentrations should not be ground in the mortar and pestle. Lumps of material that have a chemical appearance should be suspect and not ground. Explosives are generally a very finely ground grayish-white material.

6.) To the LCS, MS, and MSD, add 20 µL of the 8330 Matrix Spiking Solution #1 (8330_CAL1) and then add 20 µL of the 8330 Matrix Spiking Solution #2 (8330_CAL2). The LCS, MS and MSD, are spiked directly from the Stock Standard Solution. See Appendix_2 for infomation on the Matrix Spiking Solutions. Document the LIMS WS# of each Spiking Solution and the volume used in the benchbook.

7.) To every sample, including each batch QC sample, add 400 µL of the 8330 Surrogate Solution (8330SURR). Document the LIMS ID of the Surrogate Solution and the volume used in the benchbook.

EXTRACTION PROCEDURE:

1.) Place a 5.0 ± 0.2g subsample of each soil sample in a 20-mL labelled glass scintilation vial.

2.) Add 10.0 mL of Acetonitrile, cap, and vortex swirl for one minute.

3.) Place the sample vials in a cooled ultrasonic bath(<20 °C) for 18 hours.

4.) After the 18 hour sonication, allow samples to settle for 30 minutes.

5.) Decant as much Acetonitrile as possible into a second glass scintilation vial labeled with the sample ID and batch number.

Note: Do not make the final dilution into 5% CaCl2. This is the analysts' responsibility and should be performed just prior to analysis, as one of the target compounds (Tetryl) degrades rapidly in the presence of water/MeOH.

6.) Store extracts at 4°C (± 2°C) in Delfield refrigerator # 9.

DOCUMENTATION:

A.) Benchbooks:
Every extraction must be completely documented in the appropriate benchbook. Any changes must be made with a single line through the incorrect entry and intialed and dated by the chemist making the change. The benchbook entries must include the following:

Sample number, accompanied by the unique container identifier (A-> Z)

Initial sample weight
Final sample volume
LIMS WS# and volume used for all surrogate and spike standards
Manufacturer and lot# for all solvents, reagents, and filters
Observations concerning unusual sample appearance, odor, behavior
Errors during extraction (spilled, possibly double spiked, etc.)

B.) LIMS:
All extraction weights, volumes, and WS# must be entered into the prep entry database. It is very important that the entries are accurate and complete, as LIMS uses these to calculate sample concentrations and spike results.

C.) Peer Review:
The benchbook entries and LIMS batch sheets must be reviewed by another extraction chemist, an analyst, or Group Leader. The benchbook and LIMS batch sheet must be signed by the extraction chemist and the peer-reviewer. The peer-reviewer should make a photocopy of the benchbook page, attach it to the LIMS batch sheet, and file it in the 'Done' box.

WASTE DISPOSAL:
After extraction, place the sample vials in the fume hood and allow to dry. The dried waste then goes into the soil waste drum for later disposal.

Excess extract volume should be stored in the Delfield refrigerator for a minimum of 40 days, then transferred to the flammable waste stream drum.

POLLUTION PREVENTION:
Prepare only as much spiking and surrogate standard as can be used within the shelf-life of the standard.

APPENDIX_1: **8330 SOIL EXTRACTION SUMMARY**

Sample Weight:	5g
Extraction Solvent:	Acetonitrile
Extraction Temp:	< 20 °C in sonicator bath
Extraction Time:	18 hours
Final Extraction Solvent:	Acetonitrile *
Final Volume:	10 mL

WARNING: ***Do NOT heat these samples or extracts!***

Surrogate:	*8330SURR* 1,2-Dinitrobenzene @ 50 µg/mL	Add:	400 µL
Spike:	*8300_CAL1* All targets @ 1000 µg/mL	Add:	20 µL
	8330_CAL2 All targets @ 1000 µg/mL	Add:	20 µL

* *Note:* Do not make the final dilution into 5% $CaCl_2$ as described in method 8330. This is the analysts' responsibility and should be performed just prior to analysis, as one of the target compounds (Tetryl) degrades rapidly in the presence of water/MeOH.

APPENDIX_2: STANDARDS & REAGENTS

Source Standards

Enter all source standards into LIMS immediately upon receipt, using the Standards Menu "Source Standard Maintenance". The LIMS SS-name is unique to the vendor that the source is obtained from; if a source standard is obtained from a different vendor, a new SS-name must be assigned and the information entered in the "Source Standard Entry" table before the standard can be assigned an SS#. The standards listed below were those in use at the time this document was written, however standards may be purchased from different vendors so long as they are traceable through LIMS and the Standards Prep Logs.

Certificates of Analysis should be obtained from the vendor of each source standard; the certificates should be labeled with the LIMS ID and the date received and filed in the 3-ring binder. Source standards usually have an expiration date set by the manufacturer. If no expiration date is listed, the expiration date is one year from date received.

Working Standards

Document the preparation of all working standards in the standards prep benchbook and in the LIMS through the "Working Standards Maintenance" menu; LIMS will then assign a working standard number (WS#). The LIMS WS-name is not neccesarily unique to the source standard vendor but *is* unique to the compound list and concentrations contained in the working standard; if the concentration or compounds in the working standard changes, a new WS-name, compound list and concentrations must be entered in the "Working Standard Entry" table before the standard can be logged in and assigned a WS#. It it *very important* to enter this information correctly, as LIMS uses this information to calculate spike and surrogate recoveries.

The benchbook entry should include the prep date, LIMS SS# and concentration, volume of SS used, solvent name, solvent volume, solvent lot#, final volume and concentration of WS, expiration date of WS, and prep chemist's initials.

Working standard solutions containing 2,4-DNT and 2,6-DNT expire 30 days after preparation from the source standards per (Method 8330 Sec. 5.4.2) unless any of the source standards expire before the 30 days. If any of the source standards expire before the 30 days, change the expiration date of the working standard to match the earliest expiration date of the stock standards. All other working standard solutions expire 90 days after preparation from the source standards unless any of the source standards expire before the 90 days. If any of the source standards expire before the 90 days, change the expiration date of the working standard to match the earliest expiration date of the stock standards. **The expiration date of the working standard *must not* exceed the expiration date of any of the source standards from which it was made.**

Reagents
For any reagents that are not used directly from the bottle but are prepared by an extraction lab chemist, the preparation of all reagents, including dilutions into Millipore DI water, must be documented in the reagent prep benchbook. Each reagent must be assigned a unique ID, based on the manufacturer and the date prepared. Whenever a new lot # of reagent is received, it must be screened before use to ensure that no contamination will interfere with the analysis. The reagent manufacturer and lot# must be documented in the extraction prep log for each batch to aid in trouble-shooting when problems occur.

SOURCE STANDARDS

Label each vial with the contents, LIMS SS#, and expiration date. Store the standards in refrigerator #5 at 4°C ± 2°C. *Do not* store standards in a refrigerator containing samples or extracts.

Surrogate Source Standard @ 1,000 µg/mL (ug/mL = mg/L):
- Restek Cat. No. 31453
  LIMS Name: *8330_SURR*

Matrix Spiking Solution #1 @ 1,000 µg/mL:
- Restek Cat. No. 31450
  LIMS Name: *8330_CAL1*

Matrix Spiking Solution #2 @ 1,000 µg/mL:
- Restek Cat. No. 31451
  LIMS Name: *8330_CAL2*

WORKING STANDARD SOLUTIONS

Note: Store all standards in a refrigerator at 4°C ± 2°C.

Surrogate Solution: LIMS Name: *8330SURR*
Dilute the 1,000 µg/mL stock solution 1:20.

1.) Add about 65 mL of Methanol to a 1000 mL Class-A volumetric flask.
2.) Add 5.0 mL of the 1,000 µg/mL surrogate solution.
3.) Add Methanol to volume and mix well by inverting and rotating the flask.
4.) Transfer to 40 mL amber VOA vials labeled with the LIMS WS# and expiration date.

Spike Solutions: Use Matrix Spiking Solutions #1 and #2 (8330_CAL1 and 8330_CAL2) to spike the Laboratory Control Sample (LCS), Matrix Spike (MS), and Matrix Spike Duplicate (MSD).

REAGENTS

Acetonitrile, EMD Omni-solv, VWR Catalog# EM-AX0142-1, Store at room temperature in a Flammables cabinet for up to 6 months.

Methanol (for making the surrogate working standard), EMD Omni-solv, VWR Catalog# EM-MX0488-1, Store at room temperature for up to 1 year.

EPA 6010B QC Limits

C&T In-House Limits for
Jan 28, 2008 - Jul 27, 2008

Matrix	Analyte	LCS/LCSD Recovery	LCS/LCSD RPD	MS/MSD Recovery	MS/MSD RPD
Soil	Aluminum	80 - 120	20	49 - 152	22
	Antimony	80 - 120	20	3 - 120	33
	Arsenic	80 - 120	20	71 - 120	20
	Barium	80 - 120	20	50 - 135	24
	Beryllium	80 - 120	20	79 - 120	20
	Cadmium	80 - 120	20	71 - 120	20
	Calcium	80 - 120	20	34 - 159	27
	Chromium	80 - 120	20	65 - 120	20
	Cobalt	80 - 120	20	60 - 120	23
	Copper	80 - 120	20	42 - 152	23
	Iron	80 - 120	20	52 - 145	21
	Lead	80 - 120	20	53 - 124	28
	Magnesium	80 - 120	20	27 - 163	27
	Manganese	80 - 120	20	57 - 146	21
	Molybdenum	80 - 120	20	66 - 120	20
	Nickel	80 - 120	20	44 - 139	26
	Potassium	80 - 120	20	42 - 145	21
	Selenium	80 - 120	20	69 - 120	20
	Silver	80 - 120	20	70 - 120	20
	Sodium	80 - 120	20	64 - 123	26
	Thallium	80 - 120	20	61 - 120	20
	Vanadium	80 - 120	20	51 - 137	20
	Zinc	80 - 120	20	36 - 150	30
	Boron	80 - 120	20	56 - 120	37
	Phosphorus	80 - 120	20	70 - 130	30
	Silicon	80 - 120	20	70 - 130	30
	Sulfide	80 - 120	35	65 - 135	35
	Strontium	80 - 120	35	65 - 135	35
	Tin	80 - 120	20	62 - 120	20
	Titanium	80 - 120	20	36 - 164	26

C&T internal list numbers: 63750

Curtis & Tompkins Laboratories
MDL Summary for EPA 6010B Soil
As of 03/26/08

Analyte	Units	MET08 A	MET08 R	MET09 A	MET09 R
Aluminum	mg/Kg		0.37		0.38
Antimony	mg/Kg	0.027		0.087	
Arsenic	mg/Kg	0.050		0.096	
Barium	mg/Kg	0.0047		0.022	
Beryllium	mg/Kg	0.0021		0.0024	
Cadmium	mg/Kg	0.0027		0.024	
Calcium	mg/Kg		3.2		2.4
Chromium	mg/Kg	0.017		0.029	
Cobalt	mg/Kg	0.0078		0.021	
Copper	mg/Kg	0.028		0.096	
Iron	mg/Kg		0.39		0.39
Lead	mg/Kg	0.076		0.062	
Magnesium	mg/Kg		0.19		0.24
Manganese	mg/Kg	0.0084		0.026	
Molybdenum	mg/Kg	0.022		0.051	
Nickel	mg/Kg	0.018		0.024	
Potassium	mg/Kg		3.4		3.5
Selenium	mg/Kg	0.078		0.047	
Silver	mg/Kg	0.018		0.057	
Sodium	mg/Kg		0.33		0.98
Thallium	mg/Kg	0.034		0.086	
Vanadium	mg/Kg	0.021		0.030	
Zinc	mg/Kg	0.028		0.036	
Boron	mg/Kg	0.077		0.15	
Tin	mg/Kg	0.17		0.10	
Titanium	mg/Kg	0.013		0.020	

EPA 8330 QC Limits

C&T In-House Limits for
Jan 14, 2008 - Jul 13, 2008

Matrix	Analyte	LCS/LCSD Recovery	LCS/LCSD RPD	MS/MSD Recovery	MS/MSD RPD
Soil	HMX	80 - 120	20	70 - 130	30
	RDX	79 - 120	20	69 - 130	30
	1,3,5-Trinitrobenzene	64 - 120	20	54 - 130	30
	1,3-Dinitrobenzene	80 - 120	20	70 - 130	30
	Nitrobenzene	78 - 125	20	68 - 135	30
	Tetryl	75 - 120	20	65 - 130	30
	2,4,6-Trinitrotoluene	78 - 120	20	68 - 130	30
	2-Amino-4,6-dinitrotoluene	77 - 121	20	67 - 131	30
	4-Amino-2,6-dinitrotoluene	59 - 127	20	49 - 137	30
	2,4-Dinitrotoluene	78 - 120	20	68 - 130	30
	2,6-Dinitrotoluene	58 - 126	20	48 - 136	30
	2-Nitrotoluene	80 - 120	20	70 - 130	30
	4-Nitrotoluene	80 - 120	20	70 - 130	30
	3-Nitrotoluene	80 - 120	20	70 - 130	30
	1,2-Dinitrobenzene	80 - 120		80 - 120	

C&T internal list numbers: 63678

Curtis & Tompkins Laboratories
MDL Summary for EPA 8330 Soil
As of 03/26/08

Analyte	Units	HPLC05 A	HPLC05 L
HMX	ug/Kg	60	22
RDX	ug/Kg	43	26
1,3,5-Trinitrobenzene	ug/Kg	15	19
1,3-Dinitrobenzene	ug/Kg	13	11
Nitrobenzene	ug/Kg	17	27
Tetryl	ug/Kg	28	30
2,4,6-Trinitrotoluene	ug/Kg	7.9	25
2-Amino-4,6-dinitrotoluene	ug/Kg	32	51
4-Amino-2,6-dinitrotoluene	ug/Kg	58	47
2,4-Dinitrotoluene	ug/Kg	18	28
2,6-Dinitrotoluene	ug/Kg	31	27
2-Nitrotoluene	ug/Kg	43	28
4-Nitrotoluene	ug/Kg	67	51
3-Nitrotoluene	ug/Kg	44	44
1,2-Dinitrobenzene	ug/Kg	16	19

Attachment D.1
Hard-Copy Data Reporting Requirements

GC/MS Level "D" Deliverables

Item #	Deliverable
1	Chain of Custody
2	Sample results with analysis and extraction/preparation dates
3	Summary of MS/MSD/Duplicate recoveries and control limits (listing or link with associated samples)
4	Summary of LCS/LCSD recoveries and control limits (listing or link with associated samples)
5	Method blanks (listing or link with associated samples)
6	Summary of instrument blanks - metals only (listing or link with associated samples)
7	Summary of surrogate recoveries
8	Summary of initial calibration data (RRF and %RSD, or r if applicable)
9	Summary of continuing calibration (%D and RRF)
10	Summary of internal standards (area response and retention time)
11	Summary of instrument tuning (listing or link with associated samples, must show 12 hour clock)
12	Injection logs
13	Extraction/preparation logs
14	Case narrative to discuss anomalies
15	Raw data associated with the summary forms listed above
16	Raw data for item #2, which includes chromatograms, log books, quantitation reports, and spectra.

