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**Final**  
**Ordnance and Explosives (OE)**  
**Site-Specific Work Plan**  
**for**  
**Solid Waste Management Unit 4**  
**(SWMU 4)**

**Former U.S. Naval Ammunition Support Detachment**  
**Vieques Island, Puerto Rico**



Prepared for

**Department of the Navy**  
**Atlantic Division**  
**Naval Facilities Engineering Command**

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# List of Acronyms

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AFB	Air Force Base
ARAR	Applicable, Relevant, or Appropriate Requirements
ATF	Alcohol, Tobacco, and Firearms
bgs	Below ground surface
BIP	Blow in place
BRAC	Base Realignment and Closure
CAP	Corrective Action Plan
CAR	Corrective Action Request
CD	Compact disc
CDC	Centers for Disease Control
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CINCPACFLT	Commander in Charge Pacific Fleet
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	Central nervous system
COPCs	Contaminants of potential concern
CPR	Cardio-pulmonary resuscitation
CQC	Contractor quality control
CSO	Caretaker Support Office
CWM	Chemical warfare material
DEET	N,N-diethyl meta-toluamide
DGM	Digital geophysical mapping
DID	Data item description
DoD	Department of Defense
DoI	Department of Interior
DOT	Department of Transportation
DQO	Data quality objective
DRMO	Defense Reutilization Marketing Office
ECM	Earth-covered magazine
EE/CA	Engineering Evaluation/Cost Analysis
EMA	Eastern Maneuver Area
EMM	Earth moving machinery
EO	Expendable ordnance
EOD	Explosive ordnance disposal
EOD	Explosive Ordnance Demolition
ERM	Environmental Resources Management
EZ	Exclusion zone

ft	Feet
FUDS	Formerly used defense sites
GFCIs	Ground fault circuit interrupters
GIS	Geographic information system
GPS	Global Positioning System
HASP	Health and Safety Plan
HD	Hazard Division
HE	High Explosive
HR	Heart rate
HSM	Health and Safety Manager
IAS	Initial Assessment Study
IDW	Investigation-derived waste
IR	Installation restoration
IRF	Incident Report Form
IRP	Installation Restoration Program
LANTDIV	Atlantic Division
MEC	Munitions and Explosives of Concern
M&TE	Measuring and test equipment
mm	Millimeter
mph	Miles per hour
MSDS	Material Safety Data Sheet
MV	Milli-volt
N/A	Not available
NASD	Naval Ammunition Support Detachment
NAVFACENGCOM	Naval Facilities Engineering Command
NEW	Net explosive weight
NOSSA	Naval Ordnance Safety and Security Activity
NSC	National Safety Council
NSRR	Naval Station Roosevelt Roads
NTR	Navy Technical Representative
OB/OD	Open burn/open detonation
OE	Ordnance and explosives
OE-SIMS	Ordnance and Explosive Site Information Management System
OESO	Ordnance Explosive Safety Office
OSHA	Occupational Safety and Health Administration
ORNL	Oak Ridge National Laboratory
ORS	OE-related scrap
PA/SI	Preliminary Assessment/Site Investigation
PC	Personal computer

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PCBs	Polychlorinated biphenyls
PDGPS	Precision differential global positioning system
PFD	Personal flotation device
PHSM	Project Health and Safety Manager
PPE	Personal protective equipment
QA	Quality assurance
QC	Quality control
QCP	Quality Control Plan
Q-D	Quantity-distance
RBC	Risk based concentration
RF	Radio frequency
RCWM	Recovered Chemical Warfare Material
RFI	Request for Information
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RMSF	Rocky Mountain spotted fever
ROTHR	Relocatable Over The Horizon Radar
RPM	Remediation project manager
SOP	Standard of Practice
SOW	Scope of work
SSC	Site Safety Coordinator
SMECS	Senior MEC Supervisor
SMECCS	Senior MEC Supervisor Specialist
SVOC	Semi-volatile organic compound
TBD	To be determined
TDEM	Time-domain electromagnetic
TSDF	Treatment, storage, and disposal facility
USEPA	U.S. Environmental Protection Agency
USRADS	Ultrasonic ranging and data system
MECQCS	MEC Quality Control Specialist
MECSO	MEC Safety Officer
VOC	Volatile organic compound
WTA	Western Training Area

## SECTION 1

# Introduction

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This Site-Specific Work Plan for the Phase I Ordnance and Explosives (OE) investigation at the former open burn/open detonation (OB/OD) site at the former U.S. Naval Ammunition Support Detachment (NASD), Vieques Island, Puerto Rico, has been prepared to address site-specific response actions to be taken to minimize risks to human health, safety, and the environment from potential exposure to OE that may be present at the site as a result of past Department of Defense (DoD) activities conducted at the facility. This Site-Specific OE Work Plan has been prepared by CH2M HILL for the Naval Facilities Engineering Command (NAVFACENGCOM) Atlantic Division (LANTDIV) to meet the current DoD requirements for investigation of OE.

This Work Plan was prepared by CH2M HILL under Navy Contract N62470-95-D-6007, Navy Comprehensive Long-Term Environmental Action Navy (CLEAN), District III, Contract Task Order 205. This site is also under investigation for hazardous constituents under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and has been designated by the U.S. Environmental Protection Agency (USEPA) as Solid Waste Management Unit-4 (SWMU 4).

This Work Plan presents site-specific information related to SWMU 4 and is designed to supplement the OE Master Work Plan for the Former NASD (CH2M HILL, October 2001). The OE Master Work Plan provides the background information needed to understand OE/Munitions and Explosives of Concern (MEC) site conditions, the approach to be used for investigations, and general types of activities to be accomplished at OE sites within the Former NASD. Only supporting documentation relating to SWMU 4, including additions/deviations from the OE Master Work Plan, are presented within this document. The organization of this work plan is summarized below. Table 1-1 summarizes the site-specific updates to the OE Master Work Plan for the Former NASD.

Numerous OE/MEC related safety regulations are cited throughout this document as they apply to OE field investigations at SWMU 4. Applicable, relevant, or appropriate requirements (ARARs) that may be considered during implementation of OE investigation and removal efforts are listed in Table 1-1 of the OE Master Work Plan for the Former NASD.

**Section 1, Introduction**-Presents the purpose of the Phase I OE investigation at the site, provides a description of SWMU 4, and summarizes previous investigations conducted at the site.

**Section 2, Technical Management Plan**-Identifies the approach, methods, and operational procedures to be employed during investigation activities. Specific procedures for certain tasks are included by reference to the appropriate subsection of this Work Plan.

**Section 3, Explosives Management Plan**-Details the specific method for management of acquisition, receipt, storage, inventory, reporting, and return of explosives in accordance with applicable safety regulations.

TABLE 1-1  
OE Site-specific Work Plan Organization

Section	Name	Site-Specific Update	Description
1	Introduction	Yes	Provides overview of Site-Specific Work Plan
2	Technical Management Plan	Yes	Provides site-specific details for site approach, intrusive investigations, field documentation, data management, and site safety.
3	Explosives Management Plan	Yes	Provides site-specific details for notification and coordination; training; equipment requirements; explosive disposal operation; range operators, and blow-in-place operators.
4	Explosives Siting Plan	Yes	Provides details of explosive siting.
5	Geophysical Plan	Yes	Refer to Section 5 of the OE Master Work Plan.
6	CH2M HILL Site Safety and Health Plan	No	This Site Safety and Health Plan has been updated to include site-specific information and MEC contractor contact information.
7	Location Surveys and Mapping Plan	No	Refer to Section 7 of the OE Master Work Plan.
8	Sampling and Analysis Plan	No	Refer to Section 8 of the OE Master Work Plan.
9	Quality Control Plan	Yes	Provides site-specific schedule not provided in the OE Master Work Plan.
10	Environmental Protection Plan	No	Refer to the OE Master Work Plan.
11	Investigation-Derived Waste Management Plan	No	Refer to the OE Master Work Plan and NASD Master Work Plan.
12	Geophysical Information System Plan	Yes	Refer to the OE Master Work Plan.
13	References	No	Original reference list included for reference.
Appendix A	Ordnance-Related Scrap Metal Collection and Inspection Procedures	Yes	Procedures for Scrap Metal Collection and Inspection
Appendix B	Key MEC Personnel Resumes	Yes	Resumes provided for key MEC/OE personnel
Appendix C	Personnel Qualification Verification Forms	Yes	Forms included from the OE Master Work Plan for reference.

Note: Additional site-specific procedures will be defined after selection of the geophysical subcontractor(s) for each site.

**Section 4, Explosives Siting Plan**-Details the explosives safety criteria for planning and siting explosives operations.

**Section 5, Geophysical Investigation Plan**-Describes the approach, methods, and operational procedures employed to perform geophysical investigations during OE activities at SWMU 4.

**Section 6, CH2M HILL Site Safety and Health Plan**-Describes the Safety and Health Program and presents safety and health information and requirements to be followed during OE activities.

**Section 7, Location Surveys and Mapping Plan**-Describes the methods, equipment and accuracy requirements for location surveys and mapping in support of removal activities.

**Section 8, Sampling and Analysis Plan**-Describes the requirements for sampling and analysis, quality assurance/ quality control, laboratory qualification, data acquisition and chain-of-custody for samples that will be collected during removal activities.

**Section 9, Quality Control Plan**-Describes the approach, methods, and operational procedures to be used for the performance of quality control during removal activities.

**Section 10, Environmental Protection Plan**-Describes the approach, methods, and operation procedures to be implemented to protect the natural environment during removal activities.

**Section 11, Investigation-Derived Waste Management Plan**-Describes the requirements for managing investigation-derived waste (IDW) generated during removal activities.

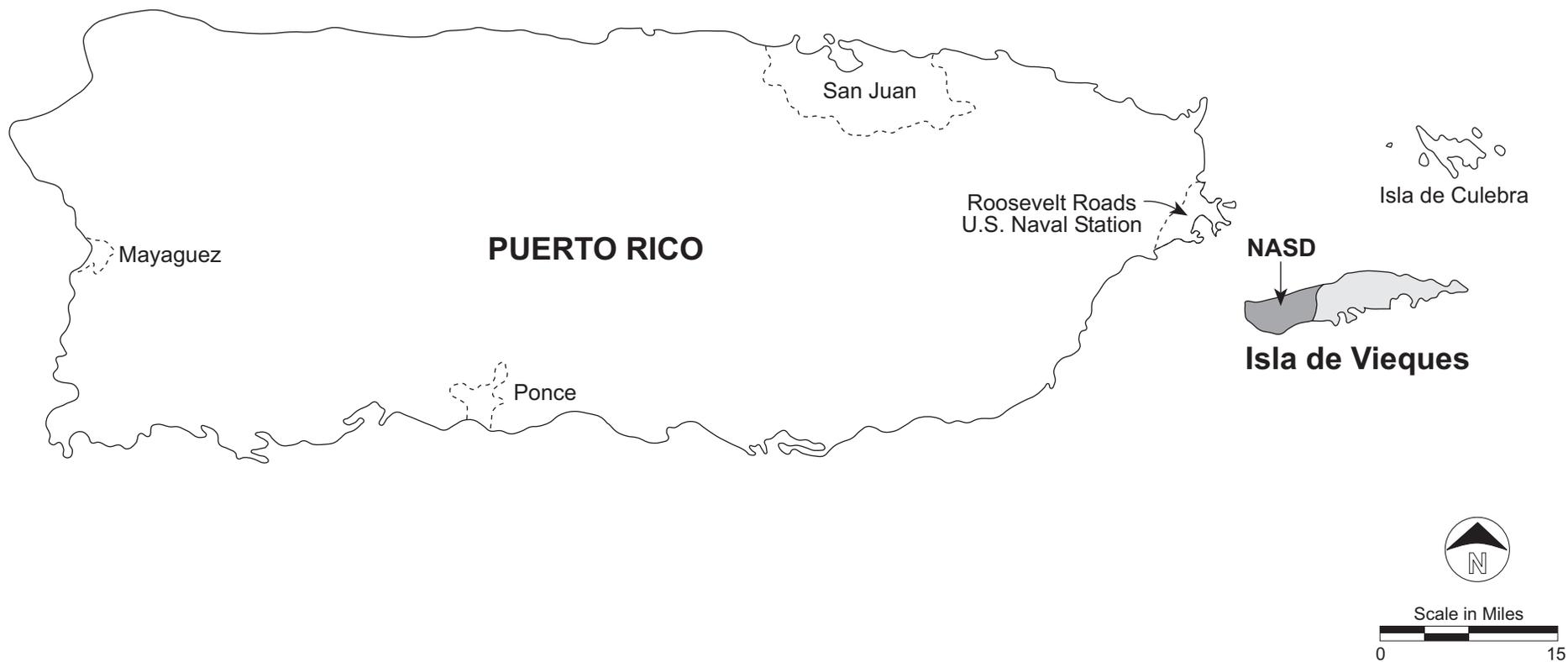
**Section 12, Geographical Information System Plan**-Describes the requirements for the geographical information system (GIS) to be utilized during assessment activities.

**Section 13, References**-Lists documents cited in this Site-Specific OE Work Plan.

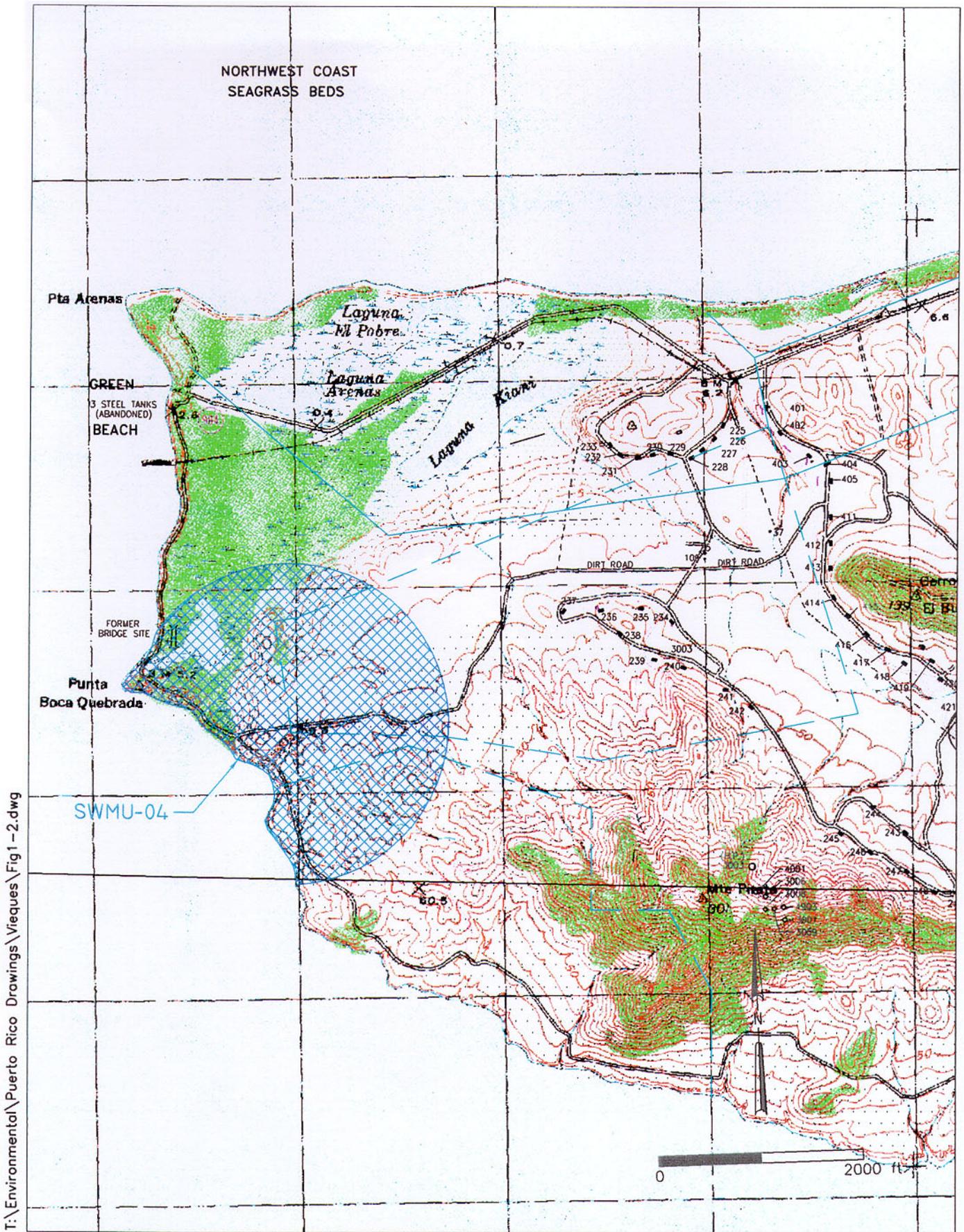
## 1.1 SWMU 4 Description

### 1.1.1 Physical Characteristics of the Site

The former OB/OD area at SWMU 4 is described as 200 yards wide by 0.5 miles long, or 36.4 acres (approximately 40 acres). The OB/OD area extended along the western shore of Vieques south of Punta Boca Quebrada. Previous investigations in June 2000 indicated that MEC projectiles most likely expelled by explosive force during from OB/OD operations, were found as far as approximately 2,000 feet (ft) east of the center point of the 40-acre site. A buffer zone of 1,000 ft was added to this distance and an arc with a radius of 3,000 ft was inscribed to define an area to be fenced off. The 3,000-ft arc comprises an area of approximately 400 acres. The 2,000-ft arc around the SWMU 4 site (area with known MEC items from OB/OD operations) encompasses approximately 200 acres. Figures 1-1 and 1-2 present the location of the Former NASD and the location of SWMU 4 in relation to the Former NASD, respectively.



**Figure 1-1**  
**SITE LOCATION MAP**  
NASD, Vieques Island, Puerto Rico **CH2MHILL**



T:\Environmental\Puerto Rico Drawings\ Vieques\Fig1-2.dwg

Figure 1-2  
SWMU-04 Site Location Map  
Former NASD, Vieques Island, Puerto Rico

Land surface elevations in the SWMU 4 area range from sea level to approximately 150 ft above mean sea level. The southern portion of the site borders the flanks of Mt. Pirata and has the highest elevation (150 ft). The northern part of the site extends into a salt water lagoon near Punta Boca Quebrada and has the lowest elevations (mean sea level). The main OB/OD 40 acre area is relatively flat, except where a quebrada (drainage area that is dry except during storm events) cuts through the southern end of the site. The 40-acre area ranges in elevation from sea level to approximately 50 ft above sea level.

The majority of SWMU 4 has a dense shrub canopy of thorny shrubs and a scattered herbaceous stratum. The total vegetative cover was approximately 75 to 95 percent. Dominant shrubs identified on the site included *Acacia farnenciana*, *Prosopis glandulosa*, *Pithecellobium dulce*, and *Zanthoxylum brevipes*. Another co-dominant shrub was *Leucaena leucocephala*. The herbaceous stratum was dominated by *Bothriochloa ischaemum*, *Commelina erecta*, *C. diffusa*, and *Lasiacis divaricata*. No endangered or threatened plant species were observed during the field survey.

### 1.1.2 Past Uses of the Site

The OB/OD unit was utilized for the thermal destruction of waste munitions, fuels, and propellants from 1969 to 1979. These materials were placed in the open burn area and a squib or other detonator was placed in the waste material. The open burn was then initiated from a safe distance using electrical detonation. The inactive OB/OD area reportedly was swept for live munitions by an Explosive Ordnance Demolition (EOD) team from Naval Station Roosevelt Roads (NSRR) in 1976 and at least two additional times by 1979. The range was fully closed in 1979 (Greenleaf/Telesca, 1984). Records reviewed during the Initial Assessment Study (IAS) completed in 1984 indicate that the site may have been used since the late 1940s.

In addition to the OB/OD activities, this location was also used for the disposal of excess and retrograde ammunition and, twice yearly, for disposal of unexploded munitions found around the targets on the Eastern Maneuver Area (EMA). The EMA is located in the eastern portion of Vieques Island and is not part of the Former NASD. Other explosive materials disposed at SWMU 4 included material from the rework of munitions (e.g., loose powder and primers) and ordnance items from the torpedo shop. Materials disposed of at the site included flares and cartridge-activated devices. The range had a maximum blow limit of 4,000 pounds of TNT equivalent according to the IAS report.

## 1.2 Site Background

This section briefly summarizes site background information, including past owners of the facility, the environmental history of the site, and previous investigations conducted at the site.

### 1.2.1 Past and Present Ownership

The Former NASD was utilized by the U.S. Navy Atlantic Fleet for storage of munitions from approximately 1942 to 2001. Activities at the Former NASD were directed under the consolidated command of Commander Fleet Air Caribbean, Naval Forces Caribbean, and Antilles Defense Command, whose headquarters are at NSRR. The mission of the Former

NASD was to receive, store, and issue all ordnance authorized by NSRR for support of Atlantic Fleet activities.

SWMU 4 is situated within the approximate 3,100 acres retained by the U.S. Government as part of the Former NASD land transfer on April 30, 2001 mandated by former President Clinton's directive of January 31, 2000. The 3,100 acres, consisting of the Conservation Zone at the Former NASD, referenced in section IV of the 1983 Memorandum of Understanding between the Municipality of Vieques and the Secretary of the Navy, were transferred to the Department of Interior (DOI) to be managed under a Cooperative Agreement between the Commonwealth of Puerto Rico, the Puerto Rico Conservation Trust, and the Secretary of the Interior.

Details of the land transfer are provided in the *Findings of Suitability for Early Transfer for U.S. Naval Ammunition Support Detachment, Vieques Puerto Rico* (CH2M HILL, November, 2000). Additional information related to the administration of this property is detailed in the *Site Management Plan for the Former NASD Facility, Vieques, Puerto Rico* (CH2M HILL, July, 2001).

## 1.2.2 Environmental History

The environmental history of SWMU 4 was based on records reviews and interviews conducted from 1984 through 2000. These records reviews and interviews included the IAS (Greenleaf/Telesca, 1984), and an Environmental Baseline Study (EBS) (Program Management Company, 2000). Results of the record searches and interviews for each investigation are summarized below.

### 1.2.2.1 Initial Assessment Study

An IAS was conducted for the Former NASD in 1984 to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous waste operations. At the time of the IAS, the site was designated as Site 19, West EOD Range, Vieques.

Records indicated that the West EOD range was the primary disposal area for Vieques. Activities included the disposal of excess and retrograde ammunition and, on a twice-yearly basis, unexploded munitions found around the targets on the EMA. Material disposed of at the site include 8-inch rounds fired in the EMA, and 105 millimeter (mm), 106 mm, and 175 mm duds fired from Punta Cereja. Other sources of OE included the material from the rework of munitions (loose power, primers) and ordnance items from the Torpedo Shop. Materials disposed at the site also included flares and cartridge-activated devices. The IAS report contained inconsistencies, however, indicating either a maximum blow limit of 4,000 pounds of TNT equivalent, or a 40,000-pound explosive limit.

According to record reviews, the EOD range was determined to be in operation from at least 1969 to 1979. Some interviewees, however, had indicated that the site was used since the early 1940s. The range closed to most uses in 1976. It was swept and cleaned up for a 0.5-mile radius by EOD personnel in 1976, and was swept at least at two additional times by 1979. The range was fully closed in 1979.

The IAS concluded that based on the extensive cleanup of the area, further study of the site was not warranted.

### 1.2.2.2 Environmental Baseline Study

As a result of the property transfer of the Former NASD to Puerto Rico, an EBS was conducted to disclose factual relevant information regarding the environmental condition of the Former NASD. The EBS was prepared based on information obtained by record reviews, interviews, site reconnaissance, and aerial photographic review.

In general, the records search and interviews were consistent with the IAS. Additional investigations at the site included an aerial photographic review. The aerial photographic review involved evaluation of 12 aerial photographs dating from 1937/1938 to 1999 by a firm specialized in the analysis of aerial photography. The aerial photographic analysis was used to:

- Track the history of site operations from pre-Navy occupation to present
- Identify Photo Identified (PI) sites; (e.g. ground scars, cleared areas, debris piles, possible disposal areas, etc.) for further follow-up investigations

The aerial photograph survey of SWMU 4 indicated 10 PI sites, including one potential trench and five ground scars. Figure 1-3 provides a location map of the PI sites identified for SWMU 4.

### 1.2.3 Previous Investigations at SWMU 4

Although no hazardous releases from the OB/OD site were documented, and although records had indicated the site was swept and cleaned by OE personnel, the Navy decided to investigate the site as part of the Installation Restoration (IR) program. The site was designated SWMU 4 at that time.