Note: The data deliverable package must have a table of contents and be paginated.

GC Level "D" Deliverables

Item #	Deliverable
1	Chain of Custody
2	Sample results with analysis and extraction/preparation dates
3	Summary of MS/MSD/Duplicate recoveries and control limits (listing or link with associated samples)
4	Summary of LCS/LCSD recoveries and control limits (listing or link with associated samples)
5	Method blanks (listing or link with associated samples)
6	Summary of surrogate recoveries
7	Summary of initial calibration data (RF and %RSD, r if applicable) Note: OC Pesticides analysis also requires summary results for DDT/Endrin breakdown, GPC, and Florisil (if performed)
8	Summary of continuing calibration (%D)
9	Injection logs
10	Extraction/preparation logs
11	Case narrative to discuss anomalies
12	Raw data associated with the summary forms listed above
13	Raw data for item #2, which includes chromatograms, log books, quantitation reports, and spectra.

Note: The data deliverable package must have a table of contents and be paginated.

QC LEVEL C DELIVERABLES DO NOT CONTAIN THE RAW DATA.

General Chemistry Level "D" Deliverables

Item #	Deliverable
1	Chain of Custody
2	Sample results with analysis and extraction/preparation dates
3	Summary of MS/MSD/Duplicate recoveries and control limits (listing or link with associated samples)
4	Summary of LCS/LCSD recoveries and control limits (listing or link with associated samples)
5	Method blanks (listing or link with associated samples)
6	Summary of initial calibration data (correlation coefficient, r)
7	Summary of continuing calibration (%D or % recovery), if applicable
8	Injection logs
9	Extraction/preparation logs, if applicable
10	Case narrative to discuss anomalies
11	Raw data associated with the summary forms listed above
12	Raw data for item #2, which includes log books, quantitation reports, and spectra.

Note: The data deliverable package must have a table of contents and be paginated.

Trace Metals Level "D" Deliverables

Item #	Deliverable
1	Chain of Custody
2	Sample results with analysis and extraction/preparation dates
3	Summary of MS/MSD/Duplicate recoveries and control limits (listing or link with associated samples)
4	Summary of LCS/LCSD recoveries and control limits (listing or link with associated samples)
5	Method blanks (listing or link with associated samples)
6	Summary of instrument blanks (listing or link with associated samples)
7	Summary of initial calibration data (% recovery - ICP) or (correlation coefficient, r - GFAA)
8	Summary of continuing calibration (%D or % recovery)
9	Injection logs
10	Extraction/preparation logs
11	Summary of ICP interference check (listing or link with associated samples)
12	Summary of graphite furnace AA, ICP post digestion spike, and serial dilution results
13	Summary of graphite furnace AA standard addition results (as required)
14	Case narrative to discuss anomalies
15	Raw data associated with the summary forms listed above
16	Raw data for item #2, which includes log books, quantitation reports, and spectra.

Note: The data deliverable package must have a table of contents and be paginated.

QC LEVEL C DELIVERABLES DO NOT CONTAIN THE RAW DATA.

HPLC Level "D" Deliverables

Item #	Deliverable
1	Chain of custody
2	Sample results with analysis and extraction/preparation dates
3	Summary of MS/MSD/Duplicate recoveries and control limits (listing or link with associated samples)
4	Summary of LCS/LCSD recoveries and control limits (listing or link with associated samples)
5	Method blanks (listing or link with associated samples)
6	Summary of instrument blanks - metals only (listing or link with associated samples)
7	Summary of surrogate recoveries
8	Summary of continuing calibration (%D and RRF)
9	Summary of internal standards (area response and retention time)
10	Summary of instrument tuning (listing or link with associated samples, must show 12-hour clock)
11	Injection logs
12	Extraction/preparation logs
13	Case narrative to discuss anomalies
14	Raw data associated with the summary forms listed above
15	Raw data for item #2, which includes chromatograms, log books, quantitation reports, and spectra.

Note: The data deliverable package must contain a table of contents and numbered pages.

QC LEVEL C DELIVERABLES DO NOT CONTAIN THE RAW DATA

Attachment E.2
Electronic Data Deliverable Reporting Requirements

ADaPT ELECTRONIC DATA DELIVERABLE FILE SPECIFICATIONS

The EDD consists of three separate, comma-delimited ASCII text files or Excel CSV files (two, if instrument calibration information is not required by the project). Each file corresponds to a database table. The tables are identified as the Analytical Results Table (Table A1), Laboratory Instrument Table (Table A2), and Sample Analysis Table (Table A3). Each file follows the naming convention of using the Laboratory Reporting Batch ID (SDG) followed by the table identifier (A1, A2, or A3), and then a ".txt" or ".csv" extension. For example, the EDD file names for a laboratory reporting batch identified as SDG001 that includes instrument calibration data would be as follows.

- SDG001A1.txt or SDG001A1.csv
- SDG001A2.txt or SDG001A2.csv (A2 file is optional)
- SDG001A3.txt or SDG001A3.csv

ANALYTICAL RESULTS TABLE (A1 FILE)

The Analytical Results table contains results and related information on an analyte level for field samples and associated quality control samples (excluding calibrations and tunes). A result record must exist for each analyte reported in a method (specified in the project library) for every field sample and laboratory method blank analyzed by that method. Laboratory control samples and matrix spikes must have a result record for every spiked analyte and surrogate (if applicable) specified in the project library. Table A1 lists the field names and descriptions for the Analytical Results Table (A1). The project library is a reference table that both the EDD error checker and validation applications use when processing the EDD. The project library is populated with information from the project QAPP.

LABORATORY INSTRUMENT TABLE (A2 FILE)

The Laboratory Instrument table contains results and related information on an analyte level for instrument initial calibration standards, initial calibration verification standards, continuing calibration standards, and GC/MS tunes. A record must exist for each target analyte reported in a method (specified in the project library), for every calibration type (QCType) associated to samples reported in the EDD. Initial calibrations, initial calibration verifications, and associated samples are linked to each other using a unique Run Batch ID for every distinct initial calibration. Continuing calibrations and associated samples are linked to each other using a unique Analysis Batch ID for every distinct continuing calibration. GC/MS tunes are linked to initial and continuing calibrations (and hence samples) using the Run Batch and Analysis Batch IDs respectively. Depending on the level of validation required by the data user, the Laboratory Instrument table may not be requested in the deliverable. Table A2 lists field names and descriptions for the Laboratory Instrument Table (A2).

SAMPLE ANALYSIS TABLE (A3 FILE)

The Sample Analysis table contains information related to sample and QC analyses (excluding calibrations and tunes), analytical methods, batch IDs, and sample preparation on a sample basis. A record exists for each sample/method/matrix/analysis type combination. Table A3 lists field names and descriptions for the Sample Analysis Table (A3).

EDD FIELD ELEMENTS

The EDD Field Elements listed in Table A1, A2, and A3 specify the type of electronic information from the analytical laboratories for populating the fields each file. These include the field name and

sequence, field name description, and field type and length for each table. Field elements in the EDD are sequenced according to the order they appear in Tables A1, A2, and A3. For example, in the Analytical Result table (the A1 file), the field “ClientSampleID” will always be the first piece of information to start a new line of data (or database record), followed by the fields “LabAnalysisRefMethodID”, “AnalysisType”, and so on.

The name, description, data type, character length, and standard value requirements for each field are listed in Tables A1, A2, and A3. Field standard values are listed in Table B. Table C lists standard values for methods and analytes. Certain fields in each file require information for a given combination of sample, matrix, method, analyte type, and calibration or QC type records. These are required fields. Tables D1, D2, and D3 indicates the required fields for each table according to the instrument category (method), matrix, analyte type, sample, and QC or calibration type record.

When creating an EDD as a text file, use the ASCII character set in a file of lines terminated by a carriage return and line feed. No characters are allowed after the carriage return and line feed. Enclose each data field in double quotes (") and separate each field by commas (comma delimited). Data fields with no information (null) may be represented by two consecutive commas. For example, in the Sample Analysis table, since the “Collected”, “ShippingBatchID”, and “Temperature” fields do not apply to laboratory generated QA/QC samples, the record for a Laboratory Control Sample by Method 8270C would be entered as follows. Note that the first two fields (“ProjectNumber” and “ProjectName”) are omitted in this example.

"LCSW100598",,"AQ","LCSW100598","LCS",,"8270C",…

Do not pad fields with leading or trailing spaces if a field is populated with less than the maximum allowed number of characters. In the above example, although the “MatrixID” field can accommodate up to 10 characters, only 2 characters were entered in this field.

Table A1: Field Descriptions for the Analytical Results Table (A1)

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ClientSampleID	Client's identifier for a sample If a sample is analyzed as a duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS and MSD respectively to the Client Sample ID (i.e., MW01DUP, MW01MS, and MW01MSD). For the Method Blanks, LCS, and LCSD enter the unique Laboratory_Sample_ID. Do not append suffixes for dilutions, reanalyses, or reextacts. For example, MW01DL and MW01RE are not allowed.	Text	25	
LabAnalysisRefMethodID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
AnalysisType	Defines the analysis type (i.e., Dilution, Reanalysis, etc.). This field is critical for distinguishing results from the same compound when multiple analyses are submitted for the same sample and method (i.e. dilutions, reextracts, etc).	Text	10	See Table B

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
LabSampleID	Laboratory tracking number for field samples and lab generated QC samples such as method blank, LCS, and LCSD Append suffixes DUP, MS and MSD, without an intervening hyphen or space, for the sample duplicate, matrix spike, and matrix spike dup respectively (i.e., 9810001DUP, 9810001MS, and 9810001MSD). Suffixes may be applied to the Lab_Sample_ID to designate dilutions, reanalyses, etc. The Lab_Sample_ID must be unique for each Method Blank, LCS, and LCSD. Each Method Batch must contain records for a matrix spike for inorganic methods and a matrix spike and matrix spike duplicate for organic methods. Parent sample records must exist for each MS and MS/MSD. If an MS or MS/MSD is shared between two EDDs, records for the MS or MS/MSD and its parent sample must exist in the Analytical Results table for both EDDs.	Text	25	
LabID	Identification of the laboratory performing the analyses	Text	7	See Table B
ClientAnalyteID	CAS # or unique identification If a CAS # is not available, use a unique identifier provided by the Contractor. For TICs from GC/MS analyses, enter retention time in decimal minutes as the Client Analyte ID. The Client Analyte ID for a particular target analyte is specified in the project library or QAPP. Each sample analysis (i.e. dilutions and reanalyses) must report the full target analyte list including surrogates if applicable. For the LCS, LCSD, MS, and MSD, only report the spike compounds for all methods, and surrogates for organic methods. For organics, surrogates must be reported for each analysis submitted (i.e. reanalyses and dilutions).	Text	12	
AnalyteName	Chemical name for the analyte (i.e., Benzene, Lead) The Analyte Name is specified in the project library or QAPP.	Text	60	
Result	Result value for the analyte Entries must be numeric even though this is a text field. For nondetects of target analytes and spikes, do not enter “ND” or leave this field blank. If an analyte or spike was not detected, enter the reporting limit value corrected for dilution and percent moisture as applicable.	Text	10	
Lab_Qualifiers	A string of single letter result qualifiers assigned by the lab based on client-defined rules and values The “U” Lab Qualifier must be entered for all non detects. Other pertinent lab qualifiers may be entered with the “U” qualifier. Order is insignificant.	Text	7	See Table B
Detection_Limit	The detection limit value for the analyte being measured	Text	10	
Detection_Limit_Type	Specifies the type of detection limit (i.e., MDL, IDL, etc.)	Text	10	See Table B
Retention_Time	The time expressed in decimal minutes between injection and detection for GC/MS TICs only.	Text	5	
Analyte_Type	Defines the type of result such as surrogate, spike, internal standard, and target compound.	Text	30	See Table B
Percent_Recovery	The percent recovery value of a spike or surrogate compound Enter the recovery value as a numeric character. If the spike or surrogate was not recovered because of dilution, enter “DIL”. If a spike or surrogate was not recovered because of matrix interference, enter “INT”. If a spike or surrogate was not recovered because it was not added to the sample, enter “NS”.	Text	5	See Table B

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Relative_Percent_Difference	The relative percent difference (RPD) of two QC results such as MS/MSD, LCS/LCSD, and sample duplicates. Report RPD in the Sample Duplicate, LCSD, and MSD records only.	Number	Single	
Reporting_Limit	Reporting limit value for the measured analyte Factor in the dilution factor and percent moisture correction, if applicable. The Reporting Limit for each analyte and matrix in a given method is specified in the project library or QAPP.	Text	10	
Reporting_Limit_Type	Specifies the type of reporting limit (i.e., CRQL, PQL, SQL, RDL, etc). The Reporting Limit Type for each method and matrix is specified in the project library or QAPP.	Text	10	
Reportable_Result	This field indicates whether or not the laboratory chooses an individual analyte result as reportable. Enter "YES" if the result is reportable. Enter "NO" if the result is not reportable. This field applies to target analytes only. If only one analysis is submitted for a particular sample and method, enter "YES" for all target compounds (Analyte Type = TRG) and all TICs (Analyte Type = TIC, for GC/MS only). If two or more analyses are submitted for a particular sample and method (i.e. initial analysis, reanalysis and/or dilutions), enter "YES" from only one of the analyses for each target compound. For example: a sample was run a second time at dilution because benzene exceeded the calibration range in the initial, undiluted analysis. All target analytes are reported in each analysis. For the initial analysis, (Analysis Type = RES), enter "NO" for benzene and enter "YES" for all other compounds. For the diluted analysis (Analysis Type = DL), enter "YES" for benzene and enter "NO" for all other compounds. For TICs (Analyte Type = TIC), if more than one analysis is submitted for a particular sample and method, choose only one of the analyses where Reportable Result = YES for all TICs. For example, a sample was run a second time because one or more target compounds exceeded the calibration range in the undiluted analysis. Choose a particular analysis and enter "YES" for all TICS. In the other analysis enter "NO" for all TICs.	Text	3	See Table B

Note: Contains laboratory test results and related information for field and QC samples (excluding calibrations) on an analyte level.

Table A2: Field Descriptions for the Laboratory Instrument Table (A2)

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Instrument_ID	Laboratory instrument identification	Text	15	
QC_Type	Type of instrument QC (i.e., Instrument_Performance_Check or type of calibration standard)	Text	10	See Table B
Analyzed	Analysis date/time for BFB, DFTPP, initial calibration verification standards, calibration verification standards, and continuing calibration standards. For the initial calibration, enter date and time of the last standard analyzed. Also, see comments about initial calibrations in the Alternate_Lab_Analysis_ID field name description.	Date/ Time	*	

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Alternate_Lab_Analysis_ID	Common laboratory identification used for standards (i.e., VOA STD50, CCAL100, BFB50, etc). For initial calibration, enter ICAL. Information from the initial calibration is entered as one record for each analyte that summarizes the results of the initial calibration (i.e. %RSD, correlation coefficient, and avg RF). Records are not entered for each individual standard within the initial calibration.	Text	12	
Lab_Analysis_ID	Unique identification of the raw data electronic file associated with the calibration standard or tune (i.e., 9812101MS.DV). Leave this field blank for the initial calibration. See comments about initial calibrations in the Alternate_Lab_Analysis_ID field description. This field is only applicable where an electronic instrument file is created as part of the analysis.	Text	15	
Lab_Analysis_Ref_Method_ID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc.). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
Client_Analyte_ID	CAS # or unique. If CAS # is not available, use a unique identifier provided by the Contractor. Records for each calibration must report the full target analyte list including surrogates as applicable. The target analyte list is specified for each method in the project library or QAPP.	Text	12	
Analyte_Name	Chemical name for the analyte (i.e., Benzene, Lead). The Analyte Name for each method is specified in the project library or QAPP	Text	60	
Run_Batch	Unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. The Run Batch ID links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the Run_Batch ID also links a BFB or DFTPP tune and the initial calibration and initial calibration verification standards to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all the metals reported under one initial calibration can use the same Run Batch ID. A new and unique Run Batch ID must used with every new initial calibration.	Text	12	
Analysis_Batch	Unique laboratory identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. The Analysis Batch ID links the continuing calibration or calibration verification to subsequently analyzed and associated field sample and QC analyses. For GC/MS methods, the Analysis Batch ID also links the BFB or DFTPP tune and the continuing calibrations to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all the metals reported under one continuing calibration can use the same Analysis Batch ID. A new and unique Analysis Batch ID must be used with every new continuing calibration or continuing calibration verification. For GC methods, only report opening standards, do not include closing standards (unless the closing standard functions as the opening standard for a subsequent set of analyses, in which case a new and unique Analysis Batch ID is assigned). When dual or confirmation columns/detectors are used, enter results from the primary column/detector only (this is similar to CLP Pesticide reporting).	Text	12	

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Lab_Reporting_Batch	Unique laboratory identifier for a batch of samples including associated calibrations and method QC, reported as a group by the lab (i.e. lab work order #, log-in #, or SDG). Links all instrument calibrations, samples, and method QC reported as a group or SDG.	Text	12	
Percent_Relative_Standard_ Deviation	The standard deviation as a percentage of the mean used to evaluate initial calibration linearity. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the %RSD. Do not enter if the Correlation Coefficient is used.	Number	Single	
Correlation_Coefficient	The correlation coefficient resulting from linear regression of the initial calibration. For metals by ICAP, enter '1.0' if a two-point initial calibration was analyzed. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the Correlation Coefficient. Do not enter if the %RSD is used	Number	Single	
Relative_Response_Factor	This field applies to GC/MS only. Enter the relative response factor for continuing calibration analyte records. Enter the average relative response factor for initial calibration analyte records. Refer to comments about initial calibration records in the field description for Alternate_Lab_Analysis_ID.	Number	Single	
Percent_Difference (or Percent Recovery)	For organic methods, this field is the difference between 2 measured values expressed as a percentage. If %RSD is reported, enter the % difference between the average response factor of the initial calibration (IC) and the response factor of the initial calibration verification (ICV) or continuing calibration (CCV). If correlation coefficient is used, enter the % difference between the true value and the measured value. The Percent_Difference is expressed as a negative or positive value. Do not express Percent_Difference as an absolute value. Use a negative value if the CCV or ICV response factor is less than the IC average response factor or, in the case of correlation coefficient, the CCV or ICV measured value is less than the true value. Use a positive value if the CCV or ICV response factor is greater than the IC average response factor, or in the case of correlation coefficient, the CCV or ICV measured value is greater than the true value. For inorganic methods, this field is the recovery of an analyte expressed as a percentage of the true amount (i.e., %R for a metal in the continuing calibration or initial calibration verification by Method 6010B).	Number	Single	
Peak_ID_01	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 50; For DFTPP, m/z = 51	Number	Integer	
Percent_Ratio_01	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_01	Number	Single	
Peak_ID_02	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 75; For DFTPP, m/z = 68	Number	Integer	
Percent_Ratio_02	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_02.	Number	Single	
Peak_ID_03	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 95; For DFTPP, m/z = 69	Number	Integer	
Percent_Ratio_03	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_03.	Number	Single	

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Peak_ID_04	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 96 For DFTPP, m/z = 70	Number	Integer	
Percent_Ratio_04	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_04.	Number	Single	
Peak_ID_05	Identifies individual ions for GC/MS tuning compounds (I.e., BFB, DFTPP). For BFB, m/z = 173; For DFTPP, m/z = 127	Number	Integer	
Percent_Ratio_05	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_05	Number	Single	
Peak_ID_06	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 174; For DFTPP, m/z = 197	Number	Integer	
Percent_Ratio_06	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_06	Number	Single	
Peak_ID_07	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 175; For DFTPP, m/z = 198	Number	Integer	
Percent_Ratio_07	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_07.	Number	Single	
Peak_ID_08	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 176; For DFTPP, m/z = 199	Number	Integer	
Percent_Ratio_08	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_08.	Number	Single	
Peak_ID_09	Identifies individual ions for GC/MS tuning compounds (i.e., BFB, DFTPP). For BFB, m/z = 177; For DFTPP, m/z = 275	Number	Integer	
Percent_Ratio_09	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_09.	Number	Single	
Peak_ID_10	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 365	Number	Integer	
Percent_Ratio_10	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_10.	Number	Single	
Peak_ID_11	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 441	Number	Integer	
Percent_Ratio_11	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_11.	Number	Single	
Peak_ID_12	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 442	Number	Integer	
Percent_Ratio_12	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_12.	Number	Single	
Peak_ID_13	Identifies individual ions for GC/MS tuning compounds (i.e., DFTPP). For DFTPP, m/z = 443	Number	Integer	
Percent_Ratio_13	Ion abundance ratios of the GC/MS tuning compounds reported as a percentage. Linked to an individual Peak_ID_13.	Number	Single	

Note: Contains information related to tuning and calibration of laboratory instruments on an analyte basis.

* Date/time format is: MM/DD/YYYY hh:mm where MM = month, DD = day, YYYY = four digits of the year, hh = hour in 24 hour format, and mm = minutes.

Table A3: Field Description for the Sample Analysis (A3)

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Project_Number	Project number assigned by the client	Text	30	
Project_Name	Project name assigned by the client	Text	90	
Client_Sample_ID	Client's identifier for a sample If a sample is analyzed as a duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS and MSD respectively to the Client Sample ID (i.e., MW01DUP, MW01MS, and MW01MSD). For the Method Blanks, LCS, and LCSD enter the unique Laboratory_Sample_ID. Do not append suffixes for dilutions, reanalyses, or reextracts. For example, MW01DL and MW01RE are not allowed.	Text	25	
Collected	Date/Time the sample of sample collection Leave this field blank for Method Blank, LCS, and LCSD. For Trip Blanks, enter the collection date of associated samples.	Date/ Time	*	
Matrix_ID	Sample matrix (i.e., AQ, SO, etc.)	Text	10	See Table B
Lab_Sample_ID	Laboratory tracking number for field samples and lab generated QC samples such as method blank, LCS, and LCSD Append suffixes DUP, MS and MSD, without an intervening hyphen or space, for the sample duplicate, matrix spike, and matrix spike dup respectively (i.e., 9810001DUP, 9810001MS, and 9810001MSD). Suffixes may be applied to the Lab_Sample_ID to designate dilutions, reanalyses, etc. The Lab_Sample_ID must be unique for each Method Blank, LCS, and LCSD. Each Method Batch must contain records for a matrix spike for inorganic methods and a matrix spike and matrix spike duplicate for organic methods. Parent sample records must exist for each MS and MS/MSD. If an MS or MS/MSD is shared between two EDDs, records for the MS or MS/MSD and its parent sample must exist in the Sample Analysis table for both EDDs.	Text	25	
QC_Type	This record identifies the type of quality control sample QC (i.e., Duplicate, LCS, Method Blank, MS, or MSD) For regular samples, leave this field blank.	Text	10	See Table B
Shipping_Batch_ID	Unique identifier assigned to a cooler or shipping container used to transport client or field samples. Links all samples to a cooler or shipping container. No entry for method blanks, LCS, and LCSD.	Text	25	
Temperature	Temperature (in centigrade degrees) of the sample as received.	Number	Single	
Lab_Analysis_Ref_Method_ID	Laboratory reference method (i.e., 8260B, 8270C, 6010B, etc.). The Lab Analysis Ref Method ID is specified in the project library or QAPP.	Text	25	
Preparation_Type	Preparation Method Number (i.e, 3010A, 3510C, 3550C, 5030B, etc.) For methods that do not have a specific preparation method number, use “Gen Prep”.	Text	25	See Table B
Analysis_Type	Defines the analysis type (i.e., Dilution, Reanalysis, etc.). This field is critical for distinguishing samples when multiple analyses are submitted for the same sample and method (i.e. dilutions, reextracts, etc). Enter “RES” for initial sample records.	Text	10	See Table B
Prepared	Preparation date/time	Date/ Time	*	
Analyzed	Date and time of analysis	Date/ Time	*	
Lab_ID	Identification of the laboratory performing the analysis	Text	7	See Table B

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
QC_Level	Level of analytical laboratory QC associated with the analysis (i.e., Certificate of Analysis)	Text	6	See Table B
Result_Basis	Wet or dry weight	Text	3	See Table B
Total_Or_Dissolved	This field indicates if the results related to this sample and method are expressed as total or dissolved. This field is applicable to samples analyzed for metals.	Text	3	See Table B
Dilution	Overall dilution of the sample aliquot. A value of one corresponds to nominal method conditions. Insert value of one for blanks, LCS, and LCSD. Dilution must be expressed as a whole number.	Number	Single	
Handling_Type	Type of leaching procedure (i.e., SPLP,TCLP, WET).	Text	10	See Table B
Handling_Batch	Unique laboratory identifier for a batch of samples prepared together for a leaching procedure (i.e., SPLP, TCLP, or WET preparation). Links samples with leaching blanks.	Text	12	
Leachate_Date	Leachate date (i.e., date for SPLP, TCLP, or WET preparation)	Date/ Time	*	
Percent_Moisture	Percent of sample composed of water. Enter for soil and sediment samples only.	Number	Single	
Method_Batch	Unique laboratory identifier for a batch of samples of similar matrices analyzed by one method and treated as a group for field QC purposes. Links the matrix spike and/or matrix spike duplicate or laboratory duplicates to associated samples. Note, the Method_Batch association may coincide with the Preparation_Batch association. The Method_Batch is specifically used to link the MS, MS/MSD, or DUP to associated samples.	Text	12	
Preparation_Batch	Unique laboratory identifier for a batch of sample aliquots prepared together for analysis by one method. Links samples with method blanks and laboratory control samples. Note, the Preparation_Batch association may coincide with the Method_Batch association. The Preparation_Batch is specifically used to link the Method Blank and LCS to associated samples.	Text	12	
Run_Batch	Unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. Links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the “Run_Batch” also links a BFB or DFTPP tune and the initial calibration and initial calibration verification standards to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all sample/metal method records reported under one initial calibration can use the same Run Batch ID. A different and unique Run Batch ID must be used with every new initial calibration. The identifier entered in this field links a particular sample/method/analysis type record to a set of associated initial calibration and initial calibration verification records from Table A2.	Text	12	

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Analysis_Batch	Unique laboratory identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. Links the continuing calibration or calibration verification to subsequent, associated field sample and QC analyses. For GC/MS methods the “Analysis_Batch” also links the BFB or DFTPP tune and the continuing calibrations to associated samples and method QC analyses. Even though methods 6010B and 6020 are treated as individual metals methods, all sample/metal method records reported under one continuing calibration can use the same Analysis Batch ID. A different and unique Analysis Batch ID must be created with every new continuing calibration or continuing calibration verification. The identifier entered in this field links a particular sample/method/analysis type record to a set of associated continuing calibration records from Table A2.	Text	12	
Lab_Reporting_Batch	Unique laboratory identifier for a batch of samples including associated calibrations and method QC, reported as a group by the lab (i.e. lab work order #, log-in #, or SDG). Links all instrument calibrations, samples, and method QC reported as a group or SDG.	Text	12	
Lab_Receipt	Date the sample was received in the lab	Date/ Time	*	
Lab_Reported	Date the hardcopy data were reported by the lab	Date/ Time	*	

Note: Contains information related to laboratory sample and QC analyses (excluding calibrations and tunes), analytical methods, batching information, and sample preparation.

* Date/time format is: MM/DD/YYYY hh:mm where MM = month, DD = day, YYYY = four digits of the year, hh = hour in 24 hour format, and mm = minutes.