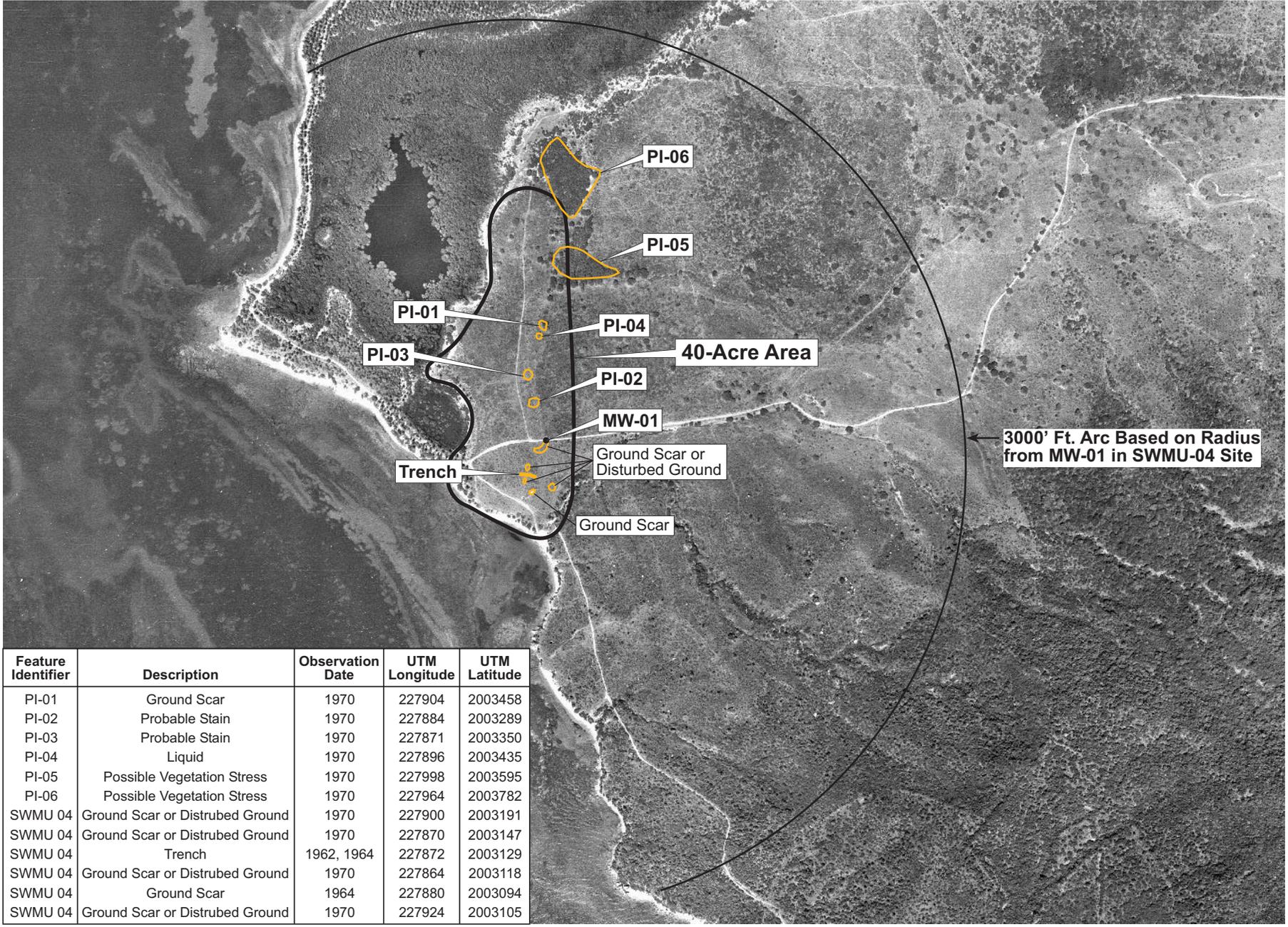
Initial investigations at the site were conducted in April 2000, and included an Expanded Preliminary Assessment/Site Investigation (PA/SI). A second phase of the PA/SI was conducted in June 2000. During the PA/SI, surface and subsurface soil and groundwater samples were collected for laboratory analysis. Results of that effort indicated that explosive-derived constituents were present in surface soils at concentrations above residential risk-based concentrations (RBCs) and soil leachability criteria. Results of the PA/SI were presented in the Phase I PA/SI Report for the Former NASD (CH2M HILL, October 2000).

As part of the PA/SI efforts at SWMU 4, a MEC avoidance geophysical survey was completed to clear the locations of soil borings and monitoring wells of potential MEC. In addition, the access roads to the sampling locations were cleared of MEC. A Schonstedt fluxgate magnetometer was used to identify potential MEC near the soil boring and monitoring well drilling sites to a depth of 2 ft. A down-hole magnetometer was used during the drilling process to check for potential MEC every 2 ft to a depth of 10 ft.

Additionally, transects were cut through the brush to identify the potential locations of the OB/OD pits. An EOD technician cleared the area in front of the bulldozer during the brush clearing for each transect. The technician performed a sweep with the Schonstedt magnetometer and identified MEC items. After the transects were cut, a conventional magnetometry survey was conducted along the transects and pads to identify potential

areas of buried metal. Figure 1-4 shows the locations of OE items found along the transects and roads, and also shows potential magnetic anomalies from the magnetometer survey.

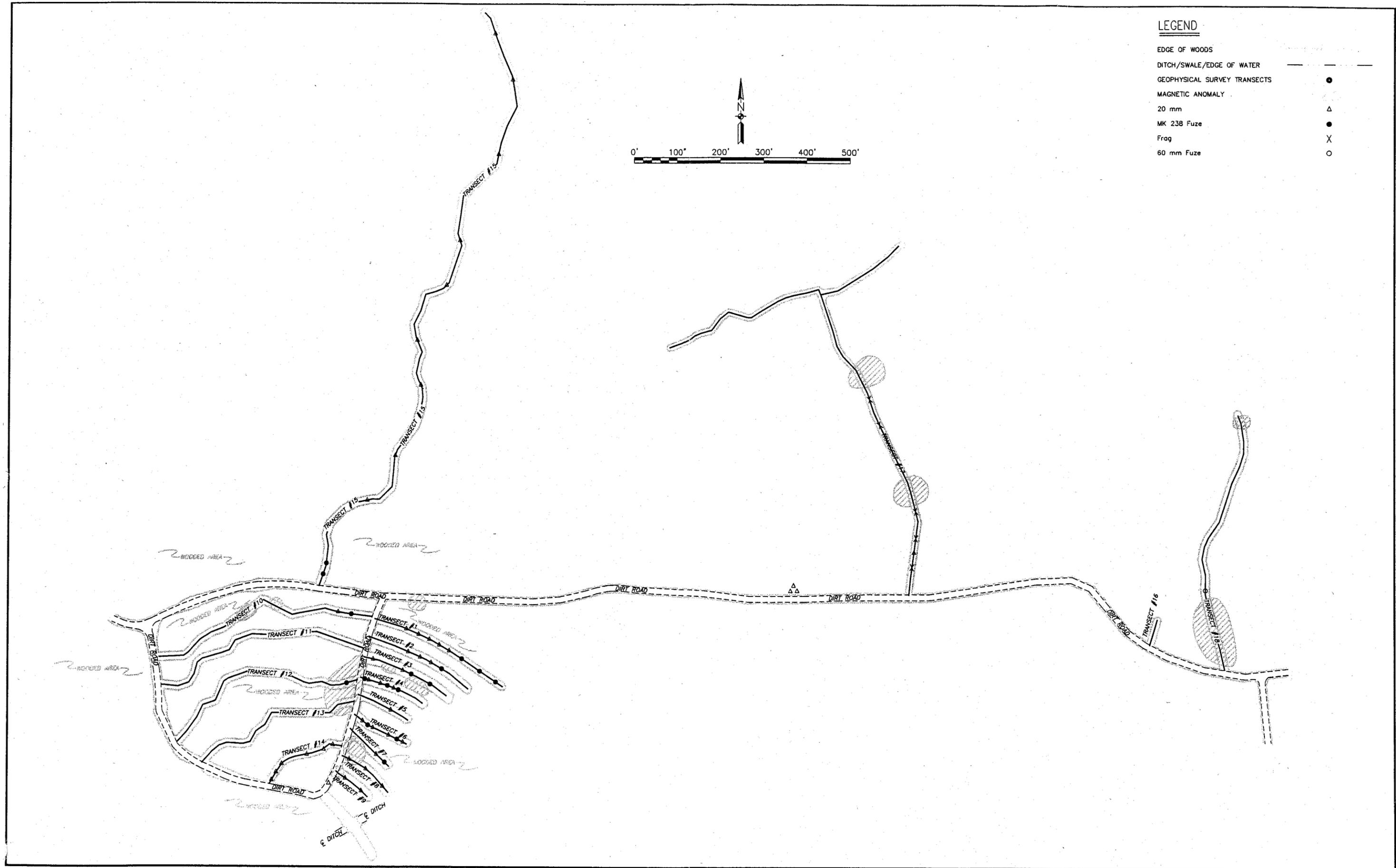
A total of 61 OE items were found, including 37 20-mm high explosive (HE) projectiles, 16 MK-230 fuses, five small arms, one 60 mm mortar fuse, one electrical blasting cap, and one auxiliary booster. Several of the OE items were identified along a transect that extended along the center of the 40-acre area where the OB/OD area was suspected to be located. The OE items detected were removed by the EOD technicians and disposed of by Navy EOD personnel.



Aerial Photograph Date: 1967



**Figure 1-3**  
 Photo-Identified Ground Scar Locations  
 NASD, Vieques Island, Puerto Rico **CH2MHILL**



**LEGEND**

- EDGE OF WOODS
- DITCH/SWALE/EDGE OF WATER
- GEOPHYSICAL SURVEY TRANSECTS ●
- MAGNETIC ANOMALY
- 20 mm Δ
- MK 238 Fuze ●
- Frag X
- 60 mm Fuze ○

**Figure 1-4**  
**SWMU-04 MEC Avoidance and Geophysical Investigation**  
**Former NASD, Vieques Island, Puerto Rico** **CH2MHILL**

## SECTION 2

# Technical Management Plan

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## 2.1 General

The general approach of the Technical Management Plan is discussed in Section 2 of the *Draft Final Ordnance and Explosives (OE) Master Work Plan*, U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico (CH2M HILL, October 2001).

Activities will be conducted in accordance with the *Draft Final OE Master Work Plan* and the *Site-Specific OE Work Plan for SWMU 4* as applicable. Specific work task Standards of Practice (SOPs) will be provided by the geophysical and MEC subcontractors. Refer to Figure 2-1 for the Project Organization Chart.

The purpose of this site-specific plan is to provide procedures not addressed in the *Draft Final OE Master Work Plan*. The primary consideration of this plan is the protection of human health and the environment.

### 2.1.1 Project Field Communication

Figure 2-2 depicts the line of communication for the SWMU 4 MEC field investigation according to the chain of command described below. The subcontractors, USA Environmental and NAEVA Geophysics, Inc., will report directly to CH2M HILL field personnel. USA's Senior MEC Supervisor will report directly to Field Superintendents (FS), Stacin Martin. The Site Geophysicist will also report directly to Stacin Martin.

The FSs will coordinate with the geophysics subcontractor and will report directly to the Project Manager (PM), Marty Clasen.

The PM, Marty Clasen, will coordinate with CH2M HILL MEC Manager, Ben Redmond, and Quality Control (QC) Supervisor, John Tomik, for senior technical advice. Marty Clasen will report directly to Chris Penny, LANTDIV Remediation Project Manager (RPM).

The LANTDIV RPM, Chris Penny, works individually with Ben Redmond and John Tomik, and will report significant findings, if necessary, directly to Rick Urbanski of the Naval Ordnance Safety and Security Activity (NOSSA).

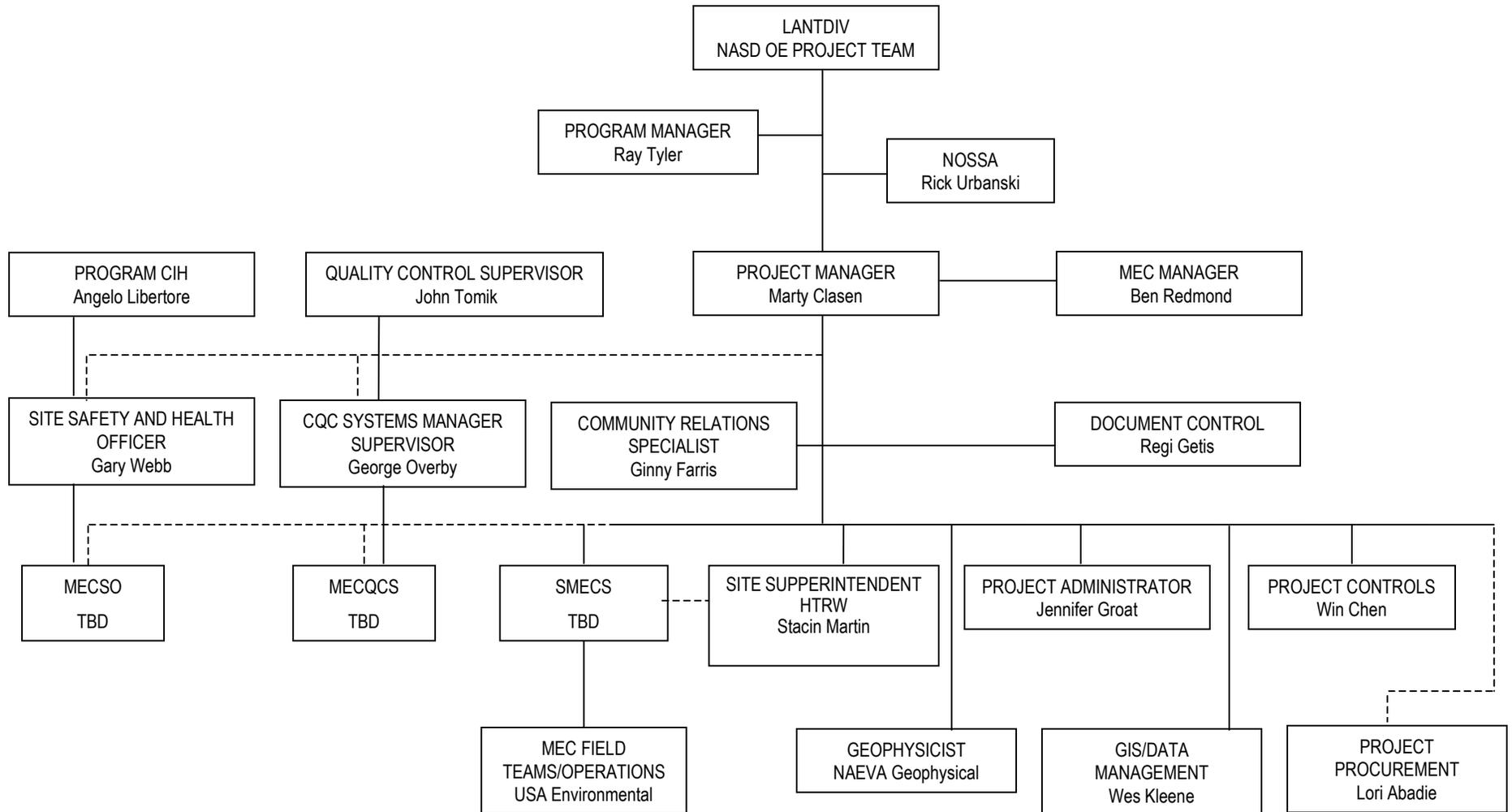
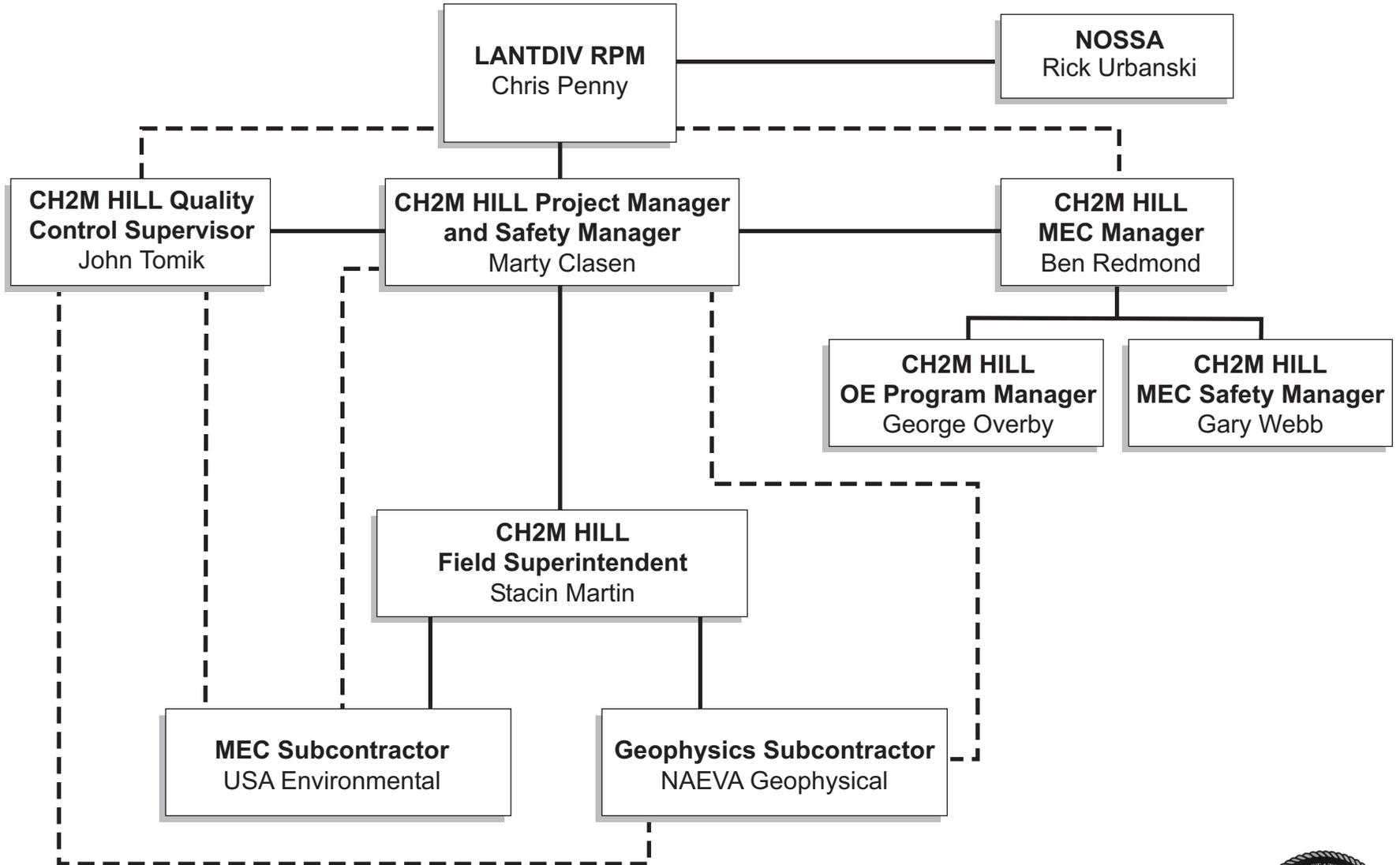


FIGURE 2-1  
PROJECT ORGANIZATIONAL CHART  
FORMER NASD VIEQUES  
PUERTO RICO



**FIGURE 2-2**  
Ordnance and Explosives (OE), SWMU 04  
Project Field Communication Plan



## 2.1.2 Field Decision Making Process

This section describes the actions to be taken in the field regarding the field investigation process, as shown on Figure 2-3.

The chain of command for the field activities is as follows:

The FS, Stacin Martin, will be the direct supervisor for the subcontractors. All activities will be channeled by them to the CH2M HILL PM, Marty Clasen. Senior technical advice to the PM will be provided by John Tomik, QC Supervisor, and Ben Redmond, MEC Manager. The PM reports to the LANTDIV RPM, Chris Penny, who in turn will update significant MEC activities, if necessary, to Rick Urbanski and Ed Klinghoffer of NOSSA.

USA Environmental will perform the visual sweep of the SWMU 4 area, along the access roads, and in the walkable portions of the vegetated area along the roads. If MEC is not found during the visual sweep, then USA Environmental will report to one of the FSs. The FS will report to the CH2M HILL PM, Marty Clasen, who in turn will report to the LANTDIV RPM, Chris Penny. If MEC is found while performing the visual sweep, the following course of action will be taken:

The FS will notify the USA Environmental Senior Supervisor and he will determine if it is safe to remove the MEC to a designated secure area for disposition. If the MEC is not safe to remove, the CH2M HILL PM will be notified immediately of the situation. If the MEC found is not safe to move, it will be blown in place. If an unknown MEC item is found, the NSRR EOD team will be called for an emergency response. The NSRR EOD team will determine the course of action for an unknown MEC item. If the EOD Team determines that removal of the MEC is safe, the FS will notify the PM of the decision by the EOD Team.

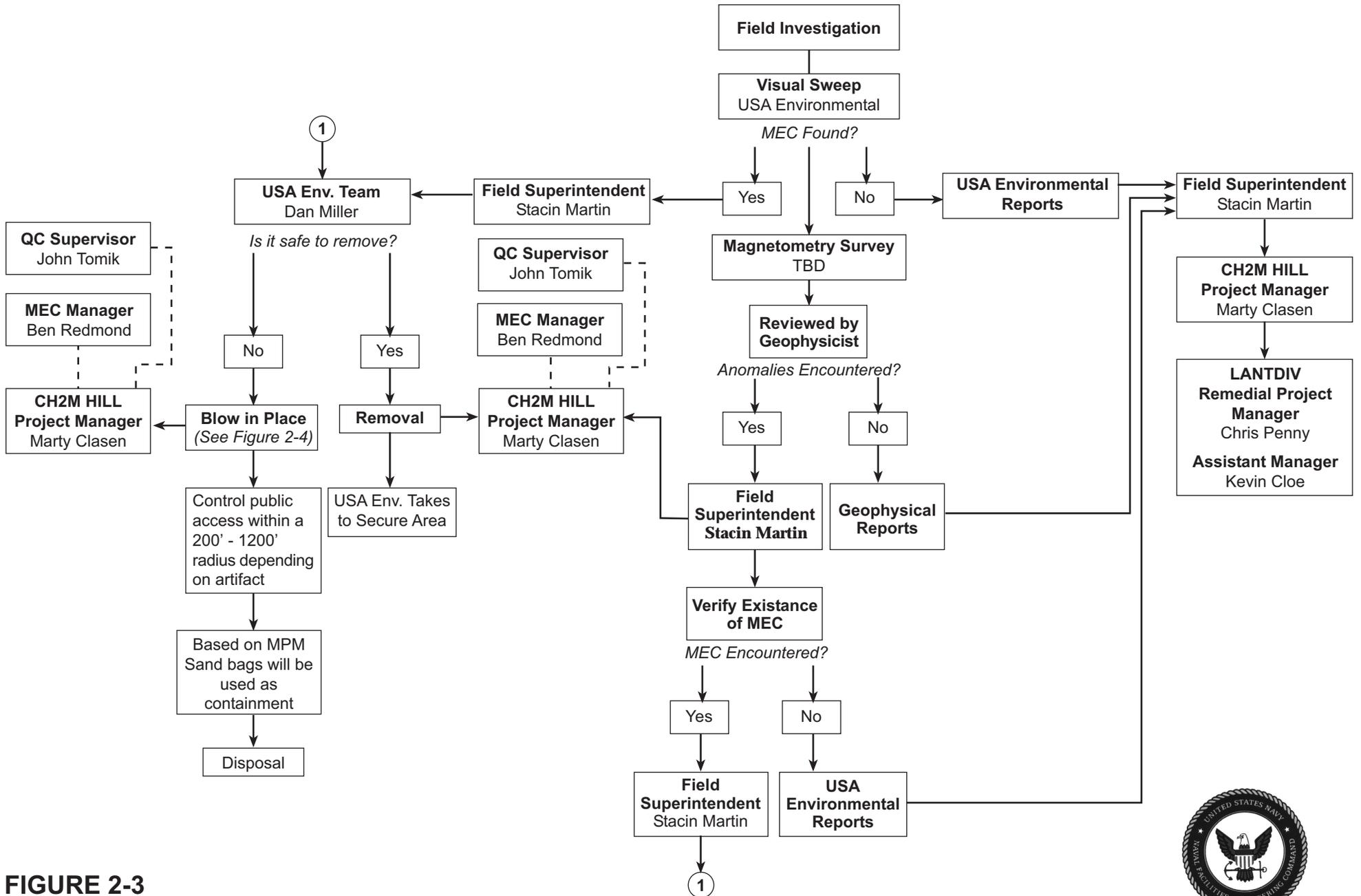
The geophysical contractor in charge of the geophysical survey of the area will be NAEVA Geophysics, Inc. If no anomalies are found, NAEVA Geophysics, Inc. will report to the FS and the chain of command will be initiated as described above. If anomalies are encountered while surveying the area, the FS will be notified by NAEVA Geophysics, Inc. and the FS will notify the PM. The area where the anomaly was encountered will be verified by USA Environmental. If no MEC is found, USA Environmental will report to the FS, and up the chain of command. Upon notification of the EOD Team, the CH2M HILL PM will be contacted immediately.

## 2.1.3 Blow-in-Place Decision Tree

The following is a description of the chain of command that pertains to the process of disposal of MEC by the blow-in-place flow chart shown in Figure 2-4.