Table B: Standard Value List (SVL)

Field Name	Standard Value	Standard Value Description
Analysis_Type	DL	Dilution of the original sample
	DL2	Second dilution of the original sample
	DL3	Third dilution of the original sample
	DL4	Fourth dilution of the original sample
	RE	Reanalysis/reextraction of sample
	RE2	Second reanalysis/reextraction of sample
	RE3	Third reanalysis/reextraction of sample
	RE4	Fourth reanalysis/reextraction of the original sample
	RES	The initial or original sample.
Analyte_Name	Refer to QAPP and Project Library	Refer to QAPP and Project Library
Analyte_Type	IS	Internal standard as defined per CLP usage
	SPK	Spiked analyte
	SURR	Surrogate as defined as per CLP usage
	TIC	Tentatively identified compound for GC/MS analysis
	TRG	Target compound
Detection_Limit_Type	CRDL	Contract required detection limit
	IDL	Instrument detection limit
	MDA	Minimum detectable activity

Field Name	Standard Value	Standard Value Description
	MDL	Method detection limit
Handling_Type	WET	Wet leaching procedure
	SPLP	Synthetic Precipitation Leaching Procedure
	TCLP	Toxicity Characteristic Leaching Procedure
Lab_Qualifiers	*	INORG: Duplicate analysis was not within control limits
	*	ORG: Surrogate values outside of contract required QC limits
	+	INORG: Correlation coefficient for the method of standard additions (MSA) was less than 0.995
	A	ORG: Tentatively identified compound (TIC) was a suspected aldol-condensation product
	B	INORG: Value less than contract required detection limit but greater than or equal to instrument detection limit
	B	ORG: Compound is found in the associated blank as well as in the sample
	C	ORG: Analyte presence confirmed by GC/MS
	D	Result from an analysis at a secondary dilution factor
	E	INORG: Reported value was estimated because of the presence of interference
	E	ORG: Concentrations exceed the calibration range of the instrument
	H	Analysis performed outside method or client-specified holding time requirement
	J	Estimated value
	M	INORG: Duplicate injection precision was not met
	N	INORG: Spiked sample recovery was not within control limits
	N	ORG: Presumptive evidence of a compound
	P	ORG: Difference between results from two GC columns unacceptable (>25% Difference)
	S	Reported value was determined by the method of standard additions (MSA)
	U	Compound was analyzed for but not detected. Analyte result was below the _Reporting_Limit_Type.
	W	INORG: Post digestion spike was out of control limits
	X	Reserved for a lab-defined data qualifier
	Y	Reserved for a lab-defined data qualifier
	Z	Reserved for a lab-defined data qualifier
Lab_ID		List of contract laboratories. To be established by each contractor.
Matrix_ID	AIR	Air
	AQ	Water
	ASH	Ash
	BIOTA	Biological matter
	FILTER	Filter
	LIQUID	Non-aqueous liquid
	OIL	Oil
	SED	Sediment
	SLUDGE	Sludge
	SO	Soil
	SOLID	Non-soil/sediment solid
	TISSUE	Tissue
	WASTE	Waste
Preparation_Type	3005A	Acid Digestion of Waters for Total Recoverable or Dissolved Metals by FLAA or ICP
	3010A	Acid of Aqueous Samples and Extracts for Total Metals by FLAA or ICP

Field Name	Standard Value	Standard Value Description
	3015	Microwave Assisted Acid Digestion of Aqueous Samples and Extracts
	3020A	Acid Digestion of Aqueous Samples and Extracts for Total Metals by GFAA
	3031	Acid Digestion of Oils for Metals Analysis by AA or ICP
	3050B	Acid Digestion of Sediments, Sludges, and Soils
	3051	Microwave Assisted Acid Digestion of Sediments, Sludges, Soils and Oils
	3052	Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices
	3060A	Alkaline Digestion for Hexavalent Chromium
	3510C	Separatory Funnel Liquid-Liquid Extraction
	3520C	Continuous Liquid-Liquid Extraction
	3535	Solid Phase Extraction
	3540C	Soxhlet Extraction
	3541	Automated Soxhlet Extraction
	3545	Pressurized Fluid Extraction
	3550B	Ultrasonic Extraction
	3560	Supercritical Fluid Extraction of Total Recoverable Petroleum Hydrocarbons
	5030B	Purge and Trap for Aqueous Samples
	5035	Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
	7470A	Acid digestion of waters for Mercury analysis
	7471A	Acid digestion of soils and solids for Mercury analysis
	Gen Prep	Generic preparation type when a preparation method ID does not exist (used mostly for general chemistry methods)
QC_Level	COA	Certificate of Analysis (accuracy and precision, no calibration)
	COACAL	Certificate of Analysis (accuracy and precision including calibration)
QC_Type	MB	Analytical control consisting of all reagents and standards that is carried through the entire procedure (Method Blank)
	CV	(Calibration Verification) Analytical standard run at a specified frequency to verify the calibration of the analytical system
	CCV	(Continuing Calibration Verification) Analytical standard run every 12 hours to verify the calibration of the GC/MS system
	DUP	A second aliquot of a sample that is treated the same as the original aliquot to determine the precision of the method
	EB	Field equipment rinsate
	FB	(Field blank) Analyte-free water or solvent brought to the field in sealed containers and transported to lab with sample containers
	FD	Duplicate sample taken from a field sample
	IC	(Initial Calibration) Analysis of analytical standards for a series of different specified concentrations
	ICV	(Initial Calibration Verification) Analytical standard run at a specified frequency to verify the accuracy of the initial calibration of the analytical system
	IPC	(Instrument Performance Check) Analysis of DFTPP or BFB to evaluate the performance of the GC/MS system
	LCS	(Laboratory Control Sample) A control sample of known composition
	LCSD	(Laboratory Control Sample Duplicate) A duplicate control sample of known composition
	MS	(Matrix Spike) Aliquot of a matrix spiked with known quantities and subjected to the entire analytical procedure to measure recovery
	MSD	(Matrix Spike Duplicate) A second aliquot of the same matrix as the matrix spike that is spiked in order to determine the precision of the method
	PB	(Preparation Blank) Analytical control containing distilled, deionized water and reagents, and subjected to entire analytical procedure

Field Name	Standard Value	Standard Value Description
	SB	(Storage Blank) Aliquot of analyte-free water or solvent stored with the samples as a check on contamination from the storage process
	TB	(Trip Blank) Analyte free water transported with sample bottles prior to and after sample collection
Reporting_Limit_Type	CRDL	Contract required detection limit
	CRQL	Contract required quantitation limit
	PQL	Practical quantitation limit
	SQL	Sample quantitation limit
	RDL	Reportable detection limit
Result_Basis	DRY	Result was calculated on a dry weight basis
	WET	Result was calculated on a wet weight basis
Result_Units*	ug/L	Micrograms per liter
	mg/L	Milligrams per liter
	ug/Kg	Micrograms per kilogram
	mg/Kg	Milligrams per kilogram
	pg/L	Picograms per liter
	ng/Kg	Nanograms per kilogram
Total_Or_Dissolved	DIS	Dissolved
	TOT	Total

*Additional result units are acceptable by adding these to the standard value table.

ADaPT STANDARD VALUES FOR METHODS

A method name must exist in standard value table before it can be added to a project library. The project library controls what is accepted in the EDD. Table C lists all the methods built into the ADaPT standard value table. Additional methods can be added to this table if necessary. If a particular method specified in the QAPP or used by the laboratory is not listed in this table, it must be added to the standard value table before that method can be built into a project library. Methods added to a project library become standard values for the Lab Reference Method ID field (method field) in any EDD processed through the error checker when selecting that project library as reference.

STANDARD VALUES FOR ANALYTES

A CAS number and analyte name must exist in the standard value table before it can be added to a method in a project library. The ADaPT standard value table contains records for several thousand compound names and their CAS numbers. Additional analyte name records can be added if necessary. Analyte names and CAS numbers added to a method within a project library become standard values for the Analyte Name and Client Analyte ID (CAS number) fields in any EDD processed through the error checker when selecting that project library as reference.

Table C: Standard Values for Analytical Methods

Method	Description
524.2	Volatile Organic Compounds by GC/MS in Drinking Water
6010B	Metals by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ag	Silver by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Al	Aluminum by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-As	Arsenic by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-B	Boron by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ba	Barium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Be	Beryllium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ca	Calcium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cd	Cadmium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Co	Cobalt by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cr	Chromium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Cu	Copper by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Fe	Iron by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-K	Potassium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Li	Lithium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mg	Magnesium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mn	Manganese by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Mo	Molybdenum by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Na	Sodium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Ni	Nickel by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-P	Phosphorus by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Pb	Lead by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sb	Antimony by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Se	Selenium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sn	Tin by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Sr	Strontium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-TCLP	TCLP Metals by Inductively Coupled Plasma-Atomic Emission Spectroscopy

Method	Description
6010B-Tl	Thallium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-V	Vanadium by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6010B-Zn	Zinc by Inductively Coupled Plasma-Atomic Emission Spectroscopy
6020	Metal by Inductively Coupled Plasma/Mass Spectrometry
7041	Antimony by Graphite Furnace Atomic Absorption
7060A	Arsenic by Graphite Furnace Atomic Absorption
7081	Barium by Graphite Furnace Atomic Absorption
7091	Beryllium by Graphite Furnace Atomic Absorption
7131A	Cadmium by Graphite Furnace Atomic Absorption
7191	Chromium by Graphite Furnace Atomic Absorption
7201	Cobalt by Graphite Furnace Atomic Absorption
7211	Copper by Graphite Furnace Atomic Absorption
7381	Iron by Graphite Furnace Atomic Absorption
7421	Lead by Graphite Furnace Atomic Absorption
7461	Manganese by Graphite Furnace Atomic Absorption
7470A	Mercury by Graphite Furnace Atomic Absorption
7471A	Mercury by Graphite Furnace Atomic Absorption
7481	Molybdenum by Graphite Furnace Atomic Absorption
7521	Nickel by Graphite Furnace Atomic Absorption
7740	Selenium by Graphite Furnace Atomic Absorption
7761	Silver by Graphite Furnace Atomic Absorption
7841	Thallium by Graphite Furnace Atomic Absorption
7911	Vanadium by Graphite Furnace Atomic Absorption
7951	Zinc by Graphite Furnace Atomic Absorption
8011	1,2-Dibromoethane and 1,2-Dibromo-3-chloropropane by Microextraction and GC
8015B	Non-halogenated organics by GC using FID
8015B DRO	Diesel Range Organics by GC using FID
8015B Extractable TPH	Extractable Petroleum Hydrocarbons as Gasoline
8015B GRO	Gasoline Range Organics by GC using FID
8015B Purgeable TPH	Purgeable Petroleum Hydrocarbons as Diesel and Motor Oil
8021B	Aromatic and Halogenated Volatiles by GC using PID/ECD
8081A	Organochlorine Pesticides by GC using ECD
8082	Polychlorinated Biphenyls (PCBs) by GC using ECD or ELCD
8082 PCB Congeners	Polychlorinated Biphenyl Congeners by GC using ECD or ELCD
8141A	Organophosphorus Compounds by GC
8151A	Chlorinated Herbicides by GC using Methylation or Pentafluorobenzylation
8260B	Volatile Organic Compounds by GC/MS
8270C	Semi-Volatile Organic Compounds by GC/MS
8270C-SIM	Semi-Volatile Organic Compounds by GC/MS SIM
8280A	Polychlorinated Dibenzo-p--Dioxins and Polychlorinated Dibenzofurans
8290	Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans
8310	Polynuclear Aromatic Hydrocarbons by HPLC
8330	Nitroaromatics and Nitramines (Explosives) by HPLC
9040	pH Electrometric Measurement
9045	Soil and Waste pH
9056	Determination of Inorganic Anions by Ion Chromatography

Method	Description
300.0	Determination of Inorganic Anions by Ion Chromatography
353.2	Determination of Total Nitrate-Nitrite by Colorimetry
160.1	Total Dissolved Samples
310.1	Alkalinity
415.1	Total Organic Carbon by combustion or oxidation
DHS Luft/7420	Organic lead
410.4	Chemical Oxygen Demand by Colorimetry
SM 3500-Fe D#4	Determination of Iron by Colorimetry
SM 4500-CO2 D	Carbon Dioxide
351.2	Total Kjeldahl Nitrogen
7196A	Hexavalent Chromium (Colorimetric)

Note: Additional methods or variations on method names can be added to the standard value table.

Table D1 (1 of 2): Required Fields in the Analytical Results Table for GC/MS, GC, and HPLC Methods

	GC/MS Methods			GC and HPLC Methods		
Field	Regular Sample*	MS/MSD	Method Blank, LCS/LCSD	Regular Sample [a]	MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time	T		T			
Analyte_Type	X	X	X	X	X	X
Percent_Recovery	S	R	R	S	R	R
Relative_Percent_Difference		D	D		D	D
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

X Required Field
D Required field for spiked compounds in the LCSD and MSD only
Q Required field if laboratory has qualified result
R Required field if Analyte_Type = “SPK” or “SURR”
S Required field for surrogate compounds only
T Required field for tentatively identified compounds by GC/MS only
[a] Also includes Equipment Blanks, Field Blanks, and Trip Blanks.