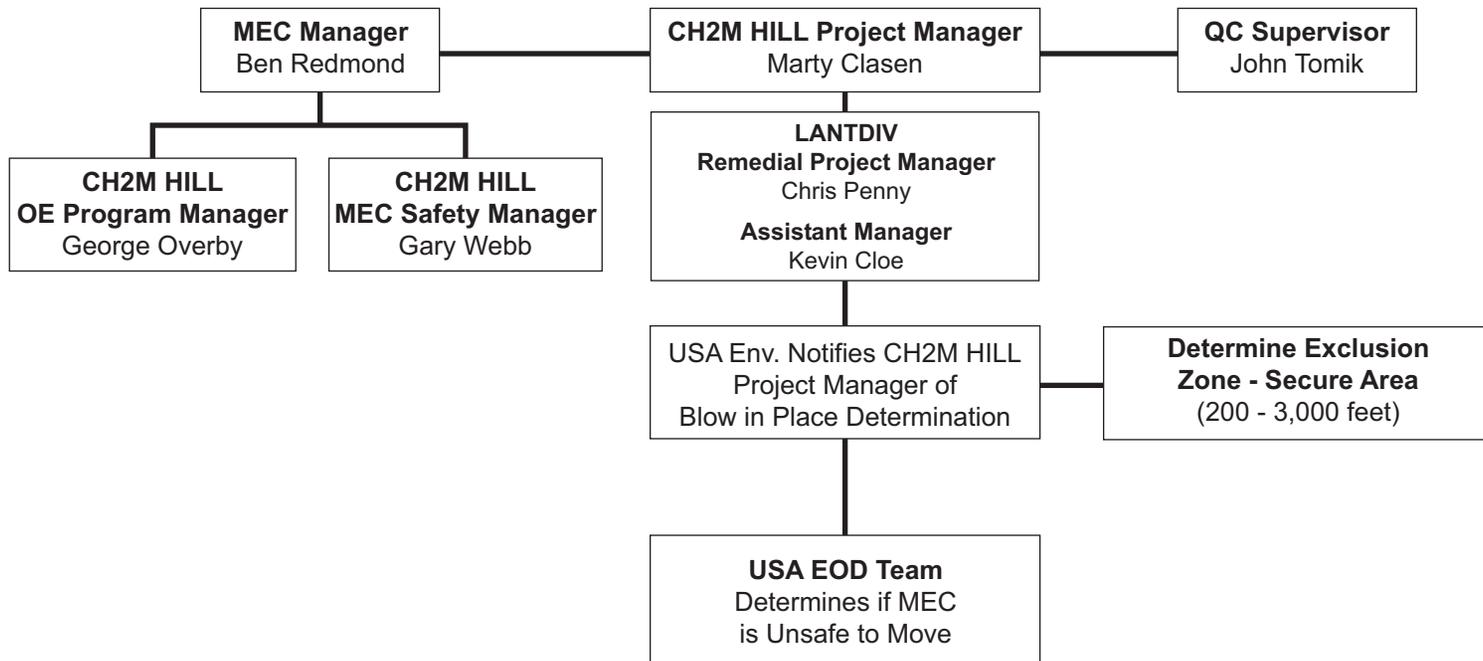
The USA Environmental MEC Team, headed by the Senior MEC Supervisor, determines if the MEC is safe to move. He notifies the CH2M HILL PM if he determines that the MEC is unsafe to move and that a blow-in-place must be performed.

The USA Environmental MEC team will determine the extent of the exclusion zone and the relative risk of MEC on SWMU 4. If there is a high risk of MEC, the option to be used is the blow-in-place. The investigation will be stopped while the appropriate institutional controls



**FIGURE 2-3**  
Ordnance and Explosives (OE), SWMU 04  
Field Decision Making Procedures





**FIGURE 2-4**  
 Ordnance and Explosives (OE)  
 Blow in Place Decision Tree



are instituted. Depending on the situation, engineering controls may not be required since OE items will either be blown in place or consolidated in an accumulation area for daily or weekly detonations. The gate at the entrance of SWMU 4 will be closed to traffic, limiting access to authorized personnel only.

## 2.2 Site Approach Methods

The site approach method for sampling and investigation of the areas of concern was selected at the Site Approach Meeting for SWMU 4 on June 20, 2001. The Site Approach working group consisted of representatives from LANTDIV, NOSSA, Ordnance Environmental Support Office (OESO), and CH2M HILL OE staff.

The meeting resulted in an agreement for investigation methods listed in Table 2-1 and presented in this Site-Specific Work Plan.

TABLE 2-1  
Project Sites and Associated Sampling Approaches

Site	Estimated Acreage	Site Approach	Sampling Methodology
SWMU 4*	50	Remedial Investigation of 25 percent of the 200 acre site (approximately 25 acres), survey grids, vegetation removal, surface OE clearance, digital geophysical mapping survey, MEC intrusive investigation to 1 ft bgs.	100 percent digital geophysical mapping survey of selected sites

Notes:

bgs below ground surface

RI Remedial Investigation

\*Inactive OB/OD, the primary release mechanism is either residual OE remaining onsite, kick-outs from explosions, poor housekeeping, mishandling or misplacement of items in the area.

The investigation approach for these sites is a digital geophysical mapping survey extending for a 100-ft square grid from the center of the suspected sites.

### 2.2.1 Recommended Approach

The recommended site approach is as follows:

- Locate and map sites previously identified; 10 points of interest.
- Survey and flag sites, OE avoidance required.
- Evaluate vegetation removal options and tree removal, ecological issues with DoI.
- Conduct surface clearance of site before vegetation removal for each PI site. The vegetation removal method may vary from site to site.
- Conduct vegetation clearance in a 100-ft square grid from the center of the points of interest, in accordance with *Draft Final OE Master Work Plan*, Section 2.2.8, and this *OE Site-Specific Work Plan*, Section 2.2.3; OE avoidance required.
- Initiate surface OE/MEC and scrap metal clearance in accordance with *Draft Final OE Master Work Plan*, Section 2.2.7.

- Initiate the digital geophysical mapping survey at each of the 10 points of interest identified from the historical aerial photos, previous investigations and site reconnaissance.
- Conduct a full coverage (100 percent) digital geophysical mapping survey to radial distance of 100 ft from the center of the points of interest.
- Complete the anomaly analysis as discussed in the *Draft Final OE Master Work Plan*, Section 2.2.13, and the sub-contractor SOP.
- Conduct the anomaly reacquisition, validation and excavations as discussed in the *Draft Final OE Master Work Plan*, Sections 2.2.14 and 2.2.15, and the sub-contractor's SOP.
- Extend the radius of the survey if OE is discovered beyond the 100-ft square grid.
- Close out.

Based on the results of the digital geophysical mapping survey, a Phase II OE removal plan will be developed. The Phase II plan will include an approach for identifying and removing the OE for the area inside the 40-acre parcel. The approach will include a contingency that if high concentrations of OE scrap are detected near the perimeter of the 40 acres (suggesting that OE may extend outside the 40-acre area), then an additional geophysical survey appropriate for large densely vegetated areas, such as an aerial survey, should be completed. The scope of the aerial survey should be included as an optional task for NOSSA to review. Another option would be extending the survey outward in 100 ft grids to map the areas of OB/OD operations.

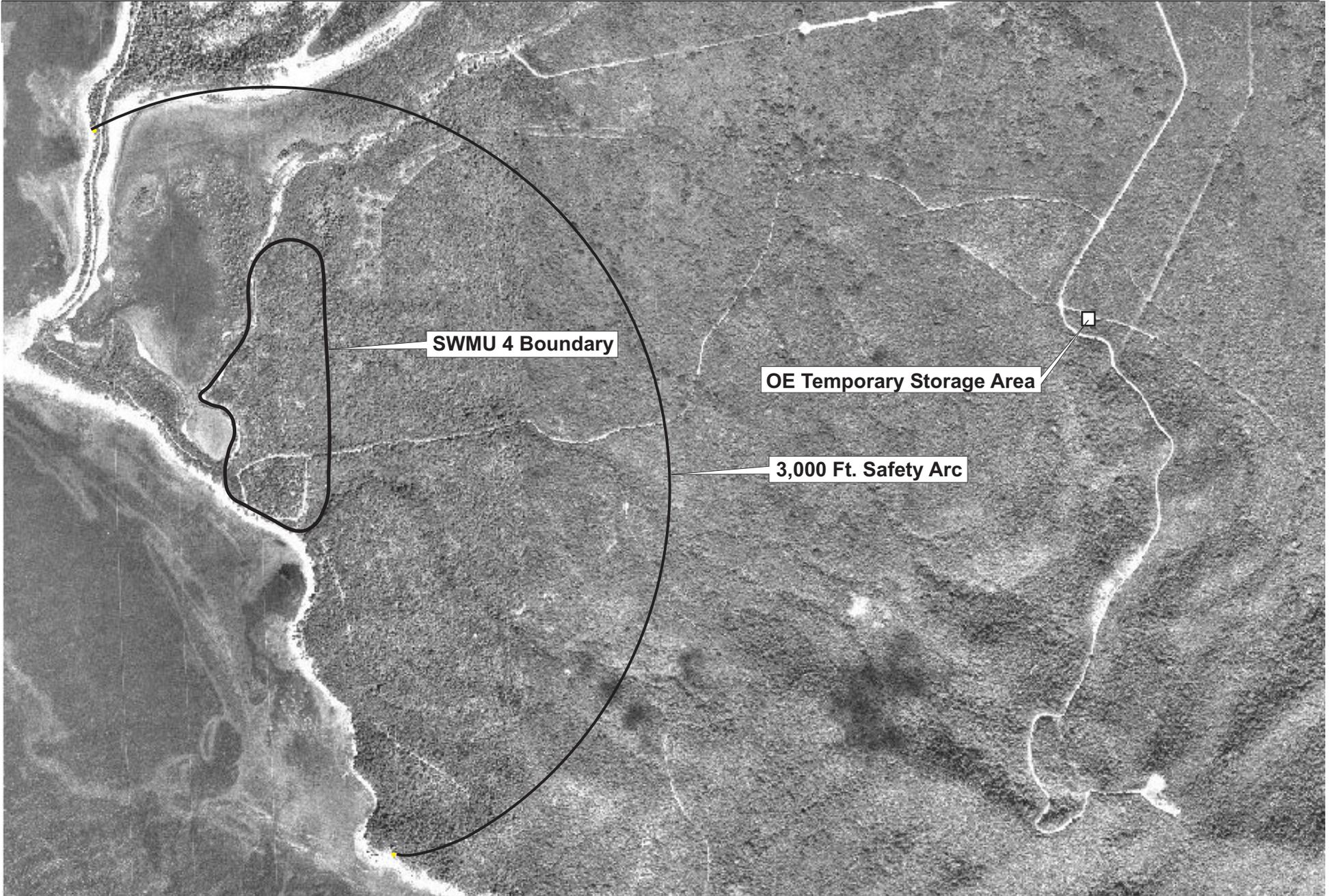
## 2.2.2 Mobilization

A storage facility will be established at Earth Covered Magazine (ECM) 239. An explosive magazine will be sited, as shown in Figure 2-5.

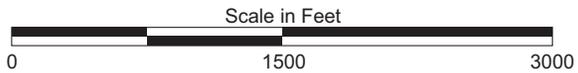
## 2.2.3 Site-Specific Training

Designated PMs and supervisors will provide and document site-specific training during the project site kickoff meeting and whenever new workers arrive onsite. No site workers will be allowed to begin work onsite until the site-specific training is completed and documented. As part of the site-specific training, the following topics shall be covered:

- Work Plan, Health and Safety Plan, Environmental Protection Plan
- Field operations
- Potential OE contact, including recognition and identification of the hazards of MEC
- Exclusion zones
- Communication systems
- Symptoms of chemical exposure
- Chemical, physical, and toxicological properties of the site contaminants
- Hazard communications
- Sampling and sampling equipment
- Emergency recognition, prevention, and emergency evacuation
- First aid/CPR and blood-borne pathogens



Aerial Photograph Date: 1994



**Figure 2-5**  
Project Trailer Location  
Former NASD, Vieques Island, Puerto Rico **CH2MHILL**

## 2.2.4 Vegetation Removal and Disposal

Vegetation removal on SWMU 4 will be conducted by mechanical means using Timberline Logging equipment or equivalent and the Standard Manual Vegetation Clearance as indicated in Section 2.2.8 of the *Draft Final OE Master Work Plan*. Any restrictions on vegetation removal activities will be reviewed by the DoI as the local environmental authority.

Because SWMU 4 is heavily vegetated, some degree of manual vegetation clearing is anticipated to be required prior to conducting geophysical surveys or anomaly excavation operations. Site clearing operations will be completed prior to start up of activities to avoid time delays in conducting MEC geophysical survey efforts.

### 2.2.4.1 Team Composition

The basic vegetation removal team consists of an MEC Technician III and a MEC Technician II. The basic MEC team can be augmented with up to five non-MEC-qualified laborers for hand cutting vegetation. The laborers will use hand tools that are appropriate for the vegetation being cut, such as chain saws, heavy-duty power weed whackers, and machetes to cut the vegetation.

### 2.2.4.2 Initial Sweep

As the first step, the MEC technicians will carefully inspect all areas of the grid ahead of the laborers with the aid of Schonstedt GA-52CX magnetometers (or equivalent). The MEC Technicians will mark any MEC or other hazards by encircling the hazard with flagging tape. The laborers will be instructed to avoid working in designated areas. If MEC is discovered on the surface, mechanical equipment will not be used unless the area can first be effectively swept of all surface MEC.

### 2.2.4.3 Vegetation Disposal

The cut vegetation will be mulched in place using the Timberline Logging equipment or equivalent. A typical method of vegetation disposal is chipping the vegetation into mulch, which is then spread over the cleared area to serve as seeding of native plants, ground cover, and soil nutrient. If a significant amount of poison oak is present, chipping will not be performed.

### 2.2.4.4 Grass and Brush Clearance

Grass or brush clearance will be accomplished with gas-powered string trimmers with saw blade attachments, or where appropriate, a tractor equipped with a bush hog mower. The brush will be cut to a height of no greater than 6 inches above ground surface to eliminate interference with MEC detection or survey activities.

### 2.2.4.5 Tree Trimming or Removal

Trees will be trimmed or removed on a case-by-case basis and only as required to accomplish the project tasks in the scope of work (SOW). If removal is required, the tree will be cut using chain saws. The tree will be sectioned, if necessary, to remove it from the immediate area, so it does not interfere with OE/MEC detection or survey activities. Qualified CH2M HILL ecologists will conduct a site reconnaissance of the proposed work area prior to tree trimming

or removal activities to identify and flag any biota that may be Federally protected species. CH2M HILL will use responsible judgement to avoid cutting trees larger than 3 inches in diameter unless absolutely necessary, and to avoid removal of hardwoods if possible. Trees will be felled into an area that has already been surface swept for MEC.

#### 2.2.4.6 Safety Hazards

Appropriate Personal Protective Equipment (PPE) will be worn according to Section 6, Site Safety and Health Plan. Certain vegetation, such as small-diameter trees and solid stalk plants, will be cut parallel to the ground and as close to the ground as possible to avoid impaling hazards in the event that someone falls on the remaining stalk.

The vegetation that is removed will either be mulched in place or placed in a staging area or clearing where it will be mulched or chipped. When the survey is completed, the mulch will be spread via mechanical means over the entire cleared area as a ground cover. Special considerations will be given to protecting the habitats of the nesting turtles and the Cobana Negra tree as specified in Section 10, Environmental Protection Plan, of the *OE Draft Final Master Work Plan*.

## 2.3 Digital Geophysical Mapping Survey

Sections 2 and 5 of the *Draft Final OE Master Work Plan*, this Site-Specific Work Plan, and the geophysical subcontractor SOPs discuss the procedures used to acquire geophysical data, process the data, and select potential MEC targets.

## 2.4 Intrusive Investigation

For each specific site, all anomalies evaluated as potential MEC will be selected for intrusive investigation. The targets will be reacquired using tape measures and/or calibrated ropes in conjunction with an appropriate reacquisition instrument, and excavated by hand. The personnel, vehicles, equipment, and mobilization/ demobilization tasks required for completion of the intrusive aspect of the field investigation are described in the following subsections. Section 2 of the *Draft Final OE Master Work Plan*, a detailed SOP for intrusive sampling, will be provided by the MEC Subcontractor.

### 2.4.1 Selection of Equipment and Personnel (Magnetometer and EM-61)

Detection equipment used for OE/MEC avoidance and reacquisition will be selected by the OE/MEC subcontractor. Equipment will be validated through a geophysical proveout. Because all ordnance targets are expected to contain a variety of materials, verification of the removal of a target from an excavation will be performed using equipment designed to detect all metals. All detection equipment will be transported by air cargo to Vieques, where it will be inspected for damage and tested prior to the start of field operations. Spare equipment and accessories will also be mobilized to minimize downtime.

Radios will be available for communication with the site office and other personnel. Radios shall not be used within 100 ft of located OE/MEC or demolition operations as per NAVSEA OP 3565, Electromagnetic Radiation Hazards for Ordnance.

## 2.4.2 OE/MEC Disposal

Disposal actions to be taken for OE/MEC recovered during investigative operations will generally fall into one of the following three categories:

### 2.4.2.1 Recovered MEC

The MEC recovered during the investigation will be documented, removed, and transported by USA Environmental to an authorized magazine storage facility or a safe holding area onsite.

Subcontractor MEC technicians will provide ordnance disposal support services upon request from the Navy Technical Representative (NTR).

When OE that cannot be moved safely is discovered, and the area can withstand a high-order detonation, then the item will be blown in place.

Engineering controls or protective measures will be employed where required to minimize the damage from blow-in-place operations. These controls may consist of earthen works, sandbags, trenching, buttressing, taping of glass, mounding, flooding, and venting to reduce the effects of detonation.

### 2.4.2.2 Recovered Ordnance-Related Scrap (ORS)

**ORS** – Ordnance related scrap materials that have been in direct contact with energetic materials of the ordnance (e.g., expended rocket motors, shell casings, and warhead fragments) will be visually inspected by at least two MEC personnel, and will be certified free from energetic materials that would pose an explosive safety hazard, if appropriate. Certified safe ORS will be containerized and disposed of in an approved landfill as uncontaminated metal debris or sent to a Defense Reutilization and Marketing Office (DRMO) authorized recycle facility. Materials that cannot be certified as safe from explosive hazards will be handled, stored, transported, and disposed of as OE by MEC personnel. Appendix A details ordnance-related scrap metal collection and inspection procedures.

### Recovered Non-OE Scrap

**Non-OE Scrap** – Metal debris that is not ordnance-related (e.g., rebar, angle iron, and sheet metal) is not classified as hazardous waste and will be consolidated at the site in a separate roll-off container. It is anticipated that non OE-related scrap will be disposed of at the NSRR DRMO facility on a landfill.

## 2.4.3 Exclusion Zones

A restricted/exclusion zone (EZ) shall be established around the area where intrusive activities are conducted, in accordance with Section 6 of this plan. Initially, a 300-ft EZ will be established at each location where intrusive activities are being conducted. If OE/MEC is located during excavation, the EZ will be adjusted to 1,250 ft for non-fragmenting explosive materials; 2,500 ft for fragmenting explosive materials; or 4,000 ft for bombs and projectiles of caliber 5-inch and greater. While MEC operations are in progress, only those personnel necessary for the operation will be allowed within the EZ. If nonessential personnel enter the area, all MEC operations will cease.

**ATTACHMENT**

**SOP**

**USA ENVIRONMENTAL, INC.**

## **1.0 Technical Approach**

*(Revision 1 – April 19, 2002)*

### **1.1 Technical Approach**

USA's has structured our response to follow the task organization contained in the SOW. The following subparagraphs describe the methods USA proposes for executing each task.

#### **1.1.1 Task 1 – Mobilization and Demobilization**

USA proposes to mobilize our personnel and equipment in the following manner:

- SUXOS: On April 24, 2002, USA will mobilize its Senior UXO Supervisor to the project site. On the 24<sup>th</sup> and 25<sup>th</sup> the SUXOS will receive and organize equipment, become familiar with the operating site and will meet with CH2M Hill's on-site representatives. *(Note: Timberline will also start mobilization on April 24<sup>th</sup>)*
- UXO Technician III: On April 28, 2002, USA will mobilize one UXO Technician III. This will bring USA's field strength to the one 2-man UXO Crew, which is specified in the third bullet in the assumptions section of the SOW.
- Upon completion of the Brush Cutting on May 24<sup>th</sup>, USA will demobilize the UXO Technician III from the project site. This will leave only USA's SUXOS on-site from May 25<sup>th</sup> through June 16<sup>th</sup>. During this period, the SUXOS will continue with Surface Preparation and will provide UXO Escort support for the geophysical survey and target reacquisition. This is a deviation from the manning levels specified in the SOW, and this deviation was discussed with and approved by Mr. Marty Clasen of CH2M Hill.
- On June 16<sup>th</sup>, USA will mobilize one UXO Technician III and two UXO Technician IIs. These personnel and the SUXOS will perform Task 6: Investigate Anomalies, and all personnel will be demobilized following completion of this investigation.

#### **1.1.2 Task 2 – Vehicle Rentals**

Throughout the field effort, USA will provide one vehicle for each two-person UXO Team. During the initial mobilization of the SUXOS, USA will obtain a pick-up truck from the San Juan area and transport it to Vieques. USA will equip this vehicle with a wooden box and other safety equipment needed to transport explosives. During transportation of the explosives to and from the site, Mr. Daniel Miller will operate the vehicle. Mr. Miller has a HAZMAT Certification and Commercial Drivers License, which is required for transporting explosives over public roads. The remaining team vehicle will be obtained from a local agency on Vieques.

#### **1.1.3 Task 3 – Field Communications**

USA will equip each of its teams with Motorola HT-1000 radios. In addition USA will provide three additional radios. Two of the additional radios will be provided to CH2M Hill for their use, and the remaining radio will be held as a spare. All radios will be assigned identical frequencies and USA will provide batteries and chargers.

#### **1.1.4 Task 4 - Brush Cutting**

USA will subcontract with Timberline Logging, Inc. (Timberline) for the actual brush cutting. USA has worked extensively with Timberline on previous large UXO/OE Removal projects and based on this experience Timberline has developed and modified its mechanized brush cutting equipment to facilitate its use on sites that are contaminated with UXO/OE items. Timberline will provide one Mechanical Brush Cutting Team and one Manual Brush Cutting Team. The Mechanical Team will consist of an Equipment Operator, Bobcat Excavator with Brush Cutting Attachment, support vehicle and other equipment and supplies needed to mechanically cut the vegetation. The Manual Brush Cutting Team will consist of two personnel equipped with gasoline-powered chainsaws, brush blades and other brush cutting equipment. Timberline will provide its services for this project on a fixed-daily-rate basis and anticipates that it will require approximately twenty (20) workdays to complete the fifteen acres specified in the SOW.

During brush cutting operations, USA will provide one UXO Escort to accompany Timberline. This escort will conduct a visual search of the cutting area to ensure that Timberline's equipment does not come into contact with surface UXO/OE items. Vegetation will be cut along ingress/egress routes to a degree that provides access to the work areas. Within each work area, Timberline will be cut and mulch the vegetation to a level sufficient to support the follow-on geophysical survey.

### **1.1.5 Task 5 – Surface Preparation**

As the individual work areas are brush cut, USA will perform a magnetometer aided surface search of these areas to locate, identify and remove surface metallic contamination. USA's on-site SUXOS will perform this work, which will begin on or about May 8<sup>th</sup> and will continue until approximately June 14<sup>th</sup>. The SUXOS will systematically search each work grid to locate and remove obvious surface metallic debris, which could interfere with the subsequent geophysical survey.

Should UXO or OE items containing explosives be encountered, USA will dispose of these items by countercharging the item with an explosive donor charge and detonating the donor charge. All explosive disposal operations will be performed under the direction and supervision of USA's on-site Senior UXO Supervisor (SUXOS). During these operations, CH2MHill's on-site UXO Site Safety Officer (UXOSO) will closely monitor these operations, strictly enforce safety and adherence to procedures, and ensure that the exclusion area is appropriately evacuated.

USA will segregate and consolidate all recovered metallic debris and OE related scrap. These materials will be jointly inspected by USA's SUXOS and CH2MHill's UXOSO to ensure they are free of energetic materials. Upon completion of the project these materials will be transported to and turned-in to the DRMO at NSRR.

### **1.1.6 Task 6 – Investigate 1,500 Target Anomalies**

Under this task, USA will excavate and identify the source of up to 1,500 target anomalies, detected during the geophysical survey. USA will perform this work using two UXO Anomaly Investigation teams. One team will consist of a SUXOS and one UXO Technician II, and the remaining team will consist of one UXO Technician III and one UXO Technician II.

Using target listings developed during interpretation of the geophysical survey data, the UXO Teams will move to each target anomaly and carefully investigate the source of the anomaly. At each anomaly location the UXO Team will carefully remove the earth overburden to uncover the anomaly, identify the source of the anomaly and record the identification data for the anomaly on the target listing. During the investigation, the UXO Teams may be required search an area extending out the radius of the length of a Schonstedt Magnetometer to locate the source of the anomaly.

Should the UXO Team encounter UXO or OE items containing explosives, the team will dispose of these items by countercharging the item with an explosive donor charge and detonating the donor charge. All explosive disposal operations will be performed under the direction and supervision of USA's on-site Senior UXO Supervisor (SUXOS). During these operations, CH2MHill's on-site UXO Site Safety Officer (UXOSO) will closely monitor these operations, strictly enforce safety and adherence to procedures, and ensure that the exclusion area is appropriately evacuated.

During the investigation, the SUXOS and UXO Tech III will digitally record identification and depth data for each of the target anomalies. The information collected will consist of the depth at which the primary anomaly was encountered, a descriptive identification of the item (for UXO items this will include nomenclature), and a general comment field to record other pertinent data (e.g. Numerous small munitions fragments).

**1.1.8 Task 7 – Silt Fence Installation UXO Avoidance**

USA will provide one UXO Avoidance Team, consisting of one SUXOS and one UXO Technician II to provide UXO Avoidance support for this task. These escorts will conduct a visual search of the ingress and egress routes leading to the installation location, and visually search the installation location to ensure that non-UXO personnel remain clear of surface UXO and/or OE items. In addition, these personnel will check each staking location with a hand-held magnetometer to ensure that the path of the stake is free of subsurface metallic contacts that could be UXO and/or OE items.

**1.1.8 Task 8 – Prepare After Action Report**

Upon completion of field operations, USA will prepare an After Action Report. This report will document the work performed, the means and methods employed in executing the work, and the results attained. To ensure the adequacy of this report, USA will coordinate the specific content and format of the report with CH2MHill prior to the start of field operations. USA will develop the report at its Corporate Headquarters in Tampa, FL. The report will initially be prepared in draft form and will be distributed for review and comment. Following receipt of comments, USA will coordinate our response to the comments with CH2MHill, update the document and publish it in final form.

**1.2 Point of Contact**

USA thanks you for the opportunity to bid on this project and looks forward to working with CH2M Hill on this and other projects. Should you have questions concerning this pricing proposal, please contact Mr. John Q. Adams, Vice President (USA Environmental, Inc.). Mr. Adams may be reached via the following:

Mail: USA Environmental, Inc.  
5802 Benjamin Center Drive  
Suite 101  
Tampa, FL 33634

Phone: (813) 884-5722, extension: 109  
Fax: (813) 884-1876  
email: [jadams@usatampa.com](mailto:jadams@usatampa.com)

## SECTION 3

# Explosives Management Plan

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This section describes the site-specific aspects of the explosives management plan for SWMU 4, and was developed to supplement the general approach of the explosive management plan as discussed in detail throughout Section 3 of the *Draft Final OE Master Work Plan*. The explosives management plan will be implemented in accordance with the appropriate components of the *Draft Final OE Master Work Plan* and this SWMU 4 Site-Specific OE Work Plan as applicable.

## 3.1 Acquisition

CH2M HILL is prepared to acquire commercial explosives from an explosive vendor(s) who will deliver the materials to the project site for OE/MEC demolition purposes. CH2M HILL maintains a licensed Bureau of Alcohol, Tobacco, and Firearms (ATF) user with a high explosives permit, who is available upon request. Explosives vendors cannot supply explosives without the required valid dealer ATF license. A copy of this dealer license will be maintained at the project site, and upon request, will be made available to any local, state, or federal authority. It is expected that the binary explosives will be shipped to Vieques via FedEx eliminating the need to develop a plan for the explosives handling area for arriving explosives.

The types and estimated quantities of explosives and their intended use are specified below. The commercial explosives vendor will be determined by the MEC subcontractor, USA Environmental.

The following explosives will be used during explosive disposal of OE/MEC:

- Main charge high-energy binary explosives that detonate at high velocities will be used to detonate MEC.
- Jet Perforators or similar prepackaged shaped charges will be used to explosively vent hard-cased munitions.
- A detonating cord will be used to construct mainline-branch line shots, to link multiple shots together, or to transmit the explosive train to the main charge explosive when the main charge is buried (tamped), underwater, or otherwise inaccessible.
- Electric and/or non-electric blasting caps may be used as initiators.
- NONEL tubing may be used to transmit the explosive train from the igniter to the demolition devices. Shock tube priming of explosives offers the instantaneous action of electric detonation without the risk of accidental initiation of the blasting cap (and the charge) by radio transmitters in the area, or by static electricity discharge. The explosion of the shock tube is totally contained within the plastic tubing.

## 3.2 Storage

This section presents the plan for storage of explosives to be used during OE projects at the Former NASD.

### 3.2.1 Establishment of Explosives Storage Facilities

Explosives will be stored in a temporary portable explosives storage Type 2 magazine as described in Section 55.208(a)(4) of ATF P 5400.7, Explosives Law and Regulations. This portable unit is constructed with separate compartments for initiators (blasting caps) and the binary explosives. Explosives items will be stored in accordance with its Hazard Division (HD) and the storage compatibility group criteria listed in Chapter 3 of DoD 6055.9-STD. The quantity-distance (Q-D) requirements are specified in Table 3-1.

TABLE 3-1  
Hazard Class/Division 1.1 Inhabited Building and Public Traffic Route Distances

Net Explosive Weight (NEW) lbs	Distance in Feet to Inhabited Building From:				Distance in Feet to Public Traffic Route From:			
	Earth Covered Magazine			Other PES	Earth Covered Magazine			Other PES
	Front	Side	Rear		Front	Side	Rear	
Col 1	Col 2 1,8	Col 3 1,8	Col 4 2,8	Col 5 3	Col 6 4,8	Col 7 5,8	Col 8 6,8	Col 9 7
1	500	250	250	1,250	300	150	150	750
2	500	250	250	1,250	300	150	150	750
5	500	250	250	1,250	300	150	150	750
10	500	250	250	1,250	300	150	150	750
20	500	250	250	1,250	300	150	150	750
30	500	250	250	1,250	300	150	150	750
40	500	250	250	1,250	300	150	150	750
50	500	250	250	1,250	300	150	150	750
100	500	250	250	1,250	300	150	150	750
150	500	250	250	1,250	300	150	150	750
200	700	250	250	1,250	420	150	150	750
250	700	250	250	1,250	420	150	150	750
300	700	250	250	1,250	420	150	150	750
350	700	250	250	1,250	420	150	150	750
400	700	250	250	1,250	420	150	150	750
450	700	250	250	1,250	420	150	150	750
500	1,250	1,250	1,250	1,250	750	750	750	750
600	1,250	1,250	1,250	1,250	750	750	750	750
700	1,250	1,250	1,250	1,250	750	750	750	750
800	1,250	1,250	1,250	1,250	750	750	750	750
900	1,250	1,250	1,250	1,250	750	750	750	750
1,000	1,250	1,250	1,250	1,250	750	750	750	750
1,500	1,250	1,250	1,250	1,250	750	750	750	750
2,000	1,250	1,250	1,250	1,250	750	750	750	750
3,000	1,250	1,250	1,250	1,250	750	750	750	750
4,000	1,250	1,250	1,250	1,250	750	750	750	750
5,000	1,250	1,250	1,250	1,250	750	750	750	750
6,000	1,250	1,250	1,250	1,250	750	750	750	750
7,000	1,250	1,250	1,250	1,250	750	750	750	750
8,000	1,250	1,250	1,250	1,250	750	750	750	750
9,000	1,250	1,250	1,250	1,250	750	750	750	750
10,000	1,250	1,250	1,250	1,250	750	750	750	750
15,000	1,250	1,250	1,250	1,250	750	750	750	750

The temporary portable explosives storage magazine will be placed on the concrete pad on the apron to the existing ECM 239 near SWMU 4. Three sides of ECM 239 will provide security for the portable magazine. A fence will be constructed on the fourth side to enclose the portable magazine and will be completed with a fence, gate and double lock. Figure 3-1 illustrates the location of ECM 239.

The maximum Net Explosives Weight in pounds (NEW) to be stored in each compartment of the magazine is 50 pounds. This explosives storage area will meet the requirements of:

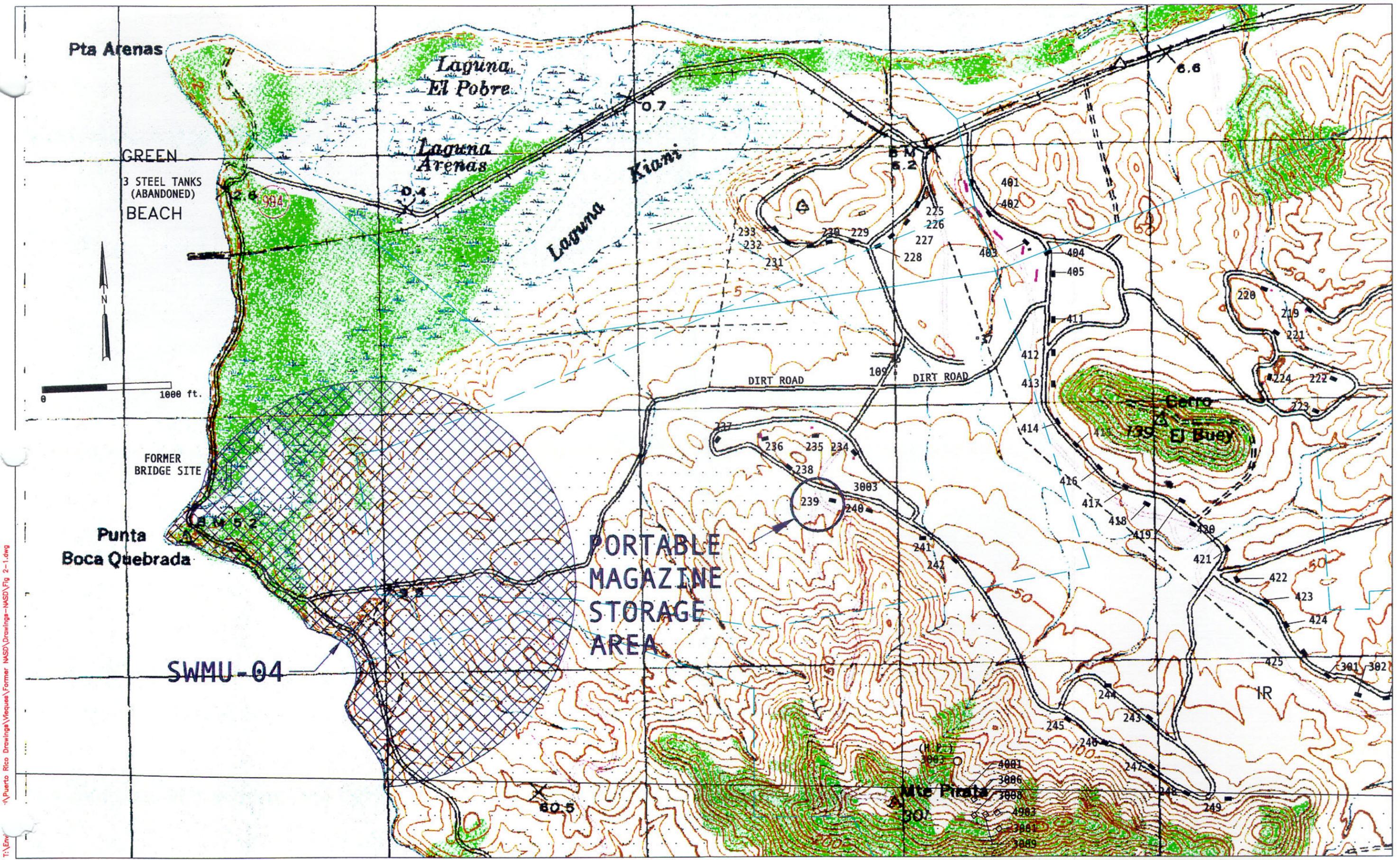
- ATF P 5400.7 - Alcohol, Tobacco, and Firearms Explosives Laws and Regulations
- DoD 6055.9-STD - DoD Ammunition and Explosives Safety Standards
- DA Pam 385-64 - Ammunition and Explosives Safety Standards
- NAVSEA OP 5 Volume 1, Ammunition and Explosives Ashore

Requirements for the explosives storage area include security locks and fences, placards, and lightning protection systems as described in Section 4.1.1 through 4.1.5 of this document.

### 3.3 Accountability

Explosives accountability is the responsibility of the Licensed MEC subcontractor purchasing, transporting, storing and using explosives for OE/MEC demolition activities. At a minimum, the following requirements apply:

- Maintain records and reports in accordance with ATF and applicable regulations.
- Retain all records pertaining to explosive materials (i.e., commercial invoices, shipping documents, permits, record books)
- Explosive material physical inventories
- Accountability of explosive material issued, used and disposition
- Date, type of explosives, description/identification of explosives, and quantity
- Records and reports of purchasing, transporting, storing or use of explosives for OE/MEC demolition purposes will be reviewed by CH2M HILL.



T:\Env\1\Puerto Rico Drawings\ Vieques\Former NASD\Drawings-MSD\Fig 2-1.dwg  
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Figure 3-1  
 LOCATION OF EARTH COVERED MAGAZINE 239  
 Former NASD, Vieques Island, Puerto Rico **CH2MHILL**

## SECTION 4

# Explosives Siting Plan

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This section presents the site-specific explosives siting plan requirements for storage of explosives to be used during OE work at SWMU 4. Safety criteria for planning and siting explosives operations were developed in accordance with NAVSEA OP 5 VOL I and OPNAVINST 8020.14. Detailed descriptions on determining EZs, minimum separation distances, and the establishment of demolition areas are presented in Section 4.1 of the *Draft Final OE Master Work Plan*. Table 4-1 in Section 4 of the *Draft Final OE Master Work Plan* summarizes the basic activities that will be conducted in OE areas the basis for determining the appropriate EZ minimum and safe separation distances.

The following subsections present the rationale and strategy for siting a portable magazine at SWMU 4 utilizing the existing concrete apron at ECM 239 to provide magazine security. A separate Magazine Siting Plan will be developed and submitted to NOSSA for review and approval as a supplement to this OE Site-Specific Work Plan.

## 4.1 Siting of Portable Magazine

The safety arcs for the existing ECMs at the Former NASD have been removed and the magazines have been closed out as part of the transfer of the Former NASD. With their availability limited, USA Environmental will provide a temporary portable Type 2 magazine consisting of two individual compartments for the storage of the initiators and the binary explosives. The initiators and binary explosives will be stored separately in the two individual compartments.

The Magazine Siting Plan to be submitted under separate cover will provide additional detail for the portable magazine including detailed figures illustrating the location of ECM 239, the proposed location of security fencing, and distances to the nearest roads, buildings, and other facilities. Safety Arcs for inhabited buildings and public traffic routes are illustrated in Figure 2-2 of the Magazine Siting Plan.

### 4.1.1 Physical Security

The concrete pad adjacent to ECM 239 to be used for the storage of the temporary portable magazine will be completed with a new chain-link fence, gate, and two separate locks that meet the standards for ATF Type 2 magazines, as specified in Section 55.208(a)(4), ATF P 5400.7. The SMECS will hold a key to one of the locks, and the MECSSO will hold the key to the other lock. Access to the explosives will require both individuals. CH2M HILL will maintain control of all keys.

### 4.1.2 Placards

The temporary portable magazine will display the placards required by OP 5, for the appropriate hazard division and class. A hazard identification for fire fighting personnel

will also be displayed at the magazine storage area. Signs stating “EXPLOSIVES” and “NO SMOKING” will be posted on the fence surrounding the magazines.

### 4.1.3 Lightning Protection System

Because the Former NASD is located under the management of the DOI, the requirements of Chapter 7 of DoD 6055.9-STD apply. These requirements specify a lightning protection system (LPS) for the explosives magazines. The LPS will be designed to intercept lightning at a 100-ft or less striking distance arc in accordance with National Fire Protection Association (NFPA) 780. The LPS will be inspected, repaired as necessary, and tested prior to receiving the first shipment of explosives. It is expected that existing grounding units inside ECM 239 will be utilized to ground the portable magazines proposed for storage inside of the ECM.

### 4.1.4 Fire Protection

Fire extinguishers of 10 pounds and type BC will be located in the magazine area. Type BC fire extinguishers are intended for use for electrical or fuel fires. Smoking, matches, open flames, spark-producing devices, and firearms will not be permitted within 50 ft of the magazines. The land surrounding the magazines will be kept clear of all combustible materials for a distance of at least 50 ft.

### 4.1.5 Stocking Procedures

Containers of explosive materials are to be stored so that marks are visible. Stocks of explosive materials are to be stored so that they can easily be counted and checked upon inspection. Except with respect to fiberboard or other non-metal containers, containers of explosive materials are not to be unpacked or repacked inside a magazine or within 50 ft of a magazine, and must not be unpacked or repacked near other explosive materials. Containers of explosive materials must be closed while being stored.

Tools used for opening and closing containers of explosive materials are to be constructed of non-sparking materials, except that metal slitters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber, or wooden mallet are to be used for opening and closing wood containers of explosive materials. Metal tools other than non-sparking transfer conveyors are not to be stored in any magazine containing high explosives.

## 4.2 Footprint Areas

### 4.2.1 Blow-in-Place

Blow-in-place occurs when an OE item is deemed unsafe to move. In this case, the item is prepared and detonated in-place. Minimum separation distances for blow-in-place are based on the criteria for planned or established demolition areas, as discussed in Section 4.1.2 of the OE Master Work Plan.

## 4.2.2 Collection Points

Collection points are areas within a search grid where recovered OE that is safe to move is temporarily accumulated pending transport to another area for storage or destruction. EZs for collection points are based on the criteria for unintentional detonations as discussed in Section 4.1.1 of the *Draft Final OE Master Work Plan*, using the 60 mm mortar as the MPM for the area. In addition to the 60 mm mortar MK 230 fuzes and 20 mm HE projectiles are also expected to be found at SWMU 4 based on results of the MEC avoidance survey conducted at the site during the PA/SI efforts.

As these projectiles are identified and deemed safe to move, they will be moved to an accumulation area consisting of a sandbagged area covered by plywood. It is anticipated that an area previously used for storage of items found during the Green Beach MEC clearance project will be utilized for the temporary storage of safe-to-move items such as the MK 230 fuze and 20 mm HE projectiles. This accumulation area is within the SWMU 4 limits and is protected by two fenced-in areas with locks. The proposed accumulation area for OE deemed safe to move is illustrated in Figure 2-5.

It is anticipated that accumulated safe-to-move ordnance will be blown in place once per week depending on the amount of items recovered.

Historical records show that 8-inch, 105 mm, 106 mm, and 175 mm projectiles may have been disposed of at the site, however, none have been found to date.

## SECTION 5

# Geophysical Investigation Plan

---

## 5.1 Geophysical Plan

This document details the geophysical plan in support of OE detection activities for the area identified as SWMU 4 on the island of Vieques in Puerto Rico. This action is authorized by the U.S. Navy (Navy Clean Prime Contract N62470-95-D-6007) and CH2M HILL.

## 5.2 Personnel Qualifications

Data acquisition will be conducted by a well-trained, experienced two-person crew led by a qualified geophysicist. All NAEVA personnel onsite will have documentation of 40-hour OSHA certification, any necessary re-certification (8-hour refresher), and OSHA-compliant medical monitoring physical exams. Throughout operations, NAEVA will strictly adhere to the following general practice. All work to be conducted is non-intrusive. Personnel will practice avoidance in the unlikely event that MEC is encountered.

## 5.3 Geophysical Investigation Plan Outline

The objectives of the geophysical work are 1) geophysical instrument prove-out and evaluation, 2) geophysical mapping of 25 acres, which includes the creation of target maps and dig-sheets and, 3) anomaly reacquisition utilizing the same geophysical instrumentation and temporary markers (i.e. pin flag, paint, or other semi-permanent markers).

### 5.3.1 Geophysical Prove Out

The initial phase of the investigation will be an evaluation of the proposed geophysical instrumentation. An established “prove-out” area, consistent with the local site conditions, will be seeded with known items and used by NAEVA for the evaluation. The qualified two-person geophysical team will separately employ an inductively coupled metal detector (EM-61) followed by a cesium-vapor total field magnetometer (Scintrex Smartmag SM-4), in conjunction with a base station magnetometer, across the entire prove-out area using the same survey techniques to be exercised for the investigation. Upon evaluation of the data, including the terrain and target item responsiveness, the best-suited instrument will be selected for the investigation.

### 5.3.2 Geophysical Mapping

The area to be investigated is described as having a dense shrub canopy that will be removed using mechanized de-vegetation techniques. The areas of concern (AOC) will be established as individual 200-foot by 200-foot grids cells to cover approximately 25 acres (1 acre=200 ft x 200 ft). Immediate surface culture (i.e., metallic debris, obstructions, etc...) will be removed prior to the start of the geophysical investigation.

### 5.3.3 Anomaly Reacquisition

Target anomalies will be re-acquired by the geophysical contractor using the GPS system where appropriate. Coordinate locations of each targeted anomaly will be uploaded into the rover, which will be used to navigate or re-occupy the point where a temporary mark will be placed. Reacquisition of target locations where no GPS coverage exists will be conducted using tape measures pulled from corner stakes to locate the interpreted local x,y coordinate position listed for each target on the dig sheet. Each reacquired target location will be marked with a pin flag labeled with the anomaly's identifying number as specified on the dig sheet.

Using the same geophysical equipment as was originally used, the reacquisition crew will then refine the location of the anomaly. This will be accomplished by collecting readings in continuous mode while slowly maneuvering the instrument over the anomaly, searching for the peak response. The pin flag will be moved to the refined location and the offset will be documented.

## 5.4 Geophysical Instrumentation

### 5.4.1 Electromagnetics

The Geonics EM61 metal detector is a time domain instrument that detects both ferrous and non-ferrous metallic objects. A transmitter current pulse in a 1meter by ½ meter transmitter coil 40 cm above the ground generates a primary magnetic field in the earth, which induces eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field that is measured by sampling induced voltages in two receiver coils (bottom coil co-planar with transmitter, and top coil 40cm higher). The measured responses are recorded in an integrated data logger. The EM61 coil dimensions are newly designed from the original square meter by meter coils to reportedly increase the sensitivity to smaller metallic items.

### 5.4.2 Total Field Magnetics

The Scintrex cesium vapor magnetometer is well suited for the detection of ferrous munitions. The magnetic method measures variations in the earth's magnetic field. Localized variations or distortions in the magnetic field can be identified and interpreted as subsurface ferro-magnetic objects. A Scintrex Envimag proton precession magnetometer (or equivalent) will be operated as a base-station to measure diurnal changes in the earth's magnetic field during times of field data acquisition. The base station instrument will remain stationary while recording continuous readings at five-second intervals. Diurnal variation observed in the base station data during total field magnetic data acquisition is removed with Geosoft's Magbase software, which is used to match the time stamps of the two magnetometers and subtract the base value.

A review of all raw data and initial editing procedures will be performed in the field using appropriate software. Once satisfied with the data quality (i.e. line path coverage, data density, positioning, etc...), it will then be electronically transferred to a workstation for final processing and interpretation using Geosoft® Oasis Montaj software.

## 5.5 Location Surveying, Mapping, and Navigation

Wooden hubs or stakes will be set on 200-foot corners throughout the area of investigation to serve as control. Using the emplaced control points, the geophysical crew will establish a grid for data collection. Where practical, positional data will be collected from an Ashtech Z-FX Surveyor RTK (Real Time Kinematic) GPS system. A GPS base station (also utilizing an Ashtech Z-FX receiver) will be set up on an established control point, and real time corrections broadcast to the roving GPS unit via a radio link. This system provides positional updates at a rate of 1 Hz, with an accuracy of 3-cm horizontal, 5-cm vertical, when no less than 5 satellites are available. The roving GPS antenna may be mounted in the center of the coils to track the EM-61 or, in areas where limited coverage exists due to terrain or vegetation, the rover may be used to locate survey cell corners for data conversions and interpolation from a local coordinate system. In areas that exhibit inadequate GPS coverage, highly accurate data positioning will be maintained through the use of color-coded ropes placed across the area of investigation to assist in straight-line profiling, and for the placement of fiducial marks within the data sets. This method will serve as a backup to GPS and be used when GPS technology is adversely affected by local vegetation or topographic conditions.

## 5.6 Instrument Standardization/Quality Control

Geophysical instruments will be field tested daily to ensure that they are operating properly. If the standard response cannot be attained, the instrument will be re-calibrated, repaired, or replaced. The following procedures will be conducted each day:

1. The instruments will be positioned at the same location each morning, and readings will be collected for no less than one minute. The data from this “static test” will be evaluated for consistency and repeatability. A uniform target item will be placed on the ground surface, in the center of the EM-61 coil, or directly under the magnetometer sensor. The instrument response to the item will be checked against the previous daily static tests to ensure that the instruments are functioning properly, as evidenced by a consistent response.
2. Upon completion of the static test, the selected geophysical instrument will be used to measure and record at least one standard calibration test line (located in pre-existing prove-out) over known inert OE items each morning prior to use. The same test line will be re-surveyed upon completion of the daily data acquisition. Peak anomalous readings over the OE items will be evaluated for consistency immediately after the data is collected.
3. Additionally, data collection over at least 4 percent of each survey cell will be repeated for direct comparison of amplitude response and positioning. If consistent response or positioning cannot be attained, the instrument will be re-calibrated, repaired, or replaced.

## 5.7 Data Processing and Analysis

The raw data is gridded and displayed on the screen as a color contour image with the track plot overlaid on the map. The purpose of this initial exercise is to assess the positioning and density of the data.

Geophysical data processing will include the following procedures:

1. Conversion of local grid coordinates to Puerto Rico State Plane coordinates
2. Diurnal Drift Correction (magnetics)
3. Heading corrections
4. Lag corrections
5. Normalization or leveling (removal of background)
6. Gridding of data
7. Digital filtering and enhancement
8. Calculating the 3D analytic signal from the magnetic data
9. Gridding of analytic signal
10. Selection of anomaly picks (above an appropriate threshold)
11. Preparation of geophysical maps and target maps

### 5.7.1 Quantitative Interpretation and Dig Sheet Development

Geophysical anomalies (or targets) will be identified from the processed data. For each grid, the geophysical subcontractor will assess each of the following factors prior to selecting anomalies (or targets):

1. The local background (terrain noise) conditions
2. An evaluation of data completeness and accuracy
3. An assessment of data quality based on the survey and grid QC data
4. The grid boundary conditions, utilities and/or other cultural features present, and unsurveyable areas (trees, buildings, etc.)
5. A delineation of the extent and boundaries of pits and trenches (anomaly lists will not be generated for extensively large areas of anomalous response).