Table D1 (2 of 2): Required Fields in the Analytical Results Table for ICAP, AA, and IC Methods

Field	ICAP and AA Methods			IC and Wet Chemistry Methods		
	Regular Sample*	Sample Duplicate, MS/MSD	Method Blank, LCS/LCSD	Regular Sample*	Sample Duplicate MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time						
Analyte_Type	X	X	X	X	X	X
Percent_Recovery		S	S		S	S
Relative_Percent_Difference		R	R		R	R
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

X Required field
Q Required field if laboratory has qualified result
R Required field for spiked compounds in LCSD or MSD, or target compounds in the Sample Duplicate only
S Required field if Analyte_Type = “SPK”
* Also includes Trip Blanks, Equipment Blanks, and Field Blanks

Table D2: Required Fields in the Laboratory Instrument Table

Field	GC/MS Tunes		Initial Calibration				Initial Calibration Verification				Calibration Verification, Continuing Calibration
	VOA	SVOA	GC/MS	GC HPLC	ICP/AA	IC*	GC/MS	GC HPLC	ICP/AA	IC*	All Methods
Instrument_ID	X	X	X	X	X	X	X	X	X	X	X
QC_Type	X	X	X	X	X	X	X	X	X	X	X
Analyzed	X	X	X	X	X	X	X	X	X	X	X
Alternate_Lab_Analysis_ID	X	X	X	X	X	X	X	X	X	X	X
Lab_Analysis_ID	X	X					X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X	X	X	X	X	X
Run_Batch	X	X	X	X	X	X	X	X	X	X	X
Analysis_Batch	C	C									X
Lab_Reporting_Batch	X	X	X	X	X	X	X	X	X	X	X
Percent_Relative_Standard_Deviation			X	X							

Field	GC/MS Tunes		Initial Calibration				Initial Calibration Verification				Calibration Verification, Continuing Calibration
	VOA	SVOA	GC/MS	GC HPLC	ICP/AA	IC*	GC/MS	GC HPLC	ICP/AA	IC*	All Methods
Correlation_Coefficient			B	B	X	X					
Relative_Response_Factor			X				X				M
Percent_Difference							X	X	X	X	X
Peak_ID_01	X	X									
Percent_Ratio_01	X	X									
Peak_ID_02	X	X									
Percent_Ratio_02	X	X									
Peak_ID_03	X	X									
Percent_Ratio_03	X	X									
Peak_ID_04	X	X									
Percent_Ratio_04	X	X									
Peak_ID_05	X	X									
Percent_Ratio_05	X	X									
Peak_ID_06	X	X									
Percent_Ratio_06	X	X									
Peak_ID_07	X	X									
Percent_Ratio_07	X	X									
Peak_ID_08	X	X									
Percent_Ratio_08	X	X									
Peak_ID_09	X	X									
Percent_Ratio_09	X	X									
Peak_ID_10		X									
Percent_Ratio_10		X									
Peak_ID_11		X									
Percent_Ratio_11		X									
Peak_ID_12		X									
Percent_Ratio_12		X									
Peak_ID_13		X									
Percent_Ratio_13		X									

X Required field (some fields are not applicable to some General (Wet) Chemistry tests)
B Required field if reporting best fit
C Required field if BFB or DFTPP associated with a continuing calibration only
M Required field for GC/MS continuing calibration only
*IC Includes Ion Chromatography and Classical or Wet Chemistry methods. Methods such as pH, Conductivity, and others do not use traditional calibration procedures, therefore some fields marked as a required field under the “IC” column do not apply for these methods.

Table D3: Required Fields in the Sample Analysis Table

	GC, GC/MS, HPLC Methods		ICAP and AA Methods		IC and Wet Chemistry Methods	
Field	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD
Client_Sample_ID	X	X	X	X	X	X
Collected		X		X		X
Matrix_ID	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
QC_Type	X	Q	X	Q	X	X
Shipping_Batch_ID		X		X		X
Temperature		X				X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Preparation_Type	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Prepared	A	A	X	X	N	N
Analyzed	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
QC_Level	X	X	X	X	X	X
Results_Basis		S		S		S
Total_Or_Dissolved			W	W		
Dilution	X	X	X	X	X	X
Handling_Type	L	L	L	L	L	L
Handling_Batch	L	L	L	L	L	L
Leachate_Date	L	L	L	L	L	L
Percent Moisture		S		S		S
Method_Batch	X	X	X	X	X	X
Preparation_Batch	X	X	X	X	X	X
Run_Batch	C	C	C	C	C	C
Analysis_Batch	C	C	C	C	C	C
Lab_Reporting_Batch	X	X	X	X	X	X
Lab_Receipt		X		X		X
Lab_Reported	X	X	X	X	X	X

X Required field
A Required field for samples prepared by methanol extraction
C Required field if Instrument Calibration Table (A2) is included in EDD
L Required field if analysis performed on SPLP, TCLP, or WET extracts
N Required field only for samples that require preparation before analysis
Q Required field for Sample Duplicate, MS, and MSD only
S Required field if “Matrix_ID” = “SO” or “SED”
W Required field for aqueous samples only
* Includes Trip Blanks, Equipment Blanks, and Field Blanks

Table E-1: Screening Criteria for Waikane Valley Training Area Soil

Analyte Name	CAS No.	Project Quantitation Limit (mg/kg)	Project Screening Criteria		
			EPA Region IX (2004) Residential Soil PRG (mg/kg)	DOH (2007) EALs (mg/kg)	Koolau Volcanic Soil 95th Percentile (mg/kg)
Nitroaromatics/Nitramines - SW-846 8330					
HMX	2691-41-0	0.2	3,100	0.21	
RDX	121-82-4	0.2	4.4	0.41	
1,3,5-trinitrobenzene	99-35-4	0.2	1,800		
1,3-dinitrobenzene	99-65-0	0.1	6.1	0.2 [1]	
Nitrobenzene	98-95-3	0.2	20	0.65	
Tetryl (2,4,6-trinitrophenyl-n-	479-45-8	0.2	610	5.8	
2,4,6-trinitrotoluene	118-96-7	0.2	16	0.67	
4-amino-2,6-dinitrotoluene	1946-51-0	0.1	12	0.2 [1]	
2-amino-4,6-dinitrotoluene	35572-78-2	0.2	12		
2,4-dinitrotoluene	121-14-2	0.1	120	0.33	
2,6-dinitrotoluene	606-20-2	0.2	61	0.5	
2-nitrotoluene	88-72-2	0.4	0.88	0.87	
3-nitrotoluene	98-08-1	0.4	730	21	
4-nitrotoluene	99-99-0	0.4	12	12	
Metals - SW-846 6010B					
Aluminum	7429-90-5	10	76,000		93,000
Antimony	7440-36-0	3	0.39	20	6.9
Barium	7440-39-3	0.5	5,400	750	181
Chromium (total)	7440-47-3	0.5	210	210	483
Copper	7440-50-8	0.5	3,100	230	183
Iron	7439-89-6	5	23,000		177,000
Lead	7439-92-1	0.15	400	200	27
Nickel	7440-02-0	1	1,600	150	346
Zinc	7440-66-6	1	23,000	600	197

Notes:

Analytes with a blank space in its respective screening level column do not have established screening levels for that constituent.

mg/kg = milligrams per kilogram

References:

Department of Health, State of Hawaii (DOH). February 2007. Environmental Action Levels (EALs). Not a drinking water source, <150m to nearest surface water body

Earth Tech Inc. 2006. Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, Oahu, Hawaii. Pearl Harbor, HI: Pacific Division, Naval Facilities Engineering Command. May.

Environmental Protection Agency, United States, Region IX (EPA Region IX). 2004. *EPA Region 9 PRGs* [Preliminary Remediation Goals] *Tables.* San Francisco. October.

[1] The HDOH EALs for 1,3-dintrobenzene and 4-amino-2,6-dinitrotoluene are 0.095 mg/kg and 0.12 mg/kg respectively. Since these levels are below both the analytical method and laboratory QLs, the project action levels will be set at the laboratory QL of 0.2 mg/kg.

5090
Ser 04XQ(LABS)/054
March 6, 2008

From: Director, Laboratory Quality and Accreditation Office (LQAO)
To: QA Program Coordinator, Consultation/Information Management Branch, Naval Facilities Engineering Service Center (Code 413), Port Hueneme CA 93043-4307

Subj: PROJECT REVIEW

Ref: (a) Draft Final Site Inspection Work Plan, Munitions Response Sites, Waikane Valley Training Area, Kaneohe, Hawaii

Encl: (1) Project Review for *Draft Final Site Inspection Work Plan, Munitions Response Sites, Waikane Valley Training Area, Kaneohe, Hawaii, January 2008*

1. Enclosure (1) provides a review of project planning documents for the site investigation at Waikane Valley Training Area, Kaneohe, Hawaii.

2. If you have any questions, please contact Jordan Adelson, at (843) 764-7337 or DSN 794-7337.

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Project Review for the Draft Final Site Inspection Work Plan, Munitions Response Sites, Waikane Valley Training Area, Kaneohe, Hawaii

Prepared for:
Naval Facilities Engineering Service Center
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Prepared on:
6 March 2008

1. Introduction

The Naval Sea Systems Command (NAVSEA) Laboratory Quality and Accreditation Office (LQAO) performed a review of planned sampling, testing, and quality assurance/quality control activities described in the draft final Site Inspection Work Plan, Munitions Response Sites, Waikane Valley Training Area, Kaneohe, Hawaii, prepared by USA Environmental, Incorporated. NAVSEA LQAO reviewed the documents to determine conformance with Navy Environmental Restoration (ER) Quality Assurance (QA) Program requirements.

The *Naval Installation Restoration Chemical Data Quality Manual (IRCDQM),* September 1999; the *DoD Quality Systems Manual for Environmental Laboratories (DoD-QSM),* Version 3, January 2006; and the *Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), March 2005* provide the standards for performing the review. Contract specifications were not available for review.

Major comments include the following:

1. The SAP does not sufficiently define the DQOs for this project. More information is needed relative to what decisions are to be made from the data collected from this project. (See comment #10 for details).
2. The SAP does not sufficiently describe the development of project-specific Measurement Quality Objectives (MQOs). MQOs (i.e. required performance criteria for precision, accuracy, and sensitivity) are project-specific criteria, not laboratory-generated criteria. They are developed by the project to ensure collected data meet the project-specific DQOs. The SAP should include a table that specifies the types, frequency, and performance criteria for all method-specified QC, as well as corrective action and reporting requirements. The table should include project-specific action limits or concentrations of concern for each target analyte in each matrix, to ensure that method sensitivity is adequate. (See comment #17 for details).
3. The SAP does not provide sufficient description and rationale for using the sample design proposed. (See comments #12, 16, and 20 for details).

Table 1 contains the results of this review.

Table 1: Review Comments

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1.	WS #1	H		Required signatures incomplete	A signature line must be added for the NAVFAC Chemist and the approval signature line should specify the approval entity.	Section 2.1 of the QFP-QAPP Manual does not specify that a chemist must sign the document, therefore, the NAVFAC Pacific RPM will determine whose signatures will be required.
2.	WSs #1, 2, 9, 11, and 16	H		Dates and scoping session are not current	Dates for this project stated on worksheets are taken from Section 5, Figure 5-1 of the Work Plan. Since all of the dates provided are from 2005 through 2007, they are no longer applicable. WS #1 – It appears that November 15, 2006 is the preparation date of this document, which is more than a year ago. WS #2 – It appears that August 29, 2006 is the last scoping session, which is more than a year ago. WS #9 – The dates of sampling are listed as March 19, to April 9, 2007. WS #11 – Dates of sampling are Spring of 2007. WS # 16 – Contains current dates that are not consistently cited in other worksheets. An additional scoping session is recommended in order to update the project activities timeline and include any changes to the project requirements relative to changes in regulations and requirements. It is recommended that this scoping session include the applicable regulators.	Due to the length of time between the last draft revision, the dates on this version of the QAPP will be revised as applicable. The recommendation for an additional scoping session has been noted.
3.	WS #2	L		Guidance references incomplete	Documents referenced in the worksheets need to be included in the list of guidance used to prepare the QAPP as the worksheets direct the reader to those documents for additional information. Such documents include: • DoD QSM Version 3 • Applicable regulations (Hawaii Dept. of Health	Worksheet #2 has been modified to include all referenced documents. Final drafts of reports will be used if they are available.

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					environmental action levels and US EPA Region 9 preliminary remediation goals • US Army Corp of Engineers Military Munitions Response Action Engineering Manual (EM 1110-1-4009). • Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, Pacific Division, Naval Facilities Engineering Corp. • US Navy Range Sustainability Environmental Program Assessment Policy Implementation Manual, December 2003 • Project Procedures Manual, US Navy Environmental Restoration Program, NAVFAC Pacific (February 2007) The Preliminary Range Assessment Report for Waikane Valley Training Area (Army Corps of Engineers, 1998), DERP-FUDS Inventory Project Report, Waikane Training Area, Island of Oahu, Hawaii, Site No. H09H1035400, Army Corps of Engineers, 1996, and the Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, June 2006 cited on other worksheets should be listed in Item #6. The data from these reports was used in determining the sample design and rationale for this project. In order to avoid inaccurate information, final reports, not draft reports, of previous applicable site investigations should be used as guidance documents, when available.	
4.	WSs #2 and 11	L		End user is incorrect	The end user of the data is relative to the project, not the report that is generated. The contractor is not the end user, the lead organization is.	Item 8 on Worksheet #2 has been changed to read NAVFAC Pacific only. NAVFAC Pacific will be added to the first paragraph on Worksheet #11.
5.	WSs #3 and 4	H		Personnel lists are incomplete	The Distribution List is missing: • Navy project chemist	Per discussions with the RPM, Fish and Wildlife Service, National Oceanic and

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					• EPA Region 9 representative • Hawaii Department of Health The Sign-off List is missing: • Navy project chemist • EPA Region 9 representative • Hawaii Department of Health	Atmospheric Administration, and Hawaii Dept of Health have been added to the Distribution List on Worksheet #3. Since DOH is lead regulatory agency, EPA receives the final SI report only. Sign-off Sheet on Worksheet 4 is only intended for personnel who participate in the field work.
6.	WS #5	H		Reporting relationships are not adequately defined	This chart doesn't make clear the lines of communication and lines of authority. These lines are not always interchangeable; therefore, the chart should distinguish between the two. For example, according to the chart, there is no link between the group validating the data and the laboratory or the lead organization and the validator. The chart does not reflect the communication pathways presented on WS #6. The project organization chart does not include the Hawaii Department of Health personnel.	The chart on Worksheet #5 has been revised. A note has been added to this worksheet directing the reader to Section 2.6 of the work plan for a chart of the field team organization.
7.	WS #6	L		Timing and mode of communication are not provided	The maximum amount of time allotted for communication to occur for each driver and the mode of communication are not defined.	Times for communication drivers have been added to Worksheet #6.
8.	WS #6	H		Responsible entity is incorrect or not identified	NAVFAC Pacific has final approval for the release of any analytical data, not the contractor as stated. The individual responsible for providing direction to the laboratory when QA/QC issues have been reported is not identified.	The responsible entity for the release of data has been changed to the NAVFAC Pacific RPM. The last entry in Worksheet #6 has been changed to show that the Project Chemist will be responsible for providing direction to the laboratory when QA/QC issues are reported.
9.	All	H		Worksheets are not stand-alone	The worksheets are intended to be a stand-alone document. Any information needed to support the project and goals and uses must be contained in the worksheets. For example: • WS #8 contains a footnote that directs the reader	This QAPP is an appendix to the project work plan. As noted at the end of Worksheet #2, crosswalks to QAPP elements found in the project work plan have been used to avoid redundancy.