### 5.7.2 Dig Sheets

The geophysical contractor will, using a qualified geophysicist, analyze the geophysical data for each OE removal grid, identify anomalies that may represent buried MEC, and prepare anomaly lists containing the following information:

1. Project site

2. Geophysical contractor
3. Responsible geophysicist
4. Grid identification
5. Grid corner locations and coordinates
6. Unique anomaly identification numbers
7. Predicted anomaly easting & northing in State Plane coordinates
8. Instrument peak value at each anomaly location

The dig-sheets will be prioritized and anomalies deemed more likely to be MEC, will be ranked higher than anomalies less likely to be MEC. The criteria for selecting and locating anomalies for the anomaly (or target) list include the following items:

1. The maximum amplitude of the response with respect to local background conditions
2. The lateral extent (width) of the response
3. The 3-dimensional shape of the response
4. The location of the response with respect to the edge of the grid, unsurveyable areas, land features, cultural features, or utilities within or adjacent to the grid
5. The shape and amplitude of the response with respect to the response of known targets buried in the geophysical prove-out test plot
6. The shape and amplitude of the response with respect to relevant anomalies encountered in previous OE removal grids
7. The apparent depth of the anomaly
8. Potential distortions in the response due to interference from nearby cultural features; any instrument or grid survey QC that could affect the analysis.

### 5.7.3 Grid Maps

The geophysical contractor will also provide, with each dig sheet, a grid map, which contains the following:

1. Grid identification
2. Grid corner locations and coordinates
3. Contoured data
4. Anomaly locations with unique identification numbers

### 5.7.4 Records Management

All files will be available for quality and/or control processing during the investigation to assure the field and data processing procedures are properly implemented. All raw data

files, final processed data files, hard copies, and field notes will be maintained for the duration of the project and then turned over to CH2M HILL.

#### 5.7.5 Final Reports and Maps, Geophysical Mapping Data

As soon as practical after collection, the geophysical field data shall be provided in delineated fields as x, y, z, v (1), v (2), etc., for delivery to CH2M HILL. After completion of survey and processing activities, all final maps and supporting geophysical interpretations shall be provided for delivery to CH2M HILL. Maps that display the geophysical anomalies with annotated, interpreted and identified physical features shall be delivered in MicroStation (.dgn) compatible format.

**ATTACHMENT:**

**SOP  
GEOPHYSICAL SURVEY**

Procedure No. QCSOP for Geo Prove Out  
Description:  
Revision No. REV1  
Date: 22 Jan, 2003  
Page i of iv

STANDARD OPERATING PROCEDURE  
GEOPHYSICAL SURVEY

U.S. NAVY AMMUNITION SUPPORT DETACHMENT  
UNEXPLODED ORDNANCE INVESTIGATION  
SWMU-4  
N62470-95-D-6007

VIEQUES, PUERTO RICO

REVISION 1

CH2M HILL

JANUARY 22, 2001

Prepared by: \_\_\_\_\_  
Gary T Webb  
Project QC Manager

Approved by: \_\_\_\_\_  
John Tomik  
Program QC Manager

# **Ordnance Related Scrap (ORS) Metal Collection and Inspection Procedures**





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2. DATA QUALITY OBJECTIVES
3. DEFINITIONS
4. PROCEDURES
5. TRAINING

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EQUIPMENT GEOPHYSICAL PROVE OUT (GPO) CERTIFICATION/ DOCUMENT/  
CHECKLIST

### ATTACHMENT 2

GEOPHYSICAL PROVE OUT (GPO) TARGET LIST.

## **1. PURPOSE**

This document details the Standard Operating Procedure (SOP) for conducting a geophysical survey in support of ordnance and explosives (OE) detection activities for the area identified as SWMU 4 on the island of Vieques in Puerto Rico. The objectives of the geophysical work are 1) conduct geophysical instrument prove-outs to demonstrate that the geophysical equipment can meet the data quality objectives, 2) geophysical mapping of 25 acres, which includes the identification of subsurface anomalies that may be indicative of OE items, and the development of target maps and dig-sheets and, 3) anomaly reacquisition utilizing the same geophysical instrumentation and temporary markers (i.e. pin flag, paint, or other semi-permanent markers) to verify potential OE locations.

## **2. DATA QUALITY OBJECTIVES**

The data quality objectives (DQOs) of the geophysical survey reflect the information that is required to meet the goals identified above and include the following::

- Assess the horizontal extent of OE items at SWMU 4
- Demonstrate the effectiveness of the geophysical equipment using a geophysical prove-out that provides a 85% probability of detection with a confidence level of 90%
- Detection of the MPM/OE to the depths indicated in Attachment 2
- Determine the location of each anomaly such that the locations identified from the geophysics are within 2.5-ft. of its actual location.

## **3. DEFINITIONS**

Deficiency – An identified condition or activity that does not meet standards or requirements and does not effect the overall quality of the finished product.

Nonconformance – Product, procedure, system process or activity that does not meet requirements and effects overall quality of the product. A nonconformance must be corrected prior to delivery of the finished product.

Surveillance – Continual monitoring and verification of the status of an entity and analysis of records to ensure specified requirements are being fulfilled.

## **4. PROCEDURES**

### **4.1 MAINTENANCE**

The Project Quality Control Manager (QCM) is responsible for the maintenance of all procedures including:

- Resolving on-site quality issues concerning the GPO and the geophysical survey
- Providing QC oversight to assigned project QC staff
- Maintaining the GPO and ECA test areas

Suggested improvements or changes to this SOP will be approved by the QCM and the Program QC Supervisor.

### **4.2 GEOPHYSICAL PROVE-OUT**

#### **4.2.1 Objectives**

Prior to initiating the geophysical survey a geophysical “prove-out” (GPO) will be completed to provide an evaluation of the proposed geophysical instrumentation. The purpose of the geophysical prove-out is to establish and validate the ability of the system, people and equipment, to attain the contract required Probability of Detection (PD) and Confidence Level (CL) prior to starting fieldwork. System certification is required prior to beginning fieldwork or when an uncertified person is assigned to the team and will be operating geophysical equipment, a change in geophysical equipment, or at the request of the QC Manager randomly or for cause. A system, for GPO purposes, is the personnel and equipment used in the detection and reacquisition of subsurface anomalies. The GPO effectively evaluates the ability of the system to detect, identify,

and reacquire anomalies. It also assesses the ability of the process to process EM and DGPS data, manage information, and track and handle data.

The GPO will be repeated weekly during the survey and any time there is a change in either the equipment or the geophysical personnel. The CH2MHILL Project Quality Control Manager will be responsible for implementing this procedure and observe the geophysical team throughout the GPO. An established prove-out area, consistent with the local site conditions, will be seeded with known items and identified by the geophysical contractor.

The number of targets to be emplaced in the GPO is determined by calculating the number of seeded targets necessary to demonstrate the DQO requirement of 85% probability of detection (Pd) and 90% confidence level (Cl). For purposes of this GPO, the Reliability Computer developed by the Naval Explosive Ordnance Disposal Technology Division was used.

Acceptable geophysical results will demonstrate the ability to acquire at least 46 out of the 48 targets will be graded as having both a Pd of greater than 0.85 and a CL greater than 90%.

#### **4.2.2 Site Characteristics**

SWMU 4 is relatively flat and heavily vegetated. However, the vegetation is being completely removed (with the exception of large trees), eliminating the vegetation as an obstacle to the geophysical survey, and there are some steep ravines (quebradas) that traverse the site. The GPO site, therefore, can be any relatively flat to rolling area within or adjacent to SWMU 4 that has been cleared of vegetation. The locations of the seeded OE in the GPO will be kept in strict confidence and will not be known to the personnel being tested.

#### **4.2.3 Procedures**

A qualified two-person geophysical team will separately employ an inductively coupled metal detector (EM-61) across the entire prove-out area using the following procedures:

1. Forty-Eight (48) targets will be buried within the GPO grid. The targets will be buried in random order at various depths, attitudes, and locations, according to the specifications in Attachment 2.

2. A Differential Global Positioning System (DGPS) will be used to record target locations (X,Y), providing an Easting and Northing for each seeded target. The location, attitude, and depth of each target will be recorded and used for the field validation process. All target markings in the GPO grid will be removed and the grid will be returned as near as possible to its natural condition. Information on the seeded target's location will not be released to the test participants.
3. Since a subcontractor is doing the geophysical data gathering, handling and processing, the construction of the GPO will be done by the (CH2M Hill) OE/UXO Quality Control manager and (CH2M Hill) Senior UXO Supervisor. These two persons will emplace each seeded OE and record the emplacement data required by Attachment 2.
4. All targets will be marked with pin flags and additional pin flags will be placed within the grid (GPO) area. Geophysical teams will conduct their search of the GPO grid as they would during collection of data throughout the site. The number of targets is not known to the geophysical equipment operators.
5. Prior to starting the prove-out an Equipment Check will be conducted by the geophysical team outside the prove-out area. This will allow the team to adjust their equipment to site conditions and ensure their equipment is functioning properly before entering the prove-out area. Specific information on target location and item type placed in Equipment Check Area (ECA) will be provided to the geophysics team.
6. Ensure flags marking the centerline of the GPO route are visible throughout the course and in good condition. Flags should be located to ensure teams can closely follow the designated route. It is important that each team follow the same path as closely as possible.
7. When team conducts the GPO, they will follow procedures as outlined in Section 6.2 for Geophysical Survey operation.
- 7) When the team has completed the geophysical survey, they will continue with the process until all data files, photocopies of logbook entries, and way point/track maps are submitted to the Data Manager for initial processing and transmission.
- 8) The Data Manager will download files from data logger and PC cards.

#### **4.2.4 New/repaired equipment certification**

When new/repaired geophysical survey equipment is being processed through the GPO, by a person already certified in the GPO process, it will not be necessary to perform the requisition operation using a UXO team. The reason for this is the anomalies identified by the geophysical survey and post processing of data can be compared with known target locations to determine effectiveness of equipment.

When new/repaired requisition equipment is being processed through the GPO, by a person already certified in the GPO process, the certification may be completed using a dig package from a previous GPO operation.

### **4.3 GEOPHYSICAL SURVEY**

The area to be investigated is described as having a dense shrub canopy that will be removed using mechanized de-vegetation techniques. The areas of concern (AOC) will be established as individual 200-foot by 200-foot grids cells to cover approximately 25 acres (1 acre=200ftx200ft). Immediate surface culture (i.e. metallic debris, obstructions, etc...) will be removed prior to the start of the geophysical investigation.

#### **4.3.1 Instrument Standardization/Quality Control**

Geophysical instruments will be field tested daily to ensure that they are operating properly. If the standard response cannot be attained, the instrument will be re-calibrated, repaired, or replaced. The following procedures will be conducted each day:

- 1.) The instruments will be positioned at the same location each morning, and readings will be collected for no less than one minute. The data from this “static test” will be evaluated for consistency and repeatability. A uniform target item will be placed on the ground surface, in the center of the EM-61 coil .The instrument response to the item will be checked against the previous daily static tests to ensure that the instruments are functioning properly, as evidenced by a consistent response.
  
- 2.) Upon completion of the static test, the selected geophysical instrument will be used to measure and record at least one standard calibration test line (located in

pre-existing prove-out) over known inert OE items each morning prior to use. The same test line will be re-surveyed upon completion of the daily data acquisition. Peak anomalous readings over the OE items will be evaluated for consistency immediately after the data is collected.

3.) Additionally, data collection over at least 4% of each survey cell will be repeated for direct comparison of amplitude response and positioning. If consistent response or positioning cannot be attained, the instrument will be re-calibrated, repaired, or replaced.

#### **4.3.2 Location Surveying, Mapping, and Navigation**

Wooden hubs or stakes will be set on 200-foot corners throughout the area of investigation to serve as control. Using the emplaced control points, the geophysical crew will establish a grid for data collection. Where practical, positional data will be collected from an Ashtech Z-FX Surveyor RTK (Real Time Kinematic) GPS system. A GPS base station (also utilizing an Ashtech Z-FX receiver) will be set up on an established control point, and real time corrections broadcast to the roving GPS unit via a radio link. This system provides positional updates at a rate of 1 Hz, with an accuracy of 3-cm horizontal, 5-cm vertical, when no less than 5 satellites are available. The roving GPS antenna may be mounted in the center of the coils to track the EM-61 or, in areas where limited coverage exists due to terrain or vegetation, the rover may be used to locate survey cell corners for data conversions and interpolation from a local coordinate system. In areas that exhibit inadequate GPS coverage, highly accurate data positioning will be maintained through the use of color-coded ropes placed across the area of investigation to assist in straight-line profiling, and for the placement of fiducial marks within the data sets. This method will serve as a backup to GPS and be used when GPS technology is adversely affected by local vegetation or topographic conditions.

### **4.3.3 Anomaly Reacquisition**

Target anomalies will be re-acquired by the geophysical contractor using the GPS system where appropriate. Coordinate locations of each targeted anomaly will be uploaded into the rover, which will be used to navigate or re-occupy the point where a temporary mark will be placed. Reacquisition of target locations where no GPS coverage exists will be conducted using tape measures pulled from corner stakes to locate the interpreted local x,y coordinate position listed for each target on the dig sheet. Each reacquired target location will be marked with a pin flag labeled with the anomaly's identifying number as specified on the dig sheet.

Using the same geophysical equipment as was originally used, the reacquisition crew will then refine the location of the anomaly. This will be accomplished by collecting readings in continuous mode while slowly maneuvering the instrument over the anomaly, searching for the peak response. The pin flag will be moved to the refined location and the offset will be documented. The actual location identified by the UXO team shall be within 2-1/2 feet of the anomaly identified by the geophysical survey.

### **4.3.4 Data Processing and Analysis**

The raw data is gridded and displayed on the screen as a color contour image with the track plot overlaid on the map. The purpose of this initial exercise is to assess the positioning and density of the data.

Geophysical data processing will include the following procedures:

1. Conversion of local grid coordinates to Puerto Rico State Plane coordinates
2. Diurnal Drift Correction (magnetics)
3. Heading corrections
4. Lag corrections
5. Normalization or leveling (removal of background)
6. Gridding of data
7. Digital filtering and enhancement

8. Calculating the 3D analytic signal from the magnetic data
9. Gridding of analytic signal
10. Selection of anomaly picks (above an appropriate threshold)
11. Preparation of geophysical maps and target maps

#### **4.3.5 Quantitative Interpretation and Dig Sheet Development**

Geophysical anomalies (or targets) will be identified from the processed data. For each grid, the geophysical subcontractor will assess each of the following factors prior to selecting anomalies (or targets):

1. The local background (terrain noise) conditions
2. An evaluation of data completeness and accuracy
3. An assessment of data quality based on the survey and grid QC data
4. The grid boundary conditions, utilities and/or other cultural features present, and unsurveyable areas (trees, buildings, etc.)
5. A delineation of the extent and boundaries of pits and trenches (anomaly lists will not be generated for extensively large areas of anomalous response).

##### **4.3.5.1 Dig Sheets**

The geophysical contractor will, using a qualified geophysicist, analyze the geophysical data for each OE removal grid, identify anomalies that may represent buried UXO, and prepare anomaly lists containing the following information:

1. Project site
2. Geophysical contractor
3. Responsible geophysicist
4. Grid identification
5. Grid corner locations and coordinates

6. Unique anomaly identification numbers
7. Predicted anomaly easting & northing in State Plane coordinates
8. Instrument peak value at each anomaly location

The dig-sheets will be prioritized and anomalies deemed more likely to be UXO, will be ranked higher than anomalies less likely to be UXO. The criteria for selecting and locating anomalies for the anomaly (or target) list include the following items:

1. The maximum amplitude of the response with respect to local background conditions
2. The lateral extent (width) of the response
3. The 3-dimensional shape of the response
4. The location of the response with respect to the edge of the grid, unsurveyable areas, land features, cultural features, or utilities within or adjacent to the grid
5. The shape and amplitude of the response with respect to the response of known targets buried in the geophysical prove-out test plot
6. The shape and amplitude of the response with respect to relevant anomalies encountered in previous OE removal grids
7. The apparent depth of the anomaly
8. Potential distortions in the response due to interference from nearby cultural features; any instrument or grid survey QC that could affect the analysis.

#### **4.3.6 Grid Maps**

The geophysical contractor will also provide, with each dig sheet, a grid map, which contains the following:

1. Grid identification
2. Grid corner locations and coordinates
3. Contoured data
4. Anomaly locations with unique identification numbers

#### **4.3.7 Records Management**

The files will be available for quality and/or control processing during the investigation to assure the field and data processing procedures are properly implemented. All raw data files, final processed data files, hard copies, and field notes will be maintained by the geophysical contractor for the duration of the field survey and then turned over to CH2M Hill.

#### **4.3.8 Final Reports and Maps, Geophysical Mapping Data**

As soon as practical after collection, the geophysical field data shall be provided in delineated fields as x, y, z, v (1), v (2), etc., for delivery to CH2M Hill. After completion of survey and processing activities, all final maps and supporting geophysical interpretations shall be provided for delivery to CH2M Hill. Maps that display the geophysical anomalies with annotated, interpreted and identified physical features shall be delivered in MicroStation (.dgn) compatible format.

## **5. TRAINING**

All project Quality Control personnel involved in conducting surveillances, and completing surveillance forms/reports will be trained in this procedure by the QCM or his designee through OJT. Determination of the adequacy of the level of training of assigned QC staff to carry out surveillance activities is the responsibility of the QCM.

Geophysical data acquisition will be conducted by a well-trained, experienced two-person crew led by a qualified geophysicist. All personnel on-site will have documentation of 40-hour OSHA certification, any necessary re-certification (8-hour refresher), and OSHA-compliant medical monitoring physical exams. Throughout operations, the geophysical staff will strictly adhere to the following general practice.

Conducted by: \_\_\_\_\_  
 Project QC Manager: \_\_\_\_\_

ATTACHMENT 2: GEOPHYSICAL PROVE OUT (GPO) TARGET LIST

	Nomenclature	Depth	Orientation	Direction
1.	5"/54 Illumination Round	48"	Horizontal	NW-SE
2.	Mech Time Fuze (projo)	4"	N/A	N/A
3.	5"/54 Illumination Round	36"	45°	Nose Down
4.	5" ZUNI Rocket Fin Assembly	6"	H	E-W
5.	MK 230 Bomb Tail fuze	14"	H	N-S
6.	MK 230 Bomb Tail fuze	16"	H	N-S
7.	5"/54 Illumination Round	48"	H	NW-SE
8.	20 MM HE (UNFUZED)	3"	V	N/A
9.	MK 230 Bomb Tail fuze	14"	V	N/A
10.	MK 230 Bomb Tail fuze	10"	H	N/A
11.	5"/54 Illumination Round	25"	45°	Nose Down
12.	40 MM CTG (Aluminum)	2"	H	N - S
13.	20 MM HE (UNFUZED)	2"	H	N/A
14.	3" Projectile HE (UNFUZED)	18"	H	E - W
15.	20 MM HE (UNFUZED)	3"	H	N/A
16.	20 MM HE (SIMULATOR)	4"	H	N/A
17.	5"/54 Illumination Round	30"	V	Nose Down

18.	3" Projectile HE (UNFUZED)	34"	45°	Nose Down
19.	5" ZUNI Rocket Fin Assembly	10"	H	E - W
20.	3" CTG Case (Aluminum)	6"	H	N/A
21.	20 MM HE (UNFUZED)	2"	H	N/A
22.	5"/54 Illumination Round	34"	H	NE-SW
23.	3" CTG Case (Aluminum)	6"	V	N/A
24.	3" Projectile HE (UNFUZED)	24"	H	E - W
25.	20 MM HE (UNFUZED)	4"	H	N/A
26.	81 MM Tail Boom Assy	7"	H	N/A
27.	5"/54 Illumination Round	38"	H	N - S
28.	3" Projectile HE (UNFUZED)	16"	H	E - W
29.	JATO bottle	44"	H	N - S
30.	5"/54 Illumination Round	42"	H	N - S
31.	3" Projectile HE (UNFUZED)	5"	H	N - S
32.	5"/54 Illumination Round	38"	H	E - W
33.	MK7 Igniter WP	5"	N/A	N/A
34.	20 MM Ammo Can Lid	2"	H	N - S
35.	3" Projectile HE (UNFUZED)	5"	H	N - S
36.	5"/54 Illumination Round	32"	H	N - S
37.	20 MM HE (UNFUZED)	4"	N/A	N/A
38.	2.75" Rocket Motor	30"	H	N - S
39.	MK 230 Bomb Tail fuze	4"	H	N - S
40.	5" ZUNI Rocket Fin Assembly	14"	H	E-W
41.	M344 Bomb Nose Fuze	5"	N/A	N/A
42.	5"/54 Illumination Round	40"	H	NE -SW
43.	MK 230 Bomb Tail fuze	10"	H	E - W
44.	20 MM HE (UNFUZED)	3"	V	N/A

45.	81 MM Tail Boom Assy	8"	45°	Nose Down
46.	3" Projectile HE (UNFUZED)	26"	V	Nose Down
47.	M84 Fuze Time (Nose)	4"	N/A	N/A
48.	5" HVAR Rocket Motor	48"	h	E - W

20 mm HE Simulator is .75 x 3" Rebar  
Depth to Center

## SECTION 6

# CH2M HILL Site Safety and Health Plan

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This site-specific Safety and Health Plan supplements the Safety and Health Plan provided in Section 6 of the *Draft Final OE Master Work Plan*, and is intended for convenient reference by field personnel during implementation of OE activities at SWMU 4. The Navy Occupational Safety and Health Manual, OPNAVINST 5100.23E, will be referenced as necessary during implementation of field activities.

This Site Safety and Health Plan will be kept onsite during field activities and will be reviewed as necessary. The plan will be amended or revised as project activities or conditions change or when supplemental information becomes available. The plan adopts, by reference, the SOPs in the CH2M HILL Health and Safety Program, Program and Training Manual, as appropriate. In addition, this plan adopts procedures in the project Work Plan. The Site Safety Coordinator (SSC) is to be familiar with these SOPs and the contents of this plan. CH2M HILL's personnel and subcontractors must sign Attachment 6-1. The main objective of this project is to conduct a surface OE/MEC and scrap metal survey and anomaly reacquisition. CH2M HILL's SOP HSE-91 for OE is included in Attachment 6-2 of this plan.

## 6.1 Project Information and Description

Project No: 162797.PP.WP

Client: U.S. Navy

Project/Site Name: OE Survey and Anomaly Reacquisition for SWMU 4 at the Former NASD

Site Address: Vieques Island, Puerto Rico

CH2M HILL Project Manager: Martin J. Clasen, P.G.

CH2M HILL Office: Tampa, Florida

Date Health and Safety Plan Prepared: October 8, 2001

Date(s) of Site Work: October 2001 – December 2003

Site Access: All investigation sites are located at the Former NASD, in the western portion of Vieques Island, Puerto Rico. All Sites are accessed through the secure gate of the Former NASD.

Site Size: 8,000 Acres

### 6.1.1 Site Topography

Land surface elevations in the SWMU 4 area range from sea level to approximately 150 ft above mean sea level. The southern portion of the site borders the flanks of Mt. Pirata and

has the highest elevation (150 ft). The northern part of the site extends into a salt water lagoon near Punta Boca Quebrada and has the lowest elevations (mean sea level). The main OB/OD 40-acre area is relatively flat, except where a quebrada (drainage area that is dry except during storm events) cuts through the southern end of the site. The 40-acre area ranges in elevation from sea level to approximately 50 ft above sea level.

The majority of SWMU 4 has a dense shrub canopy of thorny shrubs and a scattered herbaceous stratum. The total vegetative cover was approximately 75 to 95 percent. Dominant shrubs identified on the site included *Acacia farnenciana*, *Prosopis glandulosa*, *Pithecellobium dulce*, and *Zanthoxylum brevipes*. Another co-dominant shrub was *Leucaena leucocephala*. The herbaceous stratum was dominated by *Bothriochloa ischaemum*, *Commelina erecta*, *C. diffusa*, and *Lasiacis divaricata*. No endangered or threatened plant species were observed during the field survey.

### 6.1.2 Prevailing Weather

The climate of Vieques is characterized as warm and humid (tropical-marine), with frequent showers occurring throughout the year. The temperature on Vieques is affected by the easterly trade winds blowing across the island year-round. This wind moderates the temperature throughout the year, causing an annual mean temperature of 79°F to 80°F, and a mean daily temperature range of 15°F to 25°F. The average annual rainfall on the island is approximately 36 inches, with extremes of 25 inches in the east and 45 to 50 inches in the west.

### 6.1.3 Site Description and History

Vieques is the largest offshore island of Puerto Rico, with a surface area of approximately 51 square miles. It is located approximately 7 miles east-southeast of the eastern end of the main island of Puerto Rico, where NSRR is located. The Former NASD occupies the western end of the island of Vieques, encompassing approximately 7,878 acres. The majority of the site is undeveloped and heavily vegetated with trees, low-lying brush, and tall grasses. The southwestern portion of the site is the least developed, with the exception of the communications facilities on top of Mount Pirata (within the Former NASD but not technically a part of the site). The central eastern portion of the site was utilized for munitions magazines, which are scattered throughout the area. The northeastern portion of the site is the most developed, containing facilities for the main support compound. The southeastern portion of the site contains the Relocatable Over the Horizon Radar (ROTHR) station and associated facilities.

The Former NASD was utilized by the U.S. Navy Atlantic Fleet for storage of munitions. The activities at the Former NASD were directed under the consolidated command of Commander Fleet Air Caribbean, Naval Forces Caribbean, and Antilles Defense Command, whose headquarters are at NSRR. The mission of the Former NASD was to receive, store, and issue all ordnance authorized by NSRR for support of Atlantic Fleet activities. Munitions were stored in numerous bunkers located throughout the Former NASD. Other than the bunkers, the only other significant developments at the Former NASD consist of the main support compound located in the northeast portion of the facility, the Mount Pirata telecommunication sites located in the southwest portion of the facility, and the ROTHR site located in the southeastern portion of the facility.

Other activities that may potentially have been conducted at the Former NASD include amphibious assault training with blank ammunition and pyrotechnics by the U.S. Marines at the Former NASD. While the exact location and extent of the Western Training Area (WTA) has not been determined, it is possible that the beach located on the western end of Vieques may have been part of the WTA. This area of beach is known as Green Beach.