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					to refer to the DDESB TP-18. • WS #11 refers to the Work Plan, Section 1.4.2.1 for detailed information on the type of MC associated with the known or suspected munitions used at Waikane. • WS #22 refers to the work plan for the information needed.	
10.	WS #10	H		Problem Definition is incomplete	Information needed to support the DQOs of this project is not provided or is too vague to support the project goals. Missing information includes: • Present use and possible future site use • Site description (geology, hydrology, endangered species, settings, cultural setting, natural resources, etc.) • Site accessibility by government personnel • Synopsis of secondary data or information from the Preliminary Assessment/Site Investigation that was conducted, and other information previously collected for the MRS The goals of this project are vague and more information is needed to support the objective relative to site history and previously collected information. The WS states it was deemed improbable that the property could be cleared of all ordnance contamination due to previous evaluations of the site finding large quantities of MECs. Missing information (geology, hydrology, and inhabitants, etc.) is needed to evaluate the potential MC and MEC migration off-site. Information on the accessibility of the site is needed to evaluate the present potential human health risk relative to government personnel. No specific information on what was found during the previous site investigations was provided and a specific target analyte list for this project is not provided as well.	The information stated as missing is located in Section 1 of the work plan. The following sentence has been added to the end of the Project Definition on Worksheet #10 as a crosswalk: "Refer to Section 1 of the Project Work Plan for additional background information, physical characteristics and the conceptual site model for this site." The goal of this SI is stated under the Project Description - to collect information to augment a PA conducted in 1998 to determine if a release or potential release has occurred. Refer to the discussions in Section 1 of the work plan. Refer to the conceptual site model evaluating migration and exposure pathways in Section 1.4 of the work plan.

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					The worksheet states the results will be compared to the corresponding Hawaii Dept. of Health (HDOH) environmental action levels (EALs) and U.S. EPA Region 9 preliminary remediation goals (PRGs) to determine if the soil contains MC above the project action limits (PALs). It does not provide the EALs or PRGs. The evaluation of metals data must be against known background levels as well. Project decision statements relative to concentrations found versus PQL, PQL, background concentrations, and sample QC performance are needed.	The EALs and PRGs for all target analytes have been added as Attachment E. In order to differentiate between naturally-occurring background levels of MC constituents at the sites, the analytical results for metals in the soil samples will also be compared to the 95th percentile background concentrations of metals from the *Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities*, Pacific Division, Naval Facilities Engineering Command
					Due to the lack of information on future potential uses of the land, it is unclear as to what the specific purpose of this investigation is and why the project is taking place. Many previous MEC site investigations have determined MECs are prevalent and often remain undetected until heavy rains expose them.	
					It is suggested the project include contingencies for situations where a large number of MECs are detected during the site investigation prior to soil sampling activities. It would save on resources to not sample the soil if the MEC investigation has already determined there are substantial risks present and the site needs to undergo further clean-up.	The goal of this SI is to determine whether there is a release or potential release and the nature of the associated threats. Refer to Section 1.2 of the work plan for a discussion of Land Use.
						The project is designed to confirm the presence of MEC and MC. USAE has set aside 10 samples for confirmatory sampling of MC at locations where MEC is found. Since the intent is confirmatory in nature, the number of samples is considered both reasonable and adequate.

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11.	WSs #11 and 17	H		Information inconsistent with other WSs	WS #11 states the samples will be taken as described in WS #17. WS #17 states 10 biased soil samples and 1 QC sample will be collected at locates of MECs found during the MEC investigation. The WS does not discuss how locations are selected when a large number of MEC locations are detected.	A sentence has been added to Worksheet #17 stating that the first 10 discoveries will be sampled.
12.	WSs #10, 11, 12, 15, 17, 18, and 28	H		Target analyte list and methods are inconsistent or vague throughout worksheets	The target analyte list consists of indicator metals that are stable in soil and not easily dissolved in water and the 14 nitroaromatics and nitramines analyzed for by EPA SW-846 Method 8330. The WS states these analytes were selected as targets for this project because they are indicators and marker compounds according to Navy guidance. It is suggested the target analytes list for this project be made after considering the site history and results of the preliminary SI and EA, and not a default list. For example, according to the work plan PETN, nitrglycerine, and picric acid were target anlytes in the EA. Justification for inclusion or exclusion of metals and nitroaromatic and nitramines is needed. The WS provides the analytical procedures to be used, however, no information is provided for sample preparation and clean-up procedures.	As noted on Worksheet #17, Sampling Design and Rationale, the sampling design for this project has been based on the review of historical data including the PA, previous site inspections/surveys, photographs, and current site conditions. In addition, the review comments received from other Navy and Marine reviewers on the Draft QAPP were considered before selecting the final target analytes. Worksheet #11 refers the reader to Section 1.4.2.1 of the work plan for detailed discussion of the type of MC associated with the known or suspected MEC used at Waikane. Sample preparation procedures have been referenced in Worksheet #19 and #23, and included in Attachment C.
13.	All	L		Outdated references used	The worksheets need to be updated to reference the current version of Navy manuals. For example: • WSs #11 and 14 reference the Project Procedures Manual, US Navy PACDIV Installation Restoration Program, October 1998, not February 2007.	The reference to the Project Procedures Manual will be revised as noted.
14.	WS #11	H		The answer to the question "How good do the data need to be?" is not specific	The text only references measurement performance criteria and action levels specified on other worksheets. It does not state to what extent the data needs to meet specified requirements in order for	The answer to this question "How good do the data need to be?" on Worksheet #11 has been revised to note that the data must meet the Project Quantitation Limits noted in

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					the project's DQOs to be met.	Worksheet #15.
15.	WS #11	H		Requirements are too vague	The WS states the laboratory will report the data in accordance with the DoD Quality System Manual and the laboratory's quality assurance plan. The DoD QSM contains minimal guidance on data reporting. The WS states in another paragraph that the data will be reported in the format noted in Attachment C. Attachment C contains reporting formats for metals analysis, but does not contain requirements for HPLC analysis (Method 8330).	Worksheet #11 has been revised to note that the laboratory will report the data in accordance with Attachment 1-A-7-1 of NAVFAC ERP Procedure 1-A-7 (DON 2007) in addition to the DOD QSM and their QA plan. A table for Method 8330 has been added to Attachment C.
16.	WS #11	H		Rationale for sample design is not supported	The rationale for conducting multi-incremental sampling and biased discrete sampling is not supported. Detailed rationale needs to be provided to show how the sampling design will meet the project DQOs.	Multi-incremental soil sampling is not being conducted on this project, composite sampling is. Refer to Section 1.4 of the project work plan and Worksheet #17 for the rationale behind the sampling design.
17.	WSs #12, 15, and 28	H	4	MPC is laboratory specific, not project-specific	The MPCs listed for laboratory DQIs are directly taken from the in-house generated limits the laboratory provided. The limits need to be evaluated to determine whether the DQOs can still be met. The spreadsheets state the limits are for the time period of Feb 26, 2006 through August 26, 2006. The laboratory is required to update their in-house limits on a yearly basis, at a minimum. By the time the samples are collected and the data is generated, these limits may no longer be applicable to the laboratory. The projects MPCs may no longer be achievable by the laboratory. This is also the case when setting the project reporting limits from the laboratory reporting limits. The laboratory bases their reporting limits off of MDL limits, which are generated on a yearly basis, therefore they can change frequently.	The objective of the soil sampling effort is to compare concentrations of MC in the soil to the Project Action Limits (AL) in order to evaluate if further action should be recommended. Given the relatively high Project ALs, the achievable laboratory limits listed in the worksheets are more than adequate as MPCs to meet the project objectives. Updated laboratory QC limits and MDL studies have been provided in Attachment C. Any increase in these limits between now and the time samples are collected are not anticipated to be significant given the high Project ALs.

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					The acceptance limits provided for the LCS are different than those provided for the MS and MSD. If the MS and MSD are to be used for matrix interference evaluation, than the limits for the MS and MSD should be the same as the LCS (required by the DoD QSM).	The acceptance limits for the MS and MSD have been revised as required by the DoD QSM.
					The MPC for the method blank for the explosives analysis states all target analytes < RL. The laboratory RL and project RL are the same (0.2 mg/kg) for 11 of the target analytes. The Project Action Limit (PAL) and Project Quantitation Limit (PQL) for HMX, 1,3-dinitrobenzene, 4-amino-2,6-dinitrotoluene, and 2,4-dinitrotoluene are at or very near 0.2 mg/kg. This would mean contamination in blanks would be acceptable at levels near the PAL. It should be noted that the DoD QSM sets the minimum requirement of < ½ RL for method blanks.	The MPC for the method blank has been changed to ½ the QL on Worksheet #12 and 28. The project QL for 1,3-dinitrobenzene, 2,4-dinitrotoluene and 4-amino-2,6-dinitrotoluene have been changed to 0.1 mg/kg.
					Note 3 of WS #15-1 notes the HDOH EALs for 1,2-dinotrobenzene and 4-amino-2,6-dinitrotoluene are 0.095 and 0.12 mg/kg, respectively. It states that since these are below the capabilities of the laboratory, the PAL and PQLs have been set to the laboratory's QL. Because regulators were not involved in the scoping sessions for this project, it is not known whether this is acceptable to them..	The HDOH EAL supporting documentation allows the use of the laboratory reporting limit for low EALs. HDOH was also a reviewer of this QAPP but had no comments regarding this issue.
					Metals data must be evaluated against background concentration information as well. It is suggested that another column be included in WS #15-2 to include the background concentrations for each analyte. This would help to ensure the PAL and PQLs are reasonable for this specific site.	The background metal concentrations have been added to the screening criteria in Attachment E.
					The criteria of 90% completeness cannot be	As stated in Worksheet #37, "Completeness

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					demonstrated with the number of samples to be analyzed.	equals the total number of sample results for each fraction minus the total number of rejected sample results divided by the total number of sample results multiplied by 100". This can be demonstrated with 3 samples.
18.	WS #12	H		DQIs incorrectly stated	The DQIs for the matrix spike and matrix spike duplicate are listed as indicators for the laboratory. They are indicators for the sample matrix, not the laboratory.	The DQI for MS will be changed to read "Accuracy/Bias – matrix". The DQI for the MSD will be changed to read "Precision".
19.	WS #16	H		Field document and field sampling assessment activities not included	Field document and field sampling assessments are not included in the project schedule.	At this time, the exact date of the assessments are not known so they have not been included on Worksheet #16.
20.	WS #17	H		Descriptions of the sample design and rationale are not complete	More specifics are needed relative to current site use, future site use, and previous site investigation results in order to support the proposed sample design. The worksheet states where information was pulled from to support the sample design (e.g. previous site inspections and surveys and current site conditions), but does not provide any of the specifics needed to support the design choice. For instance, according to previous site inspections and surveys, there has been an excessive number of MECs discovered during each outing. The land was relinquished back to the government due to MECs being discovered and detonating, causing injuries and deaths. It appears the presence of MECs, both on the surface and sub-surface, is a main driver for this project. If there is such a high number of MECs still suspected, hot spots would be a great concern. Because of this, it is unclear what value determining the mean concentration present (multi-incremental sampling) would have. Because the problem definition is not fully developed for this project and not enough specific information is provided, it makes it difficult to determine if the sampling strategy proposed is going	As noted in Response to Comment #10 and #12, this information appears in Section 1 of the project work plan. This project is one of the first to conduct a detailed survey and soil sampling at WVTA. Due to the extreme topography of the site and unknown positions of the training targets, the proposed soil sampling strategy should be adequate to supplement the MEC survey to determine if further actions will be needed. Multi-incremental sampling is not planned for WVTA. Consolidated samples are spread across the site at random intervals and are concentrated at the lower elevations where MEC and therefore MC would be expected to migrate. Evaluation of data from this SI may identify hot spots, and if so such will be programmed for further sampling in the next phase.

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					to meet the project needs. Worksheets are to be stand alone from the project work plan, therefore, must contain all information needed to provide rationale for the project, including its sample design.	 In order to reduce redundancy, crosswalks to the project work plan have been included as noted in Section 1.2.4 of the UFP-QAPP Manual.
21.	WSs #12, 18, 19, 20, 23, and 28	H		Inconsistent information provided	The sample preparation SOPs are not provided. The SOPs listed do not contain preparation procedures. None of the worksheets provide guidance on when and how an aliquot of sample can be taken to be analyzed for % moisture. WS #18 - The sampling location is listed only as "downslope of the north valley wall" for the 35 incremental samples to be taken. Worksheet #17 states 30 incremental samples will be collected in the downslope of the north valley wall ravines and 5 incremental samples will be collected within ravines situated along the north valley wall. It is recommended this distinction be carried out throughout the worksheets for consistency.	Sample preparation SOPs have been added to Worksheet #19, 20 and 23. The SOPs have been included in Attachment C. The aliquot of sample taken for % moisture will be taken from the sample after it has been homogenized. A table note has been added to Worksheet #19 stating this. Worksheet #18 has been revised as noted.
22.	WS #20	H		Information is missing or inconsistent with other worksheets	The column for No. of MS specifies Inorganic analysis only. Other worksheets (e.g. WS #28) states MS and MSD will be prepared and analyzed with organic analysis (nitramines and nitroaromatics). The number of MS samples should be dependant on the number of soil matrices encountered since this QC sample is used to determine the presence of matrix interference. If the ratios are maintained from WS #28, the number of MS associated with nitramines and nitroaromatics should be two for every 20.	The column header for the No. of MS has been revised and the word "inorganic" deleted. The number of matrix spikes has been revised to read "3".
23.	WS #21	L		Decontamination Procedure provided	It was stated in previous worksheets that no equipment decontamination was needed because only disposable equipment will be used.	This SOP has been deleted from Worksheet #21.
24.	WS #23	H		Information is missing or inconsistent with other	The revision of each SOP is needed.	The revision version for each SOP has been added to Worksheet #23.