Munitions are not currently stored at the Former NASD and no Navy activities are being conducted at the facility, other than operations at the Mount Pirata telecommunication sites and the ROTH facility. The main support compound is not in operation. Access control for the Former NASD is provided by contracted security operations.

In accordance with CERCLA and DoD requirements, an EBS of the Former NASD was conducted to assess the possible presence of sites potentially contaminated with hazardous materials resulting from past activities. Through the EBS, the Navy identified 17 areas of potential contamination. Of these 17 areas, three sites were identified to potentially contain OE.

This site-specific safety and health plan has been developed for SWMU 4, the inactive waste explosive OB/OD.

As part of the Navy's IR Program, SWMU 4 is being investigated in accordance with the CERCLA process to assess the potential presence of hazardous constituents at the sites. During the IR field investigations, MEC technicians were contracted to perform MEC avoidance surveys.

SWMU 4 was utilized for thermal destruction of waste munitions, fuels, or propellants. The material to be burned was placed in the OB area and a squib or other detonator was placed in the waste material. The open burn was then initiated from a safe distance using electrical detonation. In addition, material from the rework of munitions (loose powder and primers) and flares and cartridge-activated devices may also have been disposed at the unit. The inactive OB/OD area has reportedly been swept for live munitions by an EOD team from NAF. MEC technicians performing the avoidance surveys discovered various small MEC and OE scrap near the surface at SWMU 4.

## 6.2 Tasks to be Performed Under this Plan

### 6.2.1 Description of Tasks

Refer to project documents (i.e., Work Plan) for detailed task information. A risk analysis (Section 6.3) has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks other than those listed below require an approved amendment or revision to this plan before tasks begin.

#### 6.2.1.1 Hazwoper-Regulated Tasks

- Site Layout
- Surface geophysical surveys
  - Magnetic
  - Electromagnetic
- Vegetation removal
- Anomaly reacquisition

### 6.2.1.2 Non-Hazwoper-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

## 6.3 Activity Hazard Analysis for Unexploded Ordnance Operations

Table 6-1 shows hazards analysis, and Table 6-2 shows inspection requirements.

TABLE 6-1  
Hazards Analysis

Principal Steps	Potential Hazards	Recommended Controls
Transportation of explosive materials <sup>1</sup>	Accidental detonation of explosives	Explosives will be transported in accordance with the 49, CFR, Parts 100-199.  Explosives will be transported in closed vehicles whenever possible.  When using an open vehicle, explosives will be covered with a flame resistant tarpaulin.  Motor vehicles will be shut off when loading/unloading explosives.  Beds of vehicles will have either a nonconductive bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings.  Initiating explosives, such as blasting caps, will remain separated at all times.  Each vehicle used for the transport of OE will be outfitted with a fire extinguisher and first aid kit.  Do not fuel trucks when loaded with OE.
	Unqualified Drivers	Drivers operating outside the boundaries of any federal installation will be licensed in accordance with federal, state, and local regulations.
Transportation of explosive materials	Vehicle operations	Drivers will observe all posted speed limits while operating a motor vehicle on a public roadway.  Vehicles transporting explosives offroad will not exceed 15 miles per hour (mph).  Chock wheels when loading or unloading OE-related materials.

TABLE 6-1 (CONTINUED)  
Hazards Analysis

Principal Steps	Potential Hazards	Recommended Controls
Storage of explosive materials <sup>1</sup>	Accidental detonation of explosives	Materials will be stored in accordance with federal, state and local regulations.  Refer to the SOP for the Storage of Explosive Materials.
Surveying and establishing boundaries and grids	Accidental detonation of explosives  Wildlife, slips, trips, falls, insects, poisonous plants, use of hand tools	Personnel involved will attend a site-specific OE/MEC recognition class prior to the commencement of any site activities.  MEC personnel will escort non-MEC personnel at all times.  Mark and avoid MEC. Only MEC personnel will handle OE waste.  Check location with magnetometer prior to driving stakes.  Refer to the Activity Hazard Analysis for section of this SSHP.
Clearing and grubbing	Accidental detonation of explosives	Personnel involved will attend a site-specific OE/MEC recognition class prior to the commencement of any site activities.  Be alert and mark all OE located.  Only clear and grub to within 4 inches of the ground surface.  MEC trained personnel will escort non-MEC personnel at all times.  Surface sweeps will be conducted with magnetometers or other suitable geophysical instrumentation to identify potential OE.
Transportation of OE waste <sup>1</sup>	Accidental detonation of explosives  Accidental detonation of explosives  Vehicle operations	No personnel allowed in OE cargo department of vehicle.  No OE allowed in passenger compartment of vehicle.  Block, brace, secure OE.  No smoking in vehicles used for transport of OE/MEC waste.  Placard vehicle in accordance with U.S. Department of Transportation (DOT) regulations.  Vehicles transporting explosives offroad will not exceed 15 mph.  Drivers will observe all posted speed limits while operating a motor vehicle on a public roadway.

TABLE 6-1 (CONTINUED)  
Hazards Analysis

Principal Steps	Potential Hazards	Recommended Controls
MEC disposal operations <sup>1</sup>	Accidental detonation of explosives	Observe procedures outlined in EODB 60A-1-1-31.
OE-related scrap demilitarization	Accidental detonation of explosives	Only MEC technicians will perform explosive demilitarization of OE-related scrap.
	Shredder Operations	Stay clear of moving mechanical parts.  Ensure that only inspected scrap is fed into shredder.
Inspection/certification of ORS	Accidental detonation of explosives	Only MEC technicians will inspect OE-related scrap.  Personnel in the immediate vicinity of OE-related scrap inspections will be kept to the minimum necessary for safe operations but no less than two MEC technicians.  Observe requirements of DoD 4160.21-M-1.
Anomaly reacquisition	Accidental detonation	Only MEC technicians will excavate or handle MEC.  Personnel in the immediate vicinity of MEC operations will be kept to the minimum necessary for safe operations, but no less than two MEC technicians.  Do not subject MEC to heat, shock, or friction.  Only hand excavation permitted when within 1 ft of MEC.  Magnetometers will be used frequently to pinpoint the location of MEC.
	Non-MEC personnel	Establish exclusion zone (EZ); post warning signs, maintain site control.  Stop all MEC operations when non-MEC trained personnel are within the EZ.
Clearing and Grubbing of vegetation	Cutting tools, chain saws, weed cutters	Eye, hand, foot, and hearing protection, (Level D). Face shield and chaps will be worn by chain saw operations. Personnel using chain saws, cutting tools, and weed cutters must provide safe distance between workers and be cautious of tools.

<sup>1</sup>For the SWMU 4, SWMU 6, AOC J and other Former NASD MEC investigations, only the MEC subcontractor or NSRR EOD personnel will transport OE/MEC material and explosives.

TABLE 6-2  
Inspection Requirements

Equipment to be Used	Inspection Requirements	Training Requirements
Vehicles	Daily preventive maintenance and operational checks	40-hour qualification per 29 CFR 1910.120
Fire extinguishers	First aid kits	8-hour refresher
First aid kits	Calibration of geophysical instrumentation	MEC personnel EOD trained
Demolition materials		Tailgate safety meetings
Explosives		Site-specific orientation
Blocking, bracing, and cushioning materials		Lead awareness training
Manual hand tools		Poison oak awareness training
Mechanized equipment		
EMM		
Geophysical instrumentation		
Global Positioning System instrumentation		
PPE		
Communications equipment		

## 6.4 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the SSC or MEC SO for clarification. The main physical or safety hazards posed to CH2M HILL personnel during project activities are described below.

### 6.4.1 Ordnance Explosives (OE Standards of Practice, SOP HSE-91)

OE includes MEC, Chemical Warfare Material (CWM), OE-contaminated soils and groundwater, range maintenance, ordnance demilitarization (Demil), and demining. OE/MEC may be encountered during field activities. Sites potentially contaminated with OE/MEC will be screened by the MEC contractor with qualified MEC Technicians prior to and during field activities.

CH2M HILL employees who are potentially exposed to hazards associated with OE activities shall follow the requirements described in this section regardless of the company performing the OE operation. These requirements also pertain to OE subcontractor personnel when CH2M HILL is providing oversight. Personnel knowledgeable of OE/MEC safety precautions must observe these precautions at all times. They must also advise others in the vicinity of proper precautions for the protection of all personnel in an OE/MEC danger area.

- Only qualified MEC Technicians or EOD personnel will locate, identify, handle, remove, transport, store, or dispose of OE/MEC items.

- The preferred and safest method for disposal of OE/MEC is to destroy it in its original position by demolition (BIP) whenever circumstances permit. By this method, both the ordnance and the hazard it poses are eliminated in one operation.
- Munitions that have been determined to be “safe to move” by an authorized MEC Technician can be transported to an approved holding area or disposal site.
- One person acting alone should never conduct operations involving contact with OE/MEC.
- OE/MEC must not be moved or disturbed in any way unless it has been determined to be safe to do so by a qualified MEC technician. Operations in the vicinity of OE/MEC should only be conducted after a complete work plan, including emergency procedures, has been established.
- Electronic equipment capable of emitting electromagnetic radiation (such as radios or cellular phones) shall not be activated in the vicinity of known or suspected electrically initiated ordnance.
- Munitions having no color-coding, incomplete color-coding, or improper color-coding are not uncommon, so color coding should not be relied on as a positive identification of ordnance.
- Inhalation of, and skin contact with, smoke, fumes, and vapors of explosives and related hazardous materials shall be avoided.
- OE/MEC that has been exposed to fire or detonation must be considered extremely hazardous. Chemical and physical changes may have occurred to the contents, which render it more sensitive than when in its original state.
- When encountered, attempts should be made to positively identify OE/MEC items. The item shall be carefully examined for markings and other identifying features such as shape, size, and external fittings. The item should not be moved prior to inspection.
- Ordnance shall be approached from the side because munitions may contain an ejection hazard, shaped charge explosive jet hazard, rocket motor, or fuzing sensitive to movement.
- Unnecessary personnel must not remain in the vicinity of OE or MEC.
- Ordnance items must be considered armed and dangerous.
- Fired ammunition or ordnance should not be considered safe.
- Souvenirs shall not be collected.
- Ordnance items larger than .50 caliber are considered MEC and may contain high explosives.

## 6.4.2 Excavation

OE/MEC subcontractors are responsible for providing a competent person to oversee OE operations. A competent person may be a SMECS, MEC SO, MEC QC Specialist, or a MEC

Technician III. Occupational Safety and Health Administration (OSHA) regulations describe a competent person as one who is capable of identifying existing and predictable hazards in the work surroundings and has the authorization to take prompt corrective measures to eliminate them.

The competent person must meet the following minimum qualification requirements:

- Be a graduate of either of one of the following: U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD; U.S. Naval EOD School, Indian Head, MD; U.S. Naval EOD School, Eglin Air Force Base, FL; EOD Assistants Course, Redstone Arsenal, AL; EOD Assistant Course at Eglin Air Force Base, FL; or a U.S. DoD-certified equivalent course.
- Have at least 10 years of combined active duty military EOD and contractor MEC experience.
- Have experience in OE clearance operations and supervising personnel.

The requirements of this section shall be followed by CH2M HILL employees who are potentially exposed to hazards associated with excavation activities, regardless of the company performing the excavation operation. The requirements below also pertain to excavation subcontractor personnel when CH2M HILL is providing oversight.

(Reference CH2M HILL SOP HSE-32, Excavations)

- Do not enter the excavations unless completely necessary, and only after the competent person has completed the daily inspection and has authorized entry.
- Follow all excavation entry requirements established by the competent person.
- Do not enter excavations where protective systems are damaged or unstable.
- Do not enter excavations where objects or structures above the work location may become unstable and fall into the excavation.
- Do not enter excavations that potentially contain a hazardous atmosphere until the air has been tested and found to be safe.
- Do not enter excavations with accumulated water unless precautions have been taken to prevent excavation cave-in.
- Use the Health and Safety Self-Assessment Checklist found in Attachment 6-5 of this Site-Specific Work Plan to evaluate excavations prior to entry.
- Conduct OE/MEC avoidance during excavation operations on known or suspect OE sites.
- Prior to excavation crews entering any of the sites, conduct a reconnaissance and OE avoidance activities to provide clear access routes to each site, according to the following procedures:
  - Identify and clearly mark the boundaries of a clear approach path for the sampling crews, vehicles, and equipment to enter the site. This path will be, at a minimum,

- twice the width of the widest vehicle. No one will be allowed outside any marked boundary.
- If OE is encountered on the ground surface, clearly mark the area where it is found, report it to the proper authorities, and divert the approach path around it.
  - Conduct an access survey using the appropriate geophysical instrument over the approach path for avoidance of OE that may be in the subsurface. If a magnetic anomaly is encountered, assume it is OE and divert the approach path around the anomaly. Only MEC personnel will operate the appropriate geophysical instrument and identify OE.
  - After preparing the site, employ the following approaches to excavation:
    - Remember that hand excavation is the most reliable method for uncovering OE.
    - Consider earth-moving machinery (EMM) to excavate overburden from suspect OE. EMM will not be used to excavate within 12 inches of suspected OE.
    - Use a step-down or offset access method for hand or EMM excavation methods.

### 6.4.3 General Hazards

The general physical or safety hazards posed to CH2M HILL personnel during project activities are:

- General hazards and housekeeping
- Hazard communications
- Shipping and transportation of chemical products
- Manual lifting
- Fire prevention
- Electrical
- Ladders
- Thermal stress
- Compressed gas cylinders
- Utilities
- Working on water
- Working near water
- Slips trips and falls
- IDW drum sampling
- Confined space entry
- Working around material handling equipment
- Biological hazards and controls
- Other hazards

The health and safety control measures for these hazards are described below.

#### 6.4.3.1 General Hazards and Housekeeping

- Site work must be performed during daylight hours whenever possible. Work conducted at night requires enough illumination intensity to read a newspaper without difficulty.

- Hearing protection must be worn in areas where shouting is necessary to hear someone within 3 ft.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel must be established and kept free from the accumulation of materials.
- Aisles, exits, ladders, stairways, scaffolding, and emergency equipment must be kept free from obstructions.
- Slip-resistant surfaces, ropes, and/or other devices must be provided.
- Stairs or ladders are generally required when there is a break in elevation of 19 inches or more.
- Specific areas shall be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers shall be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

#### 6.4.3.2 Hazard Communication

The SSC or MEC SO is to perform the following:

- Complete an inventory of chemicals brought onsite by CH2M HILL using Attachment 6-3.
- Confirm that an inventory of chemicals brought onsite by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from LANTDIV, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive onsite, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees required chemical-specific HAZCOM training using Attachment 6-3.

#### 6.4.3.3 Shipping and Transportation of Chemical Products

Chemicals are not expected to be needed as part of the field efforts. If chemicals are determined to be necessary, these chemicals might be defined as hazardous materials by DOT. All staff who ship the materials or transport them by road must receive CH2M HILL

training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

#### 6.4.3.4 Manual Lifting

These proper lifting techniques must be used when lifting any object:

- Plan storage and staging to minimize lifting or carrying distances.
- Split heavy loads into smaller loads.
- Use mechanical lifting aids whenever possible.
- Have someone assist with the lift, especially for heavy or awkward loads.
- Make sure the path of travel is clear prior to the lift.

#### 6.4.3.5 Slips, Trips, and Falls

- Institute and maintain good housekeeping practices.
- Pick up tools and debris in the work area.
- Walk or climb only on equipment surfaces designed for personnel access.
- Be aware of poor footing and potential slipping and tripping hazards in the work area.

#### 6.4.3.6 Fire Prevention

- Fire extinguishers must be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 ft. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 ft. Extinguishers must:
  - Be maintained in a fully charged and operable condition
  - Be visually inspected each month
  - Undergo a maintenance check each year
- The area in front of extinguishers must be kept clear.
- “Exit” signs must be posted over exiting doors, and “Fire Extinguisher” signs must be posted over extinguisher locations.
- Combustible materials stored outside should be at least 10 ft from any building.
- Solvent waste and oily rags must be kept in a fire-resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

#### 6.4.3.7 Electrical

- All temporary wiring, including extension cords, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:

- Equipped with third-wire grounding
- Covered, elevated, or protected from damage when passing through work areas
- Protected from pinching if routed through doorways
- Electrical power tools and equipment must be effectively grounded or double-insulated, UL-approved.
- Electrical power tools, equipment, and cords must to be inspected for damage before use. If damaged, they shall be tagged and removed from service.
- Electrically powered equipment must be operated and maintained according to manufacturer's instructions.
- All electrical equipment, tools, switches, and outlets must be protected from elements.
- Only qualified personnel are to work on energized electrical circuits and equipment.
- Only authorized personnel are permitted to enter high-voltage areas.
- Switches, fuses, and breakers must be properly labeled.
- All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction sites, which are not part of the permanent building wiring, must be equipped with GFCIs for personnel protection.
- All portable electric generator receptacles must be effectively grounded by bonding the receptacle grounding wire to the generator frame.

#### 6.4.3.8 Ladders

- Ladders must be inspected by a competent person for visible defects prior to each day's use. Defective ladders must be tagged and removed from service.
- Portable ladders must extend at least 3 ft above landing surface.
- The ladder must be faced when climbing with belt buckle between side rails.
- Both hands must be used to climb; ropes should be used to raise and lower equipment and materials.
- Straight and extension ladders must be tied off to prevent displacement.
- Ladders that may be displaced by work activities or traffic must be secured or barricaded.
- Fixed ladders greater than 20 ft in height must be provided with fall-protection devices.
- Stepladders must be used in the fully opened and locked position.
- The top two steps of a stepladder should not be used to sit or stand.
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder.

### 6.4.3.9 Heat Stress

#### Preventing and Treating Heat Stress

- Drink 16 ounces of water before beginning work. Disposable cups and water maintained at 50°F to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Take regular breaks in a cool, shaded area. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours.
- Acclimate by slowly increasing workloads (e.g., do not begin with extremely demanding activities).
- Use cooling devices, such as cooling vests, to aid natural body ventilation. The devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- Conduct field activities in the early morning or evening and rotate shifts of workers, if possible.
- Provide adequate shelter or shade to protect personnel against radiant heat (sun, flames, hot metal).
- Maintain good hygiene standards by frequently changing clothing and showering.
- Monitor buddy for signs of heat stress. Persons who experience signs of heat rash or heat cramps should consult the MEC SO or SSC to avoid progression of heat-related illness.
- Cool down immediately if heat syncope (sudden fainting), heat exhaustion (hot, pale, clammy/moist skin), or heat stroke (red, hot, dry skin; loss of consciousness) is experienced and consume cool water or sports drink. Persons who experience heat syncope or heat exhaustion should also seek medical attention as soon as possible. Persons who experience heat stroke must get immediate medical attention.

#### Monitoring Heat Stress

These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (greater than 50 percent), or when workers exhibit symptoms of heat stress.

The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 100 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 100 beats/minute at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 100 beats/minute, or 20 beats/minute above resting pulse.

#### 6.4.3.10 Procedures for Locating Buried Utilities

##### **Local Utility Mark-Out Service**

**Name:** Caleb Romero, NSSR, Puerto Rico

**Phone:** (787) 865-4429, Ext. 4068/4268

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary (e.g., uncertainty about utility locations), perform excavation or drilling of the upper depth interval manually.
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon).
- When LANTDIV or another onsite party is responsible for determining the presence and locations of buried utilities, the MECISO should confirm that arrangement.

#### 6.4.3.11 Working Near Water

When working near water, and there is a risk of drowning, the following precautions should be taken:

- U.S. Coast Guard-approved personal flotation devices (PFDs), or life jackets, provided for each employee shall be worn.
- PFDs shall be inspected before and after each use. Defective equipment will not be used.
- Sampling and other equipment shall be used according to the manufacturer's instructions.
- A minimum of one life-saving skiff shall be provided for emergency rescue.
- A minimum of one ring buoy with 90 ft of 3/8-inch solid-braid polypropylene (or equal) rope shall be provided for emergency rescue.

#### 6.4.3.12 Working on Water

- Safe means of boarding or leaving a boat or a platform must be provided to prevent slipping and falling.
- The boat/barge must be equipped with an adequate railing.
- Employees should be instructed on safe use.
- Work requiring the use of a boat must not take place at night or during inclement weather.
- The boat/barge must be operated according to U.S. Coast Guard regulations (speed, lightning, right-of-way, etc.).
- The engine must be shut off before refueling; do not smoke while refueling.

#### 6.4.3.13 IDW Drum Sampling

Personnel are permitted to handle or sample drums containing only investigation derived waste (IDW); handling or sampling other drums requires a plan revision or amendment approved by the CH2M HILL HSM. The following control measures will be taken when sampling drums containing IDW:

- Minimize transportation of drums.
- Sample only labeled drums or drums known to contain IDW.
- Use caution when sampling bulging or swollen drums. Relieve pressure slowly.
- If drums contain, or potentially contain, flammable materials, use non-sparking tools to open.
- Do not use picks, chisels, and firearms to open drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer the content of drums using a method that minimizes contact with material.
- PPE and air monitoring requirements specified in Sections 6.6 and 6.7 must address IDW drum sampling.
- Spill containment procedures specified in Section 6.9 must be appropriate for the material to be handled.

#### 6.4.3.14 Confined Space Entry

No confined space entry will be permitted. Confined space entry requires additional health and safety procedures, training, and a permit. If conditions change such that confined-space entry is necessary, the HSM must be contacted to develop the required entry permit.

When planned activities will not include confined-space entry, permit-required confined spaces accessible to CH2M HILL personnel must be identified before the task begins. The SSC is to confirm that permit spaces are properly posted or that employees are informed of their locations and hazards.

#### 6.4.3.15 Working Around Material Handling Equipment

- Never approach operating equipment from the rear. Always make positive contact with the operator, and confirm that the operator has stopped the motion of the equipment.
- Never approach the side of operating equipment; remain outside of the swing and turning radius.
- Maintain distance from pinch points of operating equipment.
- Because heavy equipment may not be equipped with properly functioning reverse signal alarms, never turn your back on any operating equipment.

- Never climb onto operating equipment or operate contractor/subcontractor equipment.
- Never ride contractor/subcontractor equipment unless it is designed to accommodate passengers, and is equipped with a firmly attached passenger seat.
- Never work or walk under a suspended load.
- Never use equipment as a personnel lift; do not ride excavator buckets or crane hooks.
- Always stay alert and maintain a safe distance from operating equipment, especially equipment on cross slopes and unstable terrain.

#### 6.4.3.16 Biological Hazards and Controls

##### Snakes

No poisonous snakes are indigenous to Puerto Rico.

Snakes typically are found in underbrush and tall grassy areas. If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. DO NOT apply ice, cut the wound, or apply a tourniquet. Try to identify the type of snake: note color, size, patterns, and markings.

##### Poison Ivy and Poison Sumac

Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas. Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.

##### Ticks

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown, and can be up to one-quarter inch in length. Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray only outside of clothing with permethrin or permanone and spray skin only with DEET. Check yourself frequently for ticks.

If bitten by a tick, grasp it at the point of attachment and carefully remove it. After removing the tick, wash your hands and disinfect and press the bite areas. Save the removed tick. Report the bite to human resources. Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Indicators of Lyme disease: a rash might appear that looks like a bullseye with a small welt in the center. Indicators of RMSF: a rash of red spots might appear under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop. If symptoms appear, seek medical attention.

##### Bees and Other Stinging Insects

Bee and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic. Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and

inform the MEC SO and/or buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

### Bloodborne Pathogens

Exposure to bloodborne pathogens may occur when rendering first aid or cardio-pulmonary resuscitation (CPR), or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and PPE are required as specified in CH2M HILL SOP HS-36, Bloodborne Pathogens. Hepatitis B vaccination must be offered where exposure is a possibility.

### Other Anticipated Biological Hazards

The following paragraphs identify the potential hazards associated with flora and fauna at the site. If additional concerns are identified, they will be added to this Site Safety Health Plan.

**Hazardous Flora.** Incidence of contact by individuals to poisonous and thorny plants is high, especially during surface water and sediment sampling activities; therefore, bare skin should be covered (i.e., long pants and shirt, steel-toed boots, leather or cotton gloves, safety glasses, and head protection) as much as practical when working in forested or densely vegetated areas. Personnel should avoid entering an area in the direct path of known poisonous flora; a secondary route should be selected. Care should also be taken when walking in such areas because uneven terrain or vines may present a tripping hazard.

While attempting to cut into dense underbrush, hazards exist from the sharp machete and gas-powered weed cutter. Therefore, care should be taken when using such devices. (Note: Hearing protection, steel-toed boots, gloves, and safety glasses are required when using weed cutters.) All rashes and other injuries will be reported to the MEC SO as soon as they are known.

**Hazardous Fauna.** Mosquitoes and sand flies pose a nuisance and physical hazard to field personnel; they distract workers, leading to accidents, and pose a physical threat by transmitting live microorganisms. Sand fly bites that are repeatedly scratched can cause secondary infections. Avoid the use of perfumes and scented deodorants, and don light-colored clothing. The use of Avon's "Skin So Soft" or other insect repellent is encouraged.

The potential exists to come in contact with other dangerous insects; these include centipedes, fire ants, bees, wasps, hornets, mites, fleas, and spiders. All personnel should perform "checks" on each other periodically and at the end of the work shift, especially when working in grassy or forested areas. All insect bites must be reported to the MEC SO.

No poisonous snakes are indigenous to Puerto Rico, only non-poisonous snakes such as the Boa Constrictor. Feral (wild) dogs and cats have been observed.