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				worksheets		
25.	WS #24	H		Calibration criteria is not complete	The note below the table states the laboratory will calibrate equipment in accordance with the requirements found in the DoD QSM. Many of the requirements in the table do not meet the DoD QSM requirements. The acceptance criteria for the interference check solution does not address requirements for the non-spiked analytes.	A new SOP titled *Department of Defense, Program Requirements based on QSM 3*, has been added to Appendix C to address how the laboratory will comply with the DoD QSM requirements. A note has been added to Worksheet #24 to reference this SOP. This SOP has also been added to the Analytical SOPs listed on Worksheet # 23. The calibration requirements listed in Worksheet #24 will meet the requirements of this project. Acceptance criteria for interference check is addressed in the SOP.
26.	WS #27	H		More detail is needed	The narrative states if a sample is lost or damaged prior to analysis, a replacement sample will be assigned a new sample number. If there is a contingency plan for going back out into the field to collect additional samples, the plan needs to be included in all appropriate worksheets. For example, who is responsible for determining if this is needed and when it will happen should be listed on WSs # 6 and 7.	The need to recollect a sample is not anticipated on this project. The fourth sentence under Sample Identification Procedure on Worksheet #27 has been removed.
27.	WS #27	L		Shipping requirements need changes/additional information	The temperature requirement for shipping samples according to the EPA, SW-846, Chapter 4, is now "cool to less than 6 degrees C", not 4± 2, as stated in this WS. The WS does not require the samplers notify the laboratory that the samples have been shipped and when to expect them. It does not require the laboratory notify the Project Manager that the samples have arrived (only requirement is notification if problems are encountered). In order to ensure delays in the project are not unnecessarily incurred, it is recommended that these requirements be added.	The temperature has been changed to read "<6". The following sentence has been added to Worksheet #27: "Copies of the COC(s) and air freight bill will be emailed or faxed to the laboratory to inform them of the pending shipment." The following sentence has been added to Worksheet #27 "The laboratory will email a copy of the signed COC to the Project Chemist."

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					The laboratory sample custody procedures state that the laboratory will document if headspace is present in the vials. This is not applicable to the samples for this site since it applies to VOA samples only.	The bullet regarding headspace has been removed.
28.	WS #27	L		Chain of custody information is not specific enough	The level of the chain of custody required to be maintained in the laboratory is not specified.	Only a basic level of custody is needed on this project.
29.	WS #28	H		Method and SOP QC acceptance limits are not provided	The table does not include the EPA Method used or the SOP QC acceptance limits for each QC sample. The MPC should be project-specific to ensure project DQOs can be met.	The EPA method has been added to the header of each table on Worksheet #28. The QC acceptance limits are noted on the QC limit sheets located in the end of Attachment C.
30.	WS #28	H		Frequency/number of QC samples is not consistent with other worksheets	The number of co-located samples is listed as 19. WS #17 states a total of 5 will be sampled. The frequency of the sample spike and sample should be consistent and linked to the varying types of soil.	The number of collocated field duplicates on Worksheet #28 has been changed to read "10% of total field samples".
31.	WS #29	L		Document storage locations not identified	The specific location (address, contact information) is needed for each record maintained in order to facilitate easy retrieval in the future.	A note has been added to the worksheet stating "Project records generated during the MEC field inspection will be retained and archived indefinitely in the project files located in the Document Control Center in the USA Environmental, Oldsmar, Florida, office."
32.	WS #29	L		Incorrect and contradicting reference is noted	The "b" note under the table states the data will be reported and validated in accordance with Appendix H of the Navy Installation Restoration Chemical Data Quality Manual (IR CDQM), NAVFEC, September 1999. This statement contradicts those of worksheets #36, 14, and 11. The current version of the Project Procedures Manual, US Navy PACDIV Installation Restoration Program is February 2007.	Table Note b has been revised to reference the Project Procedures Manual.
33.	WS #29	L		Assessments not listed	The field documentation, field assessment, and offsite laboratory assessment documentation are not listed in the table.	Field assessment reports have been added to the table. The laboratory assessment report performed by NFESC has not been provided.

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34.	WS #30	L		Backup laboratory not identified, services required not specified	It is strongly recommended that a backup laboratory be identified prior to sampling. A laboratory's ability to perform the work is dependant on their status at the time the samples are received. A laboratory's ability to meet the project requirements (turnaround time, quality, etc) is subject to change. Identifying another capable laboratory early in the process could potentially prevent unwanted delays and additional costs.	Comment noted.
35.	WS #30	L		Incorrect or insufficient information provided for analytical SOPs	This table is for analytical services only. Data validation services are not considered analytical services, therefore the last two rows are not needed. The second row listed L-1 as the SOP for metals when it is really L-2 and the third row lists L-2 as the SOP for nitramines and nitroaromatics when it is really L-1. Laboratory sample preparation SOPs are considered analytical SOPs and should be included in this table as well. Another entry is needed for % moisture and sample compositing since these elements are not included in L-1 or L-2.	Worksheet #30 has been revised.
36.	WSs #31 and #33	H		Assessment information is not complete or incorrect	A field documentation review assessment is not listed. The project chemist should evaluate the most recent assessment documentation for the laboratory to ensure the laboratory is still able to meet the project needs. A more current assessment (December 2007) of this laboratory has been performed.	A field logbook assessment has been added to Worksheet #31. The reference to the NFESC laboratory assessment in Worksheet #31 has been revised to reflect the February 2008 approval.

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37.	WS #32	L		Notification of findings not made to NAVFAC	The findings are reported to the contractor responsible for the work only, according to the table. The Navy RPM should be notified of any issues as well. Field document review and laboratory offsite assessment are not listed. The NFESC offsite laboratory assessment is a program assessment and therefore does not necessarily ensure the laboratory will meet project-specific requirements. Because of this, it is essential that the project chemist evaluate the laboratory's capabilities to meet the project-specific requirements.	The Navy RPM will be notified of any finding on the assessments. The field document review assessment have been added to the table.
38.	WS #33	L		Responsible party and report recipient not correct	The offsite laboratory TSA report is not the most current assessment performed for NFESC. The Navy RPM should contact NFESC for the laboratory's current status and a copy of the most recent assessments. A copy of all assessment reports (including field sampling TSA report) should be given to the Navy RPM.	The reference to the NFESC laboratory assessment has been revised to reflect the February 2008 approval. The Navy RPM will be informed of all assessment findings.
39.	WS #36	L		Concentration levels contradict other worksheets	The concentration level for metals is listed as low while other worksheets (e.g. WSs #20 and 28) list the concentration level as medium for metals.	The concentration has been revised to read "Medium".
40.	WS #37	H		Data usability statement and responsibilities not correct	Data usability should be determined during a scoping session involving all interested parties. The WS states only the contractors will determine the data usability.	Data usability will be addressing in the SI Report which will be distributed to all parties listed in Worksheet #3, Distribution List, to allow for review and comment.

Responses to David Henkin Comments
Waikane Valley Draft Final Work Plan
30April08

1. Regarding compliance with the Endangered Species Act, has the Marine Corps asked the U.S. Fish and Wildlife Service for a list of endangered, threatened, and proposed species and designated and proposed critical habitat that may be present in the project area? If not, pursuant to ESA section, the Marines must do so and, if necessary, consult prior to conducting the SI.

Response: This action is being performed in accordance with CERCLA Sections 104 and 121; Executive Order 12580; and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 300.400, paragraph (e) of the NCP states "No federal, state, or local permits are required for on-site response actions conducted pursuant to CERCLA sections 104, 106, 120, 121, or 122." The Navy is, however, committed to meeting the substantive provisions of permitting regulations that are applicable or relevant and appropriate. The work plan documents the assessment of impacts of our SI effort on the surrounding environment.

Per the Sikes Act, military installations are required to have Integrated Natural Resources Management Plans (INRMP). The most current INRMP for MCBH is the 2007 - 2011 plan that came out in November 2006. "Final Marine corps Base Hawaii Integrated Natural Resources management Plan Update (MCBH INRMP) (2007-2011).

This INRMP was prepared in cooperation with and approved by the USFWS, HI DLNR and NOAA. This means that the lists within the INRMP have been approved and reflect the species that occur on the installation. There are no federally listed species and/or critical habitat occurring on the property.

2. Regarding compliance with the National Historic Preservation Act, has the Marine Corps completed section 106 consultation with respect to this undertaking?

Response: MCB Hawaii has sent Section 106 consultation letters to the State Historic Preservation Office, Native Hawaiian Organizations, and interested parties.

3. Finally, has the Marine Corps prepared any documentation pursuant to the National Environmental Policy Act for the SI?

Response: NEPA does not apply to actions taken in accordance with CERCLA and the NCP. Like NEPA, CERCLA and the NCP establish a decision-making process with respect to the cleanup of past contamination that involves public notice and participation. The United States Department of Justice determined that these provisions of CERCLA, enacted into law after NEPA, are the function equivalent of the NEPA process. Accordingly, compliance with the requirements of CERCLA satisfies NEPA's twin objectives of informed decision-making and public participation.

4. In addition, I'd like to reiterate the concern expressed previously that inadvertent harm to cultural sites might occur if the Marines do not secure the assistance of cultural monitors with a sensitivity to the locations where one would expect to encounter cultural sites and other places of traditional cultural practice. I understand that we will discuss this matter further at the April 2 meeting and hope the Marines will find a way to ensure this necessary oversight while site work is being carried out.

Response: Marine Corps Base Hawaii respects your request for the site inspection field team to include cultural monitors. The potential to harm cultural sites through the site inspection fieldwork planned for this project is minimal, however, because Marine Corps Base Hawaii is committed to the protection of cultural resources, archaeologists will monitor the work to ensure that sites are protected. Additionally, Marine Corps Base Hawaii has acquired information by numerous Waikane community members and former residents of the valley regarding where to expect cultural sites and other places of traditional cultural practice. This information was acquired during the ethnographic study conducted in 2003-2004 during development of an environmental assessment. Marine Corps Base Hawaii has also offered site visits to RAB and community members to see the WVTA and identify areas where cultural sites are expected to be located. Lastly, Marine Corps Base Hawaii has offered to interview any other community members who feel they have information that could help the SI team prevent inadvertent harm to cultural sites in the WVTA parcel.

5. With respect to MCs for WVTA (section 1.4.1.2), as discussed at the February 6 meeting, it is important that the Marines test for depleted uranium. That there is no record of weapons containing DU being used at this site provides cold comfort. The Army (which used this impact area for decades) had no record of DU weapons being used anywhere in Hawai'i, yet it has now confirmed DU contamination at both Schofield and Pohakuloa. Due to the heightened community concern about DU, the Marines should test for it, if only to confirm its absence.

Response: There is no evidence of DU munitions or the Davy Crockett system use in the WVTA. It is not necessary to test for DU at WVTA during this SI. The M101 spotting charge for the Davy Crockett system was fielded in 1961. Since the Davy Crockett was an Army weapons system, and the Marines took control of WVTA in 1953, long before Davy Crockett was used; it is highly unlikely that DU exists at WVTA. Field crews will receive specific training in recognition of components of the Davy Crockett system, and any evidence of the system found during the SI will be addressed in the SI Report. Any DU sampling deemed at that point to be necessary will be scheduled for the next phase.

6. That no explosives compounds were detected above reporting limits in Waikane Stream (section 1.4.1.2) does not establish conclusively "no transport of contaminants of concern," as the draft final SI suggests. At Makua Military Reservation, very few of the surface water samples collected from streams as they exited the installation contained explosives compounds above reporting limits, yet there were a large number of samples containing elevated levels of munitions-related metals. The Marines need to test surface water for metals before drawing any conclusions about off-site transport.

Response: The Conceptual Site Model is a preliminary CSM, based on evaluation of current available data. It will be updated as data is gathered. If the soil samples taken during this SI indicate explosives contamination, surface water samples will be scheduled for the next phase.

7. The SI should not simply assume there will be substantial attenuation of exposure of MEC and of MC concentrations for offsite areas (sections 1.4.2.1 and 1.4.2.2). Rather, the Marines must test samples to determine the extent to which, in fact, attenuation occurs.

Response: The Conceptual Site Model is a preliminary CSM, based on evaluation of current available data. Results of soil samples will indicate if attenuation is an issue to be further addressed during the RI phase.

8. The schedule for site inspection in Figure 5-1 states that field SI activities started in March 2007 and were completed by June 2007, which is not accurate. The figure needs to be revised to reflect the actual dates when work is expected to occur.

Response: Figure will be revised as required.

9. The site map (Figure A-2) should not identify the upper portion of WVTA as "inaccessible for investigation" and the lower portion as "accessible for investigation," as those

labels suggest the upper portion will never be investigated. The Marines' responses to my comments on the last draft stated that "a comprehensive study" of the site, including the mauka 43 acres, would be performed during the remedial investigation. Accordingly, Figure A-2 should simply identify the lower portion of the WVTA as within the scope of the SI and identify the upper portion as being deferred until the RI.

Response: Entire area is within the scope of the SI and will be investigated to the extent it can be safely done. Until we take the field we won't know exactly how high the investigation teams can go. If the SI indicates that MEC exists at a higher elevation, it will be investigated during the RI.

SI Workplan Waikane Valley Training Area

Draft Document, January 2008

Submit comments to: ITRC@cox.net

Instructions for reviewers: Please indicate the chapter, page and line number for each comment. If you have an overall comment on the document, please just put "overall" into the chapter field. .

Chapter	Page	Line	Comment	Response
	1		Has MARCORSYSCOM been contacted about this project? Chris Dunn is the MARCORSYSCOM POC, his phone number is 703-432-3157. I have been told that they generally refer people to NOSSAINST 8020.15A, although that is a Navy instruction. If that is the case, the workplan should state upfront that an ESS determination has been made in accordance with NOSSAINST 8020.15A and what the results are of the ESS determination.	NOSSAINST 8020.15A indicates that an ESS is not required for SI activities when intentional physical contact with MEC, or ground-disturbing activity is not intended. This SI meets those criteria.
1.2.1			The last sentence uses the older terminology of "inactive". Change this to the new terminology of "other than operational range"	Will change as requested.
1.2.2			The first sentence states that a RIPRA and ASR was conducted in 1998. Was an additional ASR done in FY2001 that contains information on the site? It maybe part of the ASR for MCBH Kaneohe Bay.	USAE is only aware of the 1998 RIPRA/ASR that covered Kaneohe Bay, WVTA, and several other sites.
	1.4		In section 1.2 it states there was a designated impact area. Where is the area on the maps and charts or where is it suspected? Is it the entire 187 acres? If it is smaller than the 187 acres, the impact area may need to have its own CSM and the firing points (where DMM is likely) and the range fan may need other CSMs. These sub CSMs may lead to other potential outcomes for the subunits. Was the hill that is inaccessible for investigation the "backstop". Were targets set up on the hill or were prominent rock outcroppings the target?	The information in section 1.2 is from the RIPRA/ASR. There is no further data on size or location of impact areas. This SI will attempt to at least locate suspect impact areas. The next phase will attempt to determine areal extent.