Mongoose, rats, and mice have been documented to (potentially) carry rabies. There is some evidence that mongoose can be infected with the rabies virus in an attenuated form, allowing them to carry and spread the virus for a considerable time before succumbing to the disease. Any observed unusual behavior by mongoose and other mammals must be reported. Signs of rabies can be characterized in two forms. Animals with furious rabies exhibit agitation and viciousness, followed by paralysis and death. Animals with dumb rabies exhibit lethargy and paralytic symptoms, followed by death. Behavioral indicators for both include fearlessness and change in nocturnal/diurnal rhythms.

Working in wet or swampy areas unprotected shall not be allowed because of the presence of a variety of etiologic (disease-causing agents). Contact with surface water will be kept to a minimum. There have been several incidents of infection by schistosomes (blood flukes) from contact with surface water. The aquatic snail vector, *Australorbis glabratus*, transmits the schistosomes into surface waters, predominantly drainage ditches. Even momentary contact (especially in the presence of blisters, cuts, and open sores) with contaminated surface water is sufficient to acquire an infection. Accidental skin contact requires that the area be washed with isopropyl alcohol (as directed by MEC SO). Symptoms of infection are fever, diarrhea, itchy skin, and central nervous system (CNS) damage. Schistosomiasis is hard to treat; once established in its host, it may remain for several years.

Before beginning site activities, each individual shall be questioned as to any known sensitivities to the previously mentioned organisms or agents.

**Dengue Fever and Other Illnesses.** According to the Centers for Disease Control (CDC), Dengue Fever is primarily a viral infection transmitted by mosquito bites in residential areas. The mosquitoes are most active during the day, especially around dawn and dusk, and are frequently found in and around human habitations. The illness is flu-like and characterized by sudden onset, high fever, severe headaches, joint and muscle pain, and rash. The rash appears 3 to 4 days after the onset of fever. Because there is no vaccine or specific treatment, prevention is important. To reduce mosquito bites, travelers should wear clothes that cover most of the body. Travelers should also take insect repellent with them to use on any exposed areas of skin. The most effective repellent is DEET (N,N-diethyl meta-toluamide). Avoid applying high-concentration DEET (greater than 35 percent) products to the skin and refrain from applying repellent to portions of the hands that are likely to come in contact with the eyes and mouth. Rarely, toxic reactions or other problems have developed after contact with DEET. Please note that personnel performing water sampling should refrain from using DEET because the breakdown products can show up as false positive results in lab analysis. For greater protection, clothing can be soaked in or sprayed with permethrin, which is an insect repellent licensed for use on clothing. If applied according to directions, permethrin will repel insects from clothing for several weeks.

**Traveler's Diarrhea** is the most frequent health problem for travelers. It can be caused by viruses, bacteria, or parasites that are found universally throughout the region. Transmission is most often through contaminated food or water. Purchase food and beverages from vendors that are professional. Avoid small roadside stands and drink bottled beverages when possible. The use of over-the-counter or prescriptions medications can reduce the length of the attack.

**Hepatitis A** is a viral infection of the liver transmitted by the fecal oral route; through direct person to person contact; from contaminated water, ice, or shellfish; or from fruits or uncooked vegetables contaminated through handling. Symptoms include fatigue, fever, loss of appetite, nausea, dark urine, jaundice, vomiting, aches and pains, and light stools. No specific therapy supportive care is available, only supportive care. The virus is inactivated by boiling or cooking to 85°C for 1 minute. Therefore, eating thoroughly cooked foods and drinking only treated water serve as general precautions. CDC recommends hepatitis A vaccine as a precaution.

**Fire Ant Bites.** Fire ants typically build mounds on the land surface that are usually easy to identify. Avoid disturbing these mounds. A bite from a fire ant can be painful but rarely is life threatening. It is possible, however, that the bite could cause an allergic reaction. If bitten, check for symptoms of an allergic reaction such as weakness, nausea, vomiting, dizziness, or shortness of breath. If symptoms appear, seek medical attention.

#### 6.4.3.17 Radiological Hazards and Controls

Radiological hazards are not expected at this site. If new or additional information is provided that indicates that radiological hazards may be present, stop work and refer to CH2M HILL's Health and Safety Program, Program and Training Manual, and Health and Safety Program Radiation Protection Manual for SOPs in contaminated areas.

#### 6.4.3.18 Chemical Warfare Materials

CWM is not expected at these work sites. If, at any time during the fieldwork, suspected CWM is encountered, the MEC team must stop all work activities immediately. Field sampling teams must withdraw from the site along the cleared approach paths, away from the area where the suspected CWM is found. The MEC team will immediately report the chemical event to the designated point of contact and the Contracting Officer, who will in turn notify Navy EOD team. A MEC team consisting of a minimum of two MEC qualified personnel will secure the suspected CWM discovery and stand by in an upwind location until relieved by a government representative. The initial exclusion zone for chemical weapons is 450 upwind per FM 9-15, Explosive Ordnance Disposal Service and Unit Operations. The MEC team will provide the point of contact with a Suspect CWM Report. If the government representative confirms the presence of CWM, he or she will report the chemical event to the appropriate agencies.

#### 6.4.3.19 Contaminants of Concern

**SWMU 4 – OB/OD Site.** Previous investigations included the collection of soil and groundwater samples for VOCs, SVOCs, PCBs, and metals analysis. Parameters exceeding conservative long-term exposure risk based screening criteria in surface soils included aluminum, arsenic, iron, lead, thallium, vanadium, 2,4-dinitrotoluene, 2,4,6-trinitrotoluene, and hexahydro-1,3,5-trinitro-1,3,5,7-tetrazocine. In subsurface soils, the metals arsenic and barium exceeded screening criteria. Parameters exceeding screening criteria in groundwater included aluminum, barium, cadmium, chromium, iron, manganese, nickel, selenium, vanadium, and zinc. In addition, various small MEC and spent munitions were discovered at the site. The metals detected at the site were detected at concentrations indicative of background concentrations for the island. Table 6-3 shows potential exposure routes.

TABLE 6-3  
Potential Routes of Exposure

<b>Dermal:</b> Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 6.6.	<b>Inhalation:</b> Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 6.6 and 6.7, respectively.	<b>Other:</b> Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before drinking or smoking).
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## 6.5 Project Organization and Personnel

### 6.5.1 CH2M HILL Employee Medical Surveillance and Training

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated SSC have completed a 12-hour site safety coordinator course, and have documented requisite field experience. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones. The employees listed in Table 6-4 are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

TABLE 6-4  
CH2M HILL Employees Currently in Medical Surveillance Program

Employee Name	Office	Responsibility	SSC/FA-CPR
Marty Clasen	TPA	Project Manager	Level D SSC; FA-CPR
Erik Isern	TPA	Field Team Leader	Level D SSC; FA-CPR
Tunch Orsoy	TPA	Field Team Member	Level D; FA-CPR
Rick Gorsira	TPA	Field Team Leader	Level D SSC; FA-CPR
Ben Redmond	ORO	OE Manager	Level D; SMECS; FA-CPR
Gary Webb	SEA	MECSO	Level D; SMECS; FA-CPR
George Overby	HSV	Field Team Member	Level D; MEC III; FA-CPR

Note: Lead awareness training is provided in Attachment 6-6 of this plan. The quiz must be completed successfully by project personnel exposed to lead during OE/MEC operations.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, Reproduction Protection, including obtaining a physician's statement of the employee's ability to perform hazardous activities before being assigned field work.

### 6.5.2 Field Team Chain of Command and Communication Procedures

#### *Client*

Contact Name: Chris Penny, RPM, LANTDIV

Phone: (757) 322-4815

Facility Contact Name: Oscar Diaz, Refuse Manager

Phone: N/A

**CH2M HILL**

Project Manager: Marty Clasen/TPA  
Health and Safety Manager: Michael Goldman/ATL  
Field Team Leader and SSC: Erik Isern/TPA  
MECSO: Gary Webb/SEA

**CH2M HILL Subcontractors**

MEC Subcontractor: USA Environmental  
Subcontractor Contact Name: John Q. Adams  
Phone: (813) 884-5722

Geophysical Subcontractor: Blackhawk Geometrics  
Subcontractor Contact Name: Jim Hild  
Phone: (303) 278-8700

The subcontractors listed above are covered by this plan and must be provided a copy of it. This plan does not, however, address hazards associated with the tasks and equipment in which the subcontractor has expertise (e.g., MEC clearance). Subcontractors are responsible for the health and safety procedures specific to their work, and are required to submit these procedures to CH2M HILL for review before the start of field work. Subcontractors must comply with the established Health and Safety Plan(s). The CH2M HILL MECSO or SSC should verify that subcontractor employee training, medical clearance, and fit test records are current and must monitor and enforce compliance with the established plan(s). CH2M HILL's oversight does not relieve subcontractors of their responsibility for effective implementation and compliance with the established plan(s).

CH2M HILL should continuously endeavor to observe subcontractors' safety performance. This endeavor should be reasonable, and should include observing for hazards or unsafe practices that are both readily observable and occur in common work areas. CH2M HILL is not responsible for exhaustive observation for hazards and unsafe practices. In addition to this level of observation, the SSC is responsible for confirming CH2M HILL subcontractor performance against both CH2M HILL's and the subcontractor's Site-Specific Health Plan.

Health and safety related communications with CH2M HILL subcontractors should be conducted as follows:

- Brief subcontractors on the provisions of this plan, and require them to sign the Employee Signoff Sheet included in Attachment 6-1.
- Ask subcontractor(s) to brief the project team on the hazards and precautions related to their work.
- When apparent non-compliance/unsafe conditions or practices are observed, notify the subcontractor safety representative and require corrective action; the subcontractor is responsible for determining and implementing necessary controls and corrective actions.
- When repeat non-compliance/unsafe conditions are observed, notify the subcontractor safety representative and stop affected work until adequate corrective measures are implemented.

- When an apparent imminent danger exists, immediately remove all affected CH2M HILL employees and subcontractors, notify the subcontractor safety representative, and stop affected work until adequate corrective measures are implemented. Notify the Project Manager and HSM as appropriate.
- Document all oral health and safety related communications in the project field logbook, daily reports, or other records.

### *Contractors*

This plan does not address contractors who are contracted directly to LANTDIV. CH2M HILL is not responsible for the health and safety or means and methods of the contractor's work, and must never assume such responsibility through our actions (e.g., advising on safety and health issues). In addition to this plan, CH2M HILL staff should review contractor safety plans so staff remain aware of appropriate precautions that apply to CH2M HILL. Except in unusual situations when conducted by the HSM, CH2M HILL must never comment on or approve contractor safety procedures. Self-assessment checklists contained in Attachment 6-5 are to be used by the MECISO or SSC to review the contractor's performance *only* as it pertains to evaluating our exposure and safety.

Safety and health-related communications with contractors should be conducted as follows:

- Ask the contractor to brief CH2M HILL employees and subcontractors on the precautions related to the contractor's work.
- When an apparent contractor non-compliance/unsafe condition or practice poses a risk to CH2M HILL employees or subcontractors:
  - Notify the contractor safety representative.
  - Request that the contractor determine and implement corrective actions.
  - If needed, stop affected CH2M HILL work until contractor corrects the condition or practice. Notify LANTDIV, Project Manager, and HSM as appropriate.
- If apparent contractor non-compliance/unsafe conditions or practices are observed, inform the contractor safety representative. CH2M HILL's obligation is limited strictly to informing the contractor of our observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- If an apparent imminent danger is observed, immediately warn the contractor employee(s) in danger and notify the contractor safety representative. CH2M HILL's obligation is limited strictly to immediately warning the affected individual(s) and informing the contractor of our observation; the contractor is solely responsible for determining and implementing necessary controls and corrective actions.
- Document all oral health and safety related communications in the project field logbook, daily reports, or other records.

## 6.6 Personal Protective Equipment (PPE)

Table 6-5 details the protective equipment necessary for various site tasks.

TABLE 6-5  
Personal Protective Equipment

PPE SPECIFICATIONS <sup>a</sup>				
Task	Level	Body	Head	Respirator <sup>b</sup>
General site entry Surveying  OE surveys and removals Observation of material loading for offsite disposal Oversight of remediation and construction	D	Work clothes; leather work boots <sup>g</sup> ; work glove.	Hardhat <sup>c</sup> Safety glasses Ear protection <sup>d</sup>	None required
Tasks requiring OE/MEC anomaly reacquisition in contamination area	Modified D	Work clothes or cotton coveralls Boots: chemical-resistant boots <sup>g</sup> OR steel-toed, leather work boots with outer rubber boot covers Gloves: Inner surgical-style nitrile and outer chemical- resistant nitrile gloves.	Hardhat <sup>c</sup> Safety glasses Ear protection <sup>d</sup>	None required
Tasks requiring upgrade or downgrade for reasons presented below	C	Coveralls: Polycoated Tyvek® Boots: chemical-resistant boots <sup>g</sup> OR leather work boots <sup>g</sup> with outer rubber boot covers Gloves: Inner surgical-style nitrile and outer chemical- resistant nitrile gloves.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> Ear protection <sup>d</sup> Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent.

#### Reasons for Upgrading or Downgrading Level of Protection

Upgrade <sup>f</sup>	Downgrade
<ul style="list-style-type: none"> <li>Request from individual performing tasks</li> <li>Change in work tasks that will increase contact or potential contact with hazardous materials</li> <li>Occurrence or likely occurrence of gas or vapor emission</li> <li>Known or suspected presence of dermal hazards</li> <li>Instrument action levels (Section 6.7) exceeded</li> </ul>	<ul style="list-style-type: none"> <li>New information indicating that situation is less hazardous than originally thought</li> <li>Change in site conditions that decreases the hazard</li> <li>Change in work task that will reduce contact with hazardous materials</li> </ul>

<sup>a</sup> Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

<sup>b</sup> No facial hair that would interfere with respirator fit is permitted.

<sup>c</sup> Hardhat and splash-shield areas are to be determined by the MEC/SSO. MEC technicians are required to wear hard hats except when investigating suspect MEC.

<sup>d</sup> Ear protection should be worn when conversations cannot be held at distances of 3 ft or less without shouting.

<sup>e</sup> Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is >85 percent, or if organic vapor measurements are > midpoint of Level C range (refer to Section 6.7)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

<sup>f</sup> Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an MEC/SSO or SSC qualified at that level is present.

<sup>g</sup> Steel-toed boots are not required during surface geophysical mapping.

## 6.7 Air Monitoring/Sampling

### 6.7.1 Air Monitoring Specifications

Table 6-6 shows relevant air monitoring specifications.

TABLE 6-6  
Air Monitoring Specifications

Instrument	Tasks	Action Levels <sup>a</sup>		Frequency <sup>b</sup>	Calibration
PID: Organic Vapor Monitor (OVM) with 10.6eV lamp or equivalent	OE/MEC anomaly reacquisition in contaminated areas	0 – 1 parts per million (ppm) >1 – 5 ppm > 5 ppm	Level D Level C Stop Work	Initially and periodically during task	Daily

<sup>a</sup> Action levels apply to sustained breathing-zone measurements (2 minute duration) above background.

<sup>b</sup> The exact frequency of monitoring depends on field conditions and is to be determined by the MECSSO SSC; generally, every 5 to 15 minutes is acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

### 6.7.2 Calibration Specifications

Table 6-7 shows calibration specifications.

TABLE 6-7  
Calibration Specifications

PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing

### 6.7.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain VOCs. Contact the HSM immediately if these contaminants are encountered.

Results must be sent immediately to the HSM. Regulations may require reporting to monitored personnel.

## 6.8 Decontamination

The MECSSO or SSC must establish and monitor the decontamination procedures and their effectiveness. Decontamination procedures found to be ineffective will be modified by the MECSSO or SSC. The MECSSO or SSC must ensure that procedures are established for disposing of materials generated on the site.

## 6.8.1 Decontamination Specifications

Table 6-8 shows the general decontamination specifications.

TABLE 6-8  
Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
<ul style="list-style-type: none"> <li>• Boot wash/rinse</li> <li>• Glove wash/rinse</li> <li>• Outer-glove removal</li> <li>• Body-suit removal</li> <li>• Inner-glove removal</li> <li>• Respirator removal</li> <li>• Hand wash/rinse</li> <li>• Face wash/rinse</li> <li>• Shower immediately</li> <li>• Dispose of PPE in municipal trash, or contain for disposal</li> <li>• Dispose of personnel rinse water to facility or sanitary sewer, or contain for offsite disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Wash/rinse equipment</li> <li>• Solvent-rinse equipment</li> <li>• Contain solvent waste for offsite disposal</li> </ul>	<ul style="list-style-type: none"> <li>• Power wash</li> <li>• Steam clean</li> <li>• Dispose of equipment rinse water to facility or sanitary sewer, or contain for offsite disposal</li> </ul>

## 6.8.2 Diagram of Personnel Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The MECISO or SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

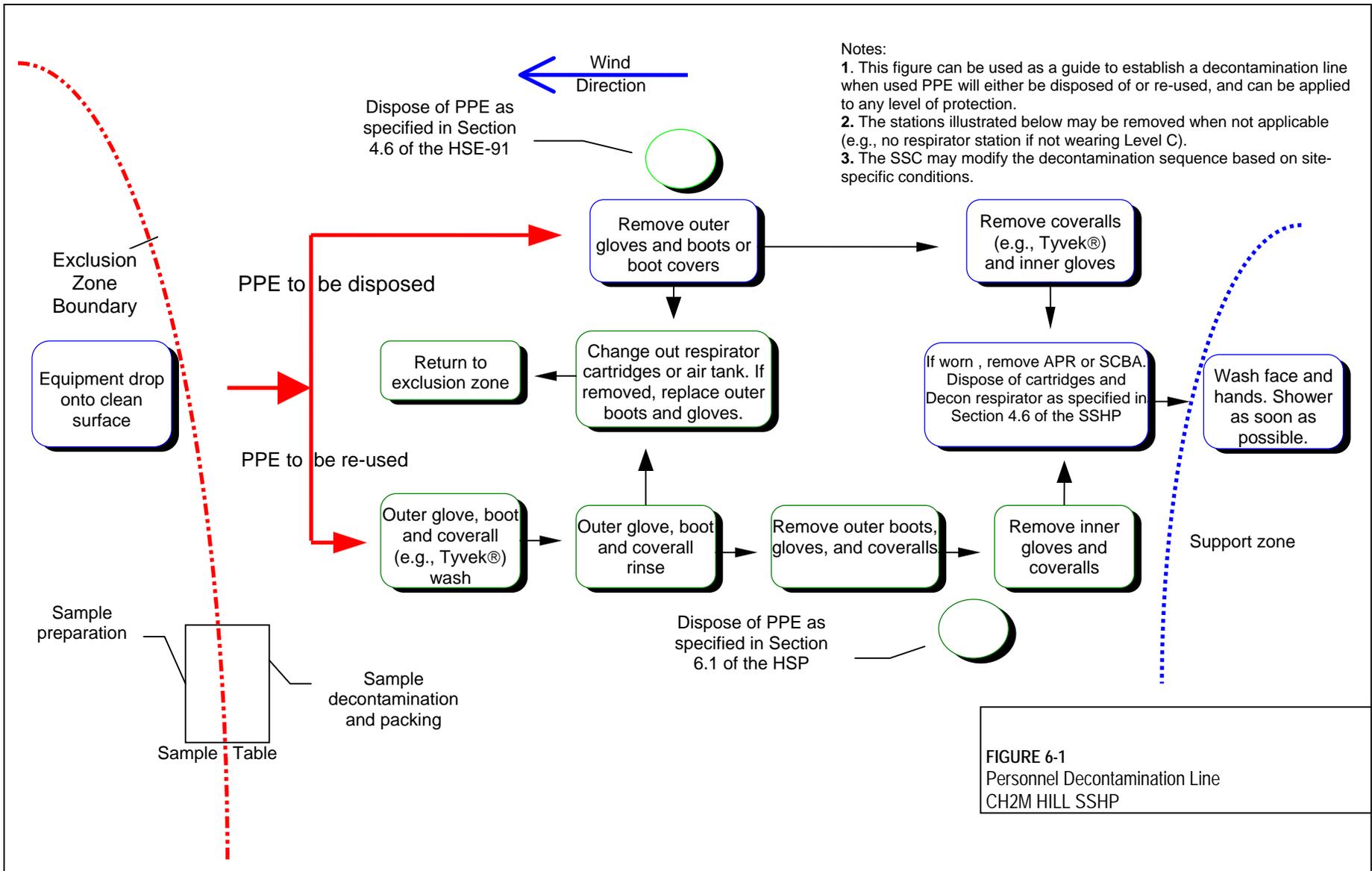
Figure 6-1 illustrates a conceptual establishment of work zones, including the decontamination line. Work zones are to be modified by the MECISO or SSC to accommodate task-specific requirements.

## 6.9 Spill Prevention and Containment Procedures

This section establishes minimum site requirements. Subcontractors are responsible for spill prevention and control related to their operations. Subcontractors' written spill prevention and control procedures must be consistent with this plan. All spills must be reported to the supervisor, site manager, and PM.

### 6.9.1 Spill Prevention

All fuel and chemical storage areas will be properly protected from onsite and offsite vehicle traffic. Fuel storage tanks must be equipped with secondary containment. Fuel tanks must be inspected daily for signs of leaks. Accumulated water must be inspected for signs of product before discharge.



Incidental chemical products must be properly stored, transferred, and used in a safe manner. If chemical product use occurs outside areas equipped with spill control materials, adequate spill control materials must be maintained.

## 6.9.2 Spill Containment and Control

Spill control materials will be maintained in the support zone and at fuel storage and dispensing locations. Incidental spills will be contained with sorbent and disposed of properly. Spilled materials must be immediately contained and controlled. Spill response procedures include taking the following actions:

- Immediately warn any nearby personnel and notify the work supervisor.
- Assess the spill area to ensure that it is safe to approach. Activate site evacuation signal if the spill presents an emergency.
- Ensure that any nearby ignition sources are immediately eliminated.
- If it can be done safely, stop the source of the spill.
- Establish site control for the spill area.
- Use proper PPE in responding to the spill.
- Contain and control spilled material through the use of sorbent booms, pads, or other materials.

## 6.9.3 Spill Clean-up and Removal

All spilled material, contaminated sorbent, and contaminated media will be cleaned up and removed as soon as possible. Contaminated spill material will be drummed, labeled, and properly stored until material is disposed of. Contaminated material will be disposed of according to applicable federal, state, and local requirements. Contact the regulatory compliance person for the project or the program for assistance.

# 6.10 Site Control Plan

## 6.10.1 Site Control Procedures

- The MECISO or SSC will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for onsite safety briefing include a general discussion of this section, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, and emergencies.
- The MECISO or SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location in accordance with CH2M HILL SOP HS-71, OSHA Postings.

- Establish support, decontamination, and exclusion zones. Delineate with flags or cones as appropriate. Support zone should be upwind of the site. Use access control at entry and exit from each work zone.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”
- Initial air monitoring is conducted by the MECISO or SSC in appropriate level of protection.
- The MECISO or SSC is to conduct periodic inspections of work practices to determine the effectiveness of this plan: refer to Sections 6.2 and 6.3. Deficiencies are to be noted, reported to the HSM, and corrected.

### 6.10.2 Hazwoper Compliance Plan

Certain parts of the site work are covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated Hazwoper tasks (Section 6.2.1.1) might occur consecutively or concurrently with respect to non-Hazwoper tasks. This section outlines procedures to be followed when approved activities specified in Section 6.2.1.2 do not require 24- or 40-hour training. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements.

- In many cases, air sampling, in addition to real-time monitoring, must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed onsite, or while non-Hazwoper-trained staff are working near Hazwoper activities. Other data (e.g., soil) also must document that no potential exists for exposure. The HSM must approve the interpretation of these data. *Draft Final OE Master Work Plan* subsections 6.4.3.20 and 6.7 address contaminant data and air sampling requirements, respectively.
- When non-Hazwoper-trained personnel are at risk of exposure, the SSC must post the exclusion zone and inform non-Hazwoper-trained personnel of the following:
  - Nature of the existing contamination and its locations
  - Limitations of their access
  - Emergency action plan for the site
- Periodic air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to airborne contaminants.
- When exposure is possible, non-Hazwoper-trained personnel must be removed from the site until it can be demonstrated that a potential for exposure to health and safety hazards no longer exists.

- Remediation treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is (for the purposes of applying the Hazwoper standard) considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hours of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must not enter the TSDF area of the site.

## 6.11 Emergency Response Plan

### 6.11.1 Pre-Emergency Planning

The MECSO or SSC will perform the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency service providers as appropriate. These tasks include:

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Where appropriate and acceptable to LANTDIV, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Rehearse the emergency response plan before site activities begin, including driving route to hospital.
- Brief new workers on the emergency response plan.

The MECSO or SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

### 6.11.2 Emergency Equipment and Supplies

The MECSO or SSC should mark the locations of emergency equipment on the site map and post the map, as illustrated in Table 6-9.

TABLE 6-9  
Sample Supply List and Locations

Emergency Equipment and Supplies	Location
20 pound (lb) (or two 10-lb) fire extinguisher (A, B, and C classes)	Support Zone/Heavy Equipment
First aid kit	Support Zone/Field Vehicle
Eye Wash	Support & Decon Zone/Field Vehicle
Potable water	Support & Decon Zone/Field Vehicle
Bloodborne pathogen kit	Support Zone/Field Vehicle
Additional equipment (specify)	N/A

### 6.11.3 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

### 6.11.4 Emergency Medical Treatment

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. The MECSO or SCC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room. During non-emergencies, follow these procedures, as appropriate:

- Notify appropriate emergency response authorities listed in Section 6.11.8 (e.g., 911).
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.

- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 6.11.7.