1.4.1.2		The first sentence states that three categories of MC can be grouped together. Should it be propellants instead of perchlorates? 60mm and 81mm mortars rounds have propelling increment charges.	Sentence is correct. We are addressing only the chemicals that may have been used to manufacture the various munitions potentially used at WVTA.
1.4.1.2	Table 1-1	The table displays known/suspected munitions. The table should differentiate between the two. Also, the source of the information should be noted in a column (ASR,EECA, PA etc.).	Not enough is known about the site to differentiate between known or suspected.
1.4.1.2	Table 1-1	The table should be more detailed if the source contains more detailed information. Projectiles is a big category and rifle grenades are different than hand grenades. Recoilless rifles were used at this point in time by infantry units, were they brought out here? This may help in follow on phases/aspects such as the MEC HA and RI where an ESS is required.	This is only the first phase of investigation, and broad categories are appropriate for the scope. As more is discovered, more detail will follow in the next phase.
1.4.2	Figure 1-3	The text refers to a figure 1-3, it should be 1-1	Will revise.
1.4.2		Does the Marine Corps plan to use this site for future housing? If not the future resident may not applicable. Of course if ownership is an issue, the future land use could be extremely debatable. If the Marine Corps retains ownership, a more realistic outcome for the site may be to once again be considered for jungle and maneuver training after the response is complete.	Consideration of future housing was added due to a comment on the draft work plan. The Marine Corps will not use Waikane for any future training.
1.4.3		The MEC and MC will have no effect on plant life should be supported by references/expected low levels of concentrations, etc.	This is a Conceptual Site Model, with our initial concept of the exposure pathways. Each argument will be examined during the SI for credibility and revised as necessary.
2.4	figure 2-1	Replace "resident" with "remedial"	Agree
2.7		The use of the minelab explorer II should have more justification associated with it. Is it the best technology to use in the basalt or is it what the contractor already has on hand?	The Minelab II is one of the detectors in USAE's toolbox, and considered the best for the geologic conditions in Hawaii. It will have to be proved out at WVTA prior to use, and if not acceptable, will be replaced with a suitable detector.

	The goal of the SI is footprint reduction and to better define site boundaries/conditions. This can be to determine firing points, range fans, impact areas, munitions type etc. In addition, follow on phases will need some idea/estimate of the amount of work to clean the impact areas, firing points etc. The rationale for each of the 100' by 100' cells should be driven to get a better estimate of the RI costs, estimated number of anomalies per acre, vegetation removal requirements, etc. It would seem that a phased approach to selecting the cells would be most beneficial. Thus high, medium and low density areas could be inspected/estimated.	The transects and grids are shown in idealized configurations. Decisions will be made in real time as data is collected to decide where to place the grids and transects to get the best information. Paragraph 3.3.2 indicates that ground scars, craters, vegetation, and terrain will be recorded.
3.3	The survey should also take note of craters, geology, topography, and vegetation/distressed vegetation.	
4.2	Does this meet the latest NIRIS standards?	This meets the scope of work.
5.6	The deliverables dates are incorrect and the dates on the figure 5-1 are also in need of being updated.	Understood and will revise for the final work plan.
6	The surface soil depth is from 0-18 inches. What is the rationale for this depth? On operational ranges, the sampling depth has been only 0-5cm.	Soil depth will be 0-6 inches.
7.3	Be aware that OP-5 is updated annualy and that you must use the current version. Also, NOSSAINST 8020.15A may be a relevant instruction which discusses the requirements for an ESS determination.	Noted
7.5	ACOE publications are not DoD publications	Disagree. However, will move USACE publication to Other Documentation.
Appendix C	This MEC avoidance SOP is not tailored to the actual project. It frequently refers to handling projectile components, handling rocket motors, safe to move items, disposal, etc. These are not MEC avoidance. The same can be said of the other SOPs.	The SOPs are standard procedures that are used on any project. They are not intended to be tailored to a single project. However, references have been updated.
Appendix C	Relevant Marine Corps/Navy references should be added such as OP-5, MCO 8020.13 and MCO P8020.10-series etc.	References have been added.
Appendix C	The vegetation removal operations SOP refers to the ACOE OE safety specialist. This is not an ACOE project.	Reference has been removed.
Appendix D	The grid area completion form needs to be modified to address the transect approach that will be used.	The form is for a grid OR area.

Appendix D	4.1.5	The section discusses grid inspection procedures, what about transect inspection procedures? An example would be helpful here. How many blind seeds will be placed per transect swath?	Transects are done using hand held instrumentation. Inspections of transects will be based on real time coverage to ensure proper techniques and procedures are employed by team members. BSI's will not be placed within the transect paths because the QC Specialist cannot anticipate the path the team will take. BSI's will be placed in the instrument test strip to verfy operator and instrument procedures and serviceability.
Appendix F		Just an FYI that the Navy is working on a MEC UFP-QAPP, but that it is not ready yet. I will send it along as soon as it is ready. You should talk to your QA person, Kay O'keefe if you are now required to submit a MEC UFP-QAPP, or if this one will slide past.	Noted

REVIEW COMMENTS DRAFT QUALITY ASSURANCE PROJECT PLAN SITE INSPECTION WORK PLAN MUNITIONS RESPONSE SITES WAIKANE VALLEY TRAINING AREA, KANEOHE, HAWAII JANUARY 2008

Reference: (a) Memo from Office of the Under Secretary of Defense, Policy on DOD Required Actions Related to Perchlorate, January 26, 2006.

General Comments:

1. The decision to recommend further action for this site is based primarily on the results of comparing site data to risk-based screening criteria, including the Hawai'i Department of Health (DOH) Environmental Action Levels (EALS) which are based on different end points, such as ecotoxicity, groundwater protection, direct exposure, etc. Since many of the target analytes for this investigation are all heavy metals, we recommend that appropriate background conditions should also be used to determine if a release has occurred at this site.

Response: The background concentrations of metals in soils will be taken into consideration during the evaluation of data.

2. There are statements throughout the Quality Assurance Project Plan (QAPP) that describe the project decision criteria as being related to potential risks at the site. Typically the goal of a Site Inspection (SI) is to determine if a historical release could have occurred at the site. If the SI determines that a release occurred, then the future investigations are typically associated with determining if there is a risk from exposure to the released materials. We recommend that the QAPP language be edited appropriately so that the goal of this investigation is clearly stated. If the goal of the investigation is tied to identifying risk from exposure, then the sampling approach described herein may not be appropriate.

Response: The project objective and decision criteria in Worksheets #10 and 11 have been revised to clarify the goal of this project.

Specific Comments:

1. QAPP Worksheet #2, QAPP Identifying Information, Item #3. Since NAVFAC Pacific is identified as the lead agency in Worksheet #1, they should be listed as the approval entity.

Response: Item #3 will be changed to NAVFAC Pacific.

2. QAPP Worksheet #2, QAPP Identifying Information, Item #7.

a. Item #7 lists NAVFAC Pacific as the land users. Consistent with the information in Worksheet #1, they should also be identified as the lead agency in the investigation.

Response: NAVFAC Pacific will be listed as both the land user and lead agency in Item #7.

b. Item #7 should also list the contractors that will be performing the work and identify that they are contractors for NAVFAC Pacific.

Response: The subcontractors performing work on this project will be added to Item #7.

3. QAPP Worksheet # 10. Project Decision Conditions. Overall Project. The first bullet in this section states, "If the findings of the SI indicate that the area poses a potential or existing risk/hazard to human health or the environment, recommendations for further actions will be made." Technically, the statement above does not correlate the possible adverse effects to a release. We recommend that this text be edited so that it is similar to the statement on the previous page. A possible edit for this statement is, "If the findings of the SI indicate that release or potential release occurred, and that it could pose potential or existing risk/hazard to human health or the environment, recommendations for further actions will be made." We also recommend that the text in the second bullet also be edited so that the decisions are tied to the discovery (or lack thereof) of a historical release at the site.

Response: The verbiage in the Project Decision Conditions on Worksheet #10 will be revised as noted.

4. QAPP Worksheet # 10. Project Decision Conditions. For soil sampling analytical data only.

a. The first bullet states that the U.S. Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRGs) will be considered as screening levels. For clarity, the exposure scenario (i.e., residential contact), target hazard index (e.g., 1, 0.1, etc.) and target cancer risk (e.g., 1E-06, etc.) should also be specified.

Response: References to the PRGs will be modified to note that the residential PRGs will be used as soil screening criteria in response to this comment. No health risk assessment or evaluation is being conducted on this project.

b. The second bullet states, "If the soil samples do not contain MC at or above the screening levels, the results of the visual and detector-aided field inspection will be used to determine if further actions will be recommended" (emphasis added). The decision criteria for how the visual and detector-aided field inspection will be used to make these decisions should be clearly explained in this worksheet.

Response: The following sentence will be added to the end of the second bullet: "If evidence of MEC is found during the field survey, further action will be recommended."

5. QAPP Worksheet # 11. What Will the Data Be Used For. The second sentence in this section reads, "This data…will be used to delineate boundaries and assess the risk/hazard

posed by any MEC found at the site…" Similar to Specific Comment # 3, we recommend that this should also relate to the identification of a release or a potential release.

Response: The sentence has been modified as noted in the response to Comment #3 to read: "If the findings of the SI indicate that a release or potential release occurred, recommendations for further actions will be made."

6. QAPP Worksheet # 11. What Type of Data Are Needed. This section refers the reader to Section 1.4.2.1 of the work plan for detailed information on the type of MC associated with the known or suspected munitions used at the site. Section 1.4.2.1 of the work plan lists items (i.e., flash powder, M& Propellant) that include potassium perchlorate. We recommend that perchlorate be added to the list of target analytes for the SI so that the project team knows if perchlorate was potentially released at the site. In addition, DOD policy in Ref (a) states that DOD shall sample for perchlorate as required by the National Contingency Plan and this policy applies to active and closed installations, operational and other than operational ranges.

Response: Perchlorate is not a target analyte on this project. Refer to the discussion in Section 1.4.1.2 of the project work plan for the rationale.

7. QAPP Worksheet # 15. Reference Limits and Evaluation Table

a. Consistent with Specific Comment # 6, depending on the site history, perchlorate should be added to this table.

Response: Refer to the Comment #6 above.

b. The Project Action Level shown for antimony (200 mg/kg) is incorrect. The correct value is 20 mg/kg.

Response: The PAL for antimony has been corrected.

c. We recommend adding a footnote that identifies the source for the total chromium Project Action Level as the EPA Region 9 PRG since this value was more conservative than the EAL (500 mg/kg).

Response: The February 2007 EAL for total chromium is 210 mg/kg, the same as the PRG. No change has been made in response to this comment.

8. QAPP Worksheet # 17. Sampling Design and Rationale. The second paragraph on page F-35 states that the analytical results for metals in the soil samples will also be compared to the 95th percentile background concentrations of metals from the Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities. However, Worksheet #13 (Secondary Data Criteria and Limitations Table) described the information in this report as "Data is not specific to WVTA soil." We recommend that a

project geologist verifies if the data in the above-referenced report is applicable to the WVTA soil. If it is determined that the background report is not applicable to the WVTA soils, then we recommend editing Worksheet #17 so that it does not advocate using this data in the SI. If it is determined that the data in the above-referenced report are appropriate to use for soils at the site, we recommend consulting a statistician to ensure the comparison of results from composite samples to 95th percentile levels is interpreted correctly.

Response: The limitation noted in Worksheet #13 was not meant to imply that the 95th percentile background level could not be used at this site, only that the study results did not include a sample from WVTA. The limitation noted on Worksheet #13 has been removed to avoid confusion. The Wil Chee Planning geologist noted that the type of soil that exists in Waikane Valley is Koolau volcanic, so the analytical results for metals will be screened against the 95th percentile background levels.

9. QAPP Worksheet # 18. Sampling Locations and Methods/SOP Requirements Table. The last two rows on this table state that surface soil will be collected at a depth ranging from 0 – 18 inches bgs. This contradicts the information reported on Worksheet #17, which states that surface soil samples will be collected at depths ranging from 0 – 6 inches bgs. We recommend updating the information on Worksheet #18 so that it is consistent with the depth range presented in Worksheet #17.

Response: The depth of soil sampling on this project will be 0 to 6 inches bgs. All references to sample depths have been changed accordingly.

Editorial Comments:

1. QAPP Worksheet # 13. Secondary Data Criteria and Limitations Table. The last block in the row that discusses the Preliminary Assessment states, "Archives data search was extensive, but site survey was limited to cursive walk-over" (emphasis added).
2. Replace "cursive" with "cursory."

Response: The changes have been made as noted.

Comments to Draft Final Waikane SI Workplan, MCBH Environmental, Randall Hu

1. Section 1.2.2, 2nd paragraph – Refers to Draft EE/CA Report. Army Corps report has not been issued. Paragraph should instead indicate that field work was conducted in June 2006 in accordance with the EE/CA work plan.

   Response: Paragraph revised to show results of field study for the EE/CA.

2. Section 1.2.3, 2nd paragraph – Is this discussion from the EA or the EE/CA work plan? The EA addresses the 187 acre AOC while the EE/CA work plan is for the 874 acre FUDS. Need to clarify accordingly.

   Response: The discussion is from the Draft EE/CA Report Plan. Paragraph is clarified.

3. Section 2.4.2 – NAVFAC Pacific will be directly contracting the archaeological monitoring contractor.

   Response: Text revised accordingly.

4. QAPP Worksheet #9 – Diane Drigot's e-mail should be diane.drigot@usmc.mil.

   Response: The email address has been changed.

5. QAPP Worksheet #11, 17 and 18 – Soil sampling depth needs to be consistent. Both 0-6 inch and 0-18 inch are mentioned.

   Response: Soil sampling depths have been changed to 0-6 inches throughout the QAPP in order to avoid confusion.