### 6.11.5 Evacuation

- Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.
- Evacuation route(s) and assembly area(s) will be designated by the MECSO or SSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The MECSO or SSC and a “buddy” will remain onsite after the site has been evacuated (if safe) to assist local responders and advise them of the nature and location of the incident.
- The MECSO or SSC will account for all personnel in the onsite assembly area.
- A designated person will account for personnel at alternate assembly area(s).
- The MECSO or SSC will write up the incident as soon as possible after it occurs and submit a report to the Director of Health and Safety.

### 6.11.6 Evacuation Signals

Table 6-10 provides examples of possible evacuation signals.

TABLE 6-10  
Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency-help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.

### 6.11.7 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss, death, etc.), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within 24 hours of incident.

- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to LANTDIV as required in contract.

### 6.11.8 Emergency Contacts (complete during project start-up)

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#### **24-hour CH2M HILL Emergency Beeper – 888/444-1226**

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<b>Medical Emergency – 911</b> Facility Medical Response #: Local Ambulance #: (787) 741-2151	CH2M HILL Medical Consultant Dr. Peter Greaney GMG WorkCare, Orange, CA (800) 455-6155 (After hours calls will be returned within 20 minutes)
<b>Fire/Spill Emergency – 911</b> Facility Fire Response #: Local Fire Dept #: (787) 741-2111	Local Occupational Physician
<b>Security &amp; Police – 911</b> Facility Security #: (787) 741-0615 Local Police #: (787) 741-2020	Corporate Director Health and Safety Name: Mollie Netherland/SEA Phone: (206) 453-5005 24-hour emergency beeper: (888) 444-1226
<b>Utilities Emergency</b> Water: Gas: Electric:	Health and Safety Manager (HSM) Name: Michael Goldman Phone: (770) 604-9182 (office) ext 592; (770) 335-2076 (Cell) Pager: (888) 856-9114
<b>Site Safety Coordinator (SSC)</b> Name: Erik Isern Phone: (813) 874-6522, Ext. 4313	Regional Human Resources Department Name: Mary Jo Jordan Phone: (352) 335-5877
<b>Project Manager</b> Name: Martin Clasen Phone: (813) 874-6522, Ext. 4307	Corporate Human Resources Department Name: John Monark/COR Phone: (303) 771-0900
<b>Federal Express Dangerous Goods Shipping</b> Phone: (800) 238-5355 CH2M HILL Emergency Number for Shipping Dangerous Goods Phone: (800) 255-3924	Worker's Compensation and Auto Claims Sterling Administration Services Phone: (800) 420-8926 After hours: (800) 497-4566 Report fatalities and report vehicular accidents involving pedestrians, motorcycles, or more than two cars.
Federal Agency/Contact Name:	Phone:
State Agency/Contact Name:	Phone:
Local Agency/Contact Name:	Phone:
Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.	
Facility Alarms:	Evacuation Assembly Area(s):
Facility/Site Evacuation Route(s):	
Hospital Name/Address: NSRR	Hospital Phone #: (787) 741-2151

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#### **Directions to Hospital**

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For minor first aid, proceed to public works Camp Garcia infirmary. For extreme or life threatening emergencies, call for helicopter from NSRR, (787) 865-5997.

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## 6.12 Approval

This SSHP has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified, and must be amended if those conditions change.

### 6.12.1 Original Plan

Written By: Gary Webb

Date: 07/23/01

Approved By: Michael Goldman

Date: 7/23/01

### 6.12.2 Revisions

Revisions Made By: \_\_\_\_\_ Date: \_\_\_\_\_

Revisions to Plan: \_\_\_\_\_

Revisions Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

## 6.13 Attachments

- Attachment 6-1: Employee Signoff Form – Site Safety and Health Plan
- Attachment 6-2: CH2M HILL HSE-91, OE SOP
- Attachment 6-3: Project-Specific Chemical Product Hazard Communication Form
- Attachment 6-4: Chemical-Specific Training Form
- Attachment 6-5: Applicable Material Safety Data Sheets
- Attachment 6-6: Lead Awareness Training



## **ATTACHMENT 6-2**

# **CH2MHILL**

## **Ordnance Explosives (OE) Standard of Practice HSE- 91**

### **Note:**

**This Standard of Practice covers the entire spectrum of OE/MEC-related project activities, including investigation and removal.**

**For this specific project, “Initial Ordnance and Explosives Site Assessment for SWMU 4 at the Former NASD,” the removal tasks described in Sections 4.2.2.(b), 4.2.3.(d), and 4.2.7 of this Standard of Practice will be conducted by NSRR EOD personnel and may not apply to this project.**

# CH2MHILL

## Ordnance Explosives (OE) Standard of Practice HSE- 91

### 1.0 Applicability and Scope

#### 1.1 Applicability

This Standard of Practice (SOP) applies to: 1) CH2M HILL employees who enter areas known or suspected of having Ordnance Explosives (OE) and 2) CH2M HILL Safety Coordinators (SCs) and CH2M HILL EE&SBG Unexploded Ordnance Safety Officers (UXOSO) who may be responsible for providing oversight of a subcontractors OE operations. OE operations may be conducted on active, inactive, closed, transferring, or transferred ranges; former battlefields; disposal sites; or munitions manufacturing and storage sites.

#### 1.2 Scope

This SOP provides information regarding the spectrum of hazards and issues to be addressed during each phase of a project associated with OE operations. OE hazards addressed in this SOP include exposure to Unexploded Ordnance (UXO), Chemical Warfare Material (CWM), explosives contaminated soil and groundwater, and the hazards associated with operations to locate, identify, remove, and dispose of OE. CH2M HILL employees who enter OE areas must take precautions to avoid these hazards and be aware of associated safe work practices.

As described in the “Subcontractor, Contractor, and Owner” SOP HSE-55, responsibilities for health, safety and environment (HS&E ) are expressly defined through the subcontract terms and conditions, and CH2M HILL’s HS&E practices in the field are determined based on these defined responsibilities. Consistent with HSE-55, the subcontractor must determine how to operate safely and in compliance with applicable HS&E regulations and industry standards, and how to correct deficiencies. CH2M HILL employees shall not direct the means and methods of OE operations nor direct the details of corrective actions.

#### 1.3 Regulatory Review

OE projects are often complex and have a myriad of regulatory requirements to ensure safety. Support for determining the governing laws and regulations for any specific OE project must be reviewed by the EE&SBG UXOSO to ensure compliance and safety.

Department of Defense (DOD) Ammunition and Explosives Safety Standards, DOD 6055.9-STD, establishes uniform safety standards applicable to ammunition and explosives, to associated personnel and property, and to unrelated personnel and property exposed to the potential damaging effects of an accident involving ammunition and explosives during their development, manufacturing, testing, transportation, handling, storage, maintenance, demilitarization, and disposal.

The U.S. Environmental Protection Agency (EPA) regulates the disposal of military munitions and waste containing military munitions through the Military Munitions Rule (RCRA; 40 CFR part 266, subpart M). The rule 1) identifies when conventional and chemical military munitions become a solid waste and 2) provides criteria for storage and transportation of such waste, including a conditional exemption if the munitions are managed under DOD rules.

## **2.0 Project Planning**

### **2.1 Training Requirements**

CH2M HILL employees and subcontractors who work on projects that involve OE must complete the following training:

- 40-hour hazardous waste comprehensive course with training in hazard recognition and basic health and safety issues, as required by the occupational safety and health regulations contained in 29 CFR 1910.120(e)
- Annual 8-hour hazardous waste refresher course
- Hazardous waste supervisory training as specified in 29 CFR 1910.120(e) [only required for management and supervisors]
- All UXO personnel will be graduates of one of the following: U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD; U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD; U.S. Naval EOD School, Eglin Air Force Base, FL; EOD Assistants Course, Redstone Arsenal AL; EOD Assistant Course at Eglin Air Force Base, FL; or a U.S. DOD-certified equivalent course

The EE&SBG UXOSO can provide assistance in reviewing subcontractor personnel qualifications.

### **2.2 Medical Surveillance Requirements**

All CH2M HILL employees who work on OE sites must be on a medical surveillance program consisting of a baseline health assessment that includes a medical and occupational history review, blood and urine tests for contaminants of interest, electrocardiogram, slit-lamp corneal examination, pulmonary function tests, chest x-ray, respiratory fit test, and a general physical examination that includes hearing and vision.

Employees who terminate employment and who have worked at OE project sites may be required to undergo an exit examination equivalent to the baseline health assessment.

Subcontractors are responsible for ensuring that their employees receive medical surveillance as required.

### **2.3 Drug Abuse Surveillance Requirements**

CH2M HILL employees who perform OE operations and oversight are subject to the provisions contained in HSE-76.

## **2.4 Competent Person Requirements**

OE/UXO subcontractors are responsible for providing a competent person to oversee OE operations. A competent person may be a Senior UXO Supervisor, UXO Safety Officer, UXO Quality Control Specialist, or a UXO Technician III. The competent person must meet the following minimum qualification requirements:

- Be a graduate of either of one of the following: U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD; U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, MD; U.S. Naval EOD School, Eglin Air Force Base, FL; EOD Assistants Course, Redstone Arsenal Alabama; EOD Assistant Course at Eglin Air Force Base, FL; or a U.S. DOD-certified equivalent course
- Have at least 10 years of combined active duty military EOD and contractor UXO experience
- Have experience in OE clearance operations and supervising personnel

CH2M HILL competent person requirements are the same as for a subcontractor.

## **2.5 Safety Equipment**

OE subcontractors are responsible for providing all personal protective equipment (PPE) necessary for their employees. CH2M HILL will provide PPE only for its own employees. Other safety equipment will be provided as delineated in the subcontract and referenced documents. The EE&SBG UXOSO must review subcontractor work plans and health and safety plans to ensure that appropriate safety equipment has been included to meet the scope of work requirements.

## **2.6 Subcontractor Selection**

OE subcontractors are selected as described in the “Subcontractor, Contractor, and Owner” SOP HSE-55. The “Subcontractor Safety Procedure Criteria – OE Operations” found in Attachment 1 provides the minimum criteria for OE operations. Additional criteria may be developed dependent upon the specific OE scope of work requirements for the subcontractor. These criteria shall be used by the CH2M HILL EE&SBG UXOSO to review subcontractor OE procedures submitted when oversight is required by HSE-55.

## **2.7 Planning Activities**

Assistance for planning OE operations is available from the CH2M HILL EE&SBG UXOSO for planning and executing OE support for Hazardous Toxic Radiological Waste (HTRW) support activities, construction support activities, OE response actions, CWM activities, explosive contaminated soils, and ordnance demilitarization. The following types of support may be needed for OE operations:

- On a HTRW site with known or suspected OE, UXO support refers to the anomaly avoidance techniques implemented to avoid any potential surface UXO and any subsurface anomalies.
- On a construction site with known or suspected OE, UXO support is provided by qualified UXO personnel during construction activities. The level of UXO support

required is dependent on the probability of encountering UXO, as determined on a project-by-project basis.

- OE response actions in which location, identification, excavation, removal, and disposal of UXO is accomplished require qualified UXO personnel, including a Senior UXO Supervisor, UXO Safety Officer, and UXO Quality Control Specialist to provide oversight for UXO Teams performing operations.
- On an OE site that has OE contamination of soils and/or groundwater, UXO support may include both anomaly avoidance techniques and OE construction support for excavation and/or treatment of OE contaminated soil and groundwater.
- On ordnance demilitarization and CWM projects, OE support may be needed for identification, handling, disassembly, processing, transportation, and treatment or disposal of munition components.
- On projects where OE waste (OEW) is transported or disposed off-range, the UXO and Environmental Compliance Coordinator (ECC) may assist in identifying the applicable regulations and permits required.
- On projects where Ordnance Related Scrap (ORS) or inert ordnance is recovered and processed for disposal as scrap, UXO and ECC support may determine if incineration and certification is required, along with any permitting requirements for portable incinerator operation.

The CH2M HILL EE&SBG UXOSO or EE&SBG UXO Quality Control Specialist shall verify subcontractor training and current medical examinations prior to the start of field operations.

### **3.0 Definitions**

**3.1 Active Range.** A military range that is currently in use and being regularly used for range activities.

**3.2 Anomaly.** Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and nonferrous material at a site.

**3.3 Anomaly Avoidance.** Techniques employed by EOD or UXO personnel at sites with known or suspected OE to avoid any potential surface UXO or subsurface anomalies. This usually occurs at mixed hazard sites when HTRW investigations must occur prior to execution of an OE removal action. Intrusive anomaly investigations are not authorized during ordnance avoidance operations.

**3.4 Chemical Warfare Materials (CWM).** An item configured as a munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. Also includes V- and G-series nerve agents, H-series blister agent, and lewisite in other-than-munition configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control agents, chemical herbicides, smoke and flame producing items, or soil, water, debris, or other media contaminated with a chemical agent.

**3.5 OE Construction Support.** Support provided by qualified UXO personnel during construction activities at potential OE sites to ensure the safety of construction personnel from the harmful effects of UXO. When a determination is made that the probability of encountering UXO is low (current or previous land use leads to a determination that OE may be present), a two person UXO team will stand by in case the construction contractor encounters a suspected UXO. When a determination is made that the probability of encountering a UXO is moderate to high (current or previous land use leads to a determination that OE was employed or disposed of in the parcel of concern, e.g., open burn and open detonation areas), UXO teams are required to conduct subsurface UXO clearance for the known construction footprint either in conjunction with the construction contractor or prior to construction.

**3.6 EOD Personnel.** EOD personnel are those active duty military individuals performing EOD operations.

**3.7 Explosive Ordnance Disposal (EOD).** EOD includes the detection, identification, field evaluation, rendering safe, and final disposal of OE.

**3.8 Explosive Safety Submission (ESS).** The document that serves as the specifications for conducting work activities at the project. The ESS details the scope of the project, the planned work activities, and potential hazards and the methods for their control.

**3.9 Explosive Soil.** Refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

- (a) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether an explosive is classified as “primary” or “secondary.”
- (b) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include lead azide, lead styphnate, and mercury fulminate.
- (c) Secondary explosives are bursting and boosting explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives.
- (d) Soil containing 10 percent or more by weight of any secondary explosive mixture of secondary explosives is considered “explosive soil.”
- (e) Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosion hazards.

**3.10 Inactive Range.** A military range that is not currently being used, but that is still under military control and considered by the military to be a potential range area, and that has not been put to a new use that is incompatible with range activities.

**3.11 Intentional Detonation.** An intentional detonation is a planned, controlled detonation.

**3.12 Intrusive Activity.** An activity that involves or results in the penetration of the ground surface at an area known or suspected to contain OE. Intrusive activities can be of an investigative or removal action nature.

**3.13 Maximum Credible Event.** The worst single event that could occur at any time, with maximum release of a chemical agent from a munition, container, or process as a result of unintended, unplanned, or accidental occurrence.

**3.14 Most Probable Event (MPE).** The most likely event, as a result of an accidental, unplanned, or unintended detonation of an item of ordnance, that could occur during OE activities. The event must be realistic with reasonable probability of occurrence.

**3.15 Most Probable Munition (MPM).** The OE item that has the greatest hazard distance based on calculations of the explosion effects of the OE items anticipated to be found at a site. Typically, the MPM is the OE item with the greatest fragmentation or overpressure distance based on the type of OE items that were historically used at the site.

**3.16 Military Munitions.** All ammunition products and components produced or used by or for the U.S. DOD or the U.S. Armed Services for national defense and security, including military munitions under the control of the DOD, the U.S. Coast Guard, the U.S. Department of Energy (DOE), and the National Guard personnel. The term military munitions includes: confined gases, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries used by DOD components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof.

**3.17 Military Range.** Designated land and water areas set aside, managed, and used to conduct research on, develop, test, and evaluate military munitions and explosives, other ordnance or weapons systems, or to train military personnel in their use and handling. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, and buffer zones with restricted access and exclusionary areas.

**3.18 Non-Stockpile Chemical Warfare Materials.** CWM (defined above) that is not included in the chemical stockpile. Nonstockpile CWM is divided into five categories:

- (1) Buried CWM.
- (2) Recovered chemical weapons (items recovered during range clearing operations, from chemical burial sites, and from research and development testing).
- (3) Former chemical weapon production facilities.
- (4) Binary chemical weapons.
- (5) Miscellaneous CWM (unfilled munitions and devices and equipment specially designed for use directly in connection with employment of chemical weapons).

**3.19 Ordnance and Explosives (OE)** consists of:

- (1) Ammunition, ammunition components, chemical or biological warfare materials that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity.
- (2) Explosive Soil. See definition under “explosive soils.”
- (3) OE market includes: Unexploded Ordnance (UXO), Chemical Weapons Materials (CWM), OE Contaminated Soils and Groundwater, Range Maintenance, Ordnance Demilitarization (Demil), and Demining (DM).

**3.20 Quantity-Distance (QD).** The quantity of explosives material and distance separations that provide defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables provided in DOD 6055.9-STD. Separation distances are not absolute safe distances but are relative protective safe distances. Greater distances than those shown in the Q-D tables shall be used whenever possible.

**3.21 Removal Action.** The cleanup of OE from the environment to include the disposal of removed material. The term includes, in addition, without being limited to, security fencing or other measures to prevent, minimize, or mitigate damage to the public health or welfare or the environment.

**3.22 Response Action.** Action taken instead of or in addition to a removal action to prevent or minimize the release of OE so that it does not cause substantial danger to present or future public health or welfare or the environment.

**3.23 Senior UXO Supervisor (SUXOS).** Supervises all contractor onsite UXO activities. This individual must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen proving Ground, MD, or the U.S. Naval EOD School, Indian Head, MD. This individual must have at least 15 years of combined active duty military EOD and contractor UXO experience, to include at least 10 years in supervisory positions.

**3.24 Unintentional Detonation.** A detonation not planned in advance.

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

**3.26 UXO Personnel.** Contractor personnel who have completed specialized military training in EOD methods and have satisfactorily performed the EOD function while serving in the military. Various grades and contract positions are established based on skills and experience.

**3.27 UXO Safety Officer (UXOSO).** Contractor personnel with the responsibility of enforcing the contractor’s SSHP. This individual must, therefore, be in the field whenever possible to observe operations. This individual must have the same minimum qualifications as the UXO Technician III. In addition, this individual must have the specific training,

knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements.

**3.28 UXO Technician III.** Supervises a UXO team. This individual must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD, the U.S. Naval EOD School, Indian Head, MD, or U.S. Naval EOD School, Elgin Air Force Base, FL, or a DOD-equivalent certified course. This individual must have a minimum of 10 years of military EOD or contractor UXO experience.

**3.29 UXO Technician II.** This individual must be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD, the U.S. Naval EOD School, Indian Head, MD, or U.S. Naval EOD School, Elgin Air Force Base, FL, or a DOD-equivalent certified course. This individual must have a minimum of 5 years of military EOD or contractor UXO experience.

## **4.0 Project Execution**

### **4.1 Safe Work Practices**

The requirements of this section are to be followed by CH2M HILL employees who enter OE exclusion zones, regardless of the company performing OE operations. These requirements also pertain to OE subcontractor personnel when CH2M HILL is providing oversight.

### **4.2 Regulations/Industry Standards**

As described in the “Subcontractor, Contractor, and Owner” SOP HSE-55, CH2M HILL’s project EE&SBG UXOSO may be required to provide oversight of an OE subcontractor. OE subcontractors retain control over their practices, and CH2M HILL’s oversight does not relieve them of their own responsibility for effective implementation and enforcement of HS&E requirements. The following subsections provide the minimum regulatory and industry standard requirements pertaining to OE operations.

#### **4.2.1 General Safety Concerns and Procedures**

- (a) OE operations will not be conducted until a complete plan for the site is prepared and approved by the CH2M HILL EE&SBG UXOSO. These plans will be based upon limiting exposure to the minimum number of personnel, for the minimum amount of time, to the least amount of OE consistent with safe and efficient operations.
- (b) Only UXO qualified personnel will perform OE procedures. Non-UXO personnel may be used to perform OE-related procedures when supervised by a UXO Technician III. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III.
- (c) Personnel who will be handling OE items will not wear outer or inner garments having static electricity-generating characteristics. Materials made of 100 percent polyester, nylon, silk, and wool are highly static producing.

- (d) UXO Technicians are required to wear hard hats except when investigating suspect UXO. Hard hats may create an unsafe condition by falling off of the head of a UXO technician at a critical moment. In the event of the accidental detonation of a UXO (the worst case accident scenario), the hard hat will not protect the UXO technician from fragments and may worsen the injury by reflecting fragments into the head of the technician. This is consistent with safety guidance from the U.S. Army Corps of Engineers OE Center of Excellence. Also, protective shoes worn by personnel performing UXO operations should be constructed of nonferrous materials (e.g., fiberglass) to prevent interference with sensitive geophysical instruments.
- (e) Prior to any action being performed on an ordnance item, all fuzing will be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze, i.e., burned, broken, parts exposed/sheared, etc.

#### **4.2.2 OE Safety Precautions**

- (a) Every effort will be made to identify a suspect OE item. Under no circumstances will any OE be moved in an attempt to make a positive identification. The OE item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown OE item is encountered, the CH2M HILL EE&SBG UXOSO will be notified immediately. The following are additional considerations for the safe handling of OE items:
  - (1) Projectiles containing base detonating (BD) fuzes are to be considered armed if the round is fired.
  - (2) Arming wires and pop-out pins on unarmed fuzes should be secured prior to any movement.
  - (3) Do not depress plungers, turn vanes, rotate spindles, levers, setting rings, or other external fittings on OE items. Such actions may arm or activate the OE.
  - (4) Do not attempt to remove any fuzes from the OE. Do not dismantle or strip components from any OE items unless the item is included in the scope of work (SOW).
  - (5) UXO personnel are not authorized to inert any OE items found onsite unless it is a part of the SOW.
  - (6) OE/UXO items will not be taken from the site as souvenirs/training aids.
  - (7) Civil War ordnance will be treated as any other OE.
- (b) Prior to entering U.S. Army-controlled areas/ranges contaminated with Improved Conventional Munitions (ICM), an approved Department of the Army (DA) waiver must be obtained.
- (c) Any time suspect chemical warfare material (CWM) is encountered during conventional OE site activities, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of two personnel will secure the area to prevent unauthorized access. Personnel should

- position themselves as far upwind as possible while still maintaining security of the area. The local point of contact designated in the Work Plan will be immediately notified.
- (d) Avoid inhalation and skin contact with smoke, fumes, and vapors of explosives and other related materials.
  - (e) Consider OE items that have been exposed to fire and detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents, which might render them more sensitive than their original state.
  - (f) Do not rely on the color coding of OE for positive identification. Munitions having incomplete or improper color codes have been encountered.
  - (g) Avoid approaching the forward area of an OE item until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped charge munitions contain piezoelectric (PZ) fuzing system until identified. PZ is extremely sensitive. It can function at the slightest physical change and can remain hazardous for an indefinite period of time.
  - (h) Approach an unfired rocket motor from the side at a 45-degree angle. Accidental ignition can cause a missile hazard and hot exhaust.
  - (i) Do not expose unfired rocket motors to any electromagnetic radiation (EMR) sources.
  - (j) Consider an emplaced landmine armed until proven otherwise. It may be intentionally booby-trapped to deceive.
  - (k) Assume that practice OE contains a live charge until it can be determined otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorous residue. Due to incomplete combustion, the phosphorous may reignite if the crust is broken and exposed to air.
  - (l) Do not approach a smoking white phosphorous (WP) munition. Burning WP may detonate the explosive burster charge at anytime.
  - (m) Foreign ordnance was returned to the United States for exploitation and subsequent disposal. Every effort must be made to research the applicable documentation and publications prior to commencement of a project.

#### **4.2.3 OE Storage**

- (a) During OE projects, explosive storage falls into two categories, on-DOD installations and off-DOD installations.
- (b) For On-DOD installations the provisions of DOD 6055.9-STD will be followed.
- (c) In the event the installation does not have an existing storage facility, the provisions of DOD 6055.9-STD will apply.

- (d) For Off-DOD installations, establish a temporary explosive storage area that will meet all local, state, and 27 CFR, Bureau of Alcohol Tobacco, and Firearms (BATF) requirements and as much of DOD 6055.9-STD as is practical to implement. The establishment of a temporary explosive storage area must meet the following requirements:
- (1) The area will, if possible, meet the inhabited building and public traffic route distances specified in DOD 6055.9-STD. If the distances are less than required by the DOD guidance, a proposed barricading plan to protect the public from accidental detonation must be developed and reviewed by the CH2M HILL Corporate UXOSO.
  - (2) Magazines must meet the requirements of the BATF regulations, and each magazine must have a Net Explosive Weight (NEW) established for the explosives to be stored.
  - (3) Each magazine must be grounded as specified in NFPA 780 and must meet the intermagazine distances as defined in the DOD guidance.
  - (4) A physical security survey will be conducted to determine if fencing or guards are required. This survey will be coordinated through the CH2M HILL EE&SBG UXOSO and local law enforcement agencies.
  - (5) A fire plan for either on- or off-installation explosive storage areas will be prepared and coordinated through the CH2M HILL EE&SBG UXOSO and the local fire department. All magazines will have placards.
- (e) OE Waste (OEW) may be stored: 1) in RCRA regulated units (i.e., tanks, containers, containment buildings, etc.) as described in HSE-80; 2) in military magazines conforming to DDESB standards (as described above); or 3) under the MMR conditional exemption (40 CFR 266.205). The MMR conditional exemption applies to military non-chemical munitions, and the following procedures must be met:
- (1) Follow DDESB requirements for storage.
  - (2) Notify EPA of the location of the unit within 90 days of when storage unit first is used for waste munitions storage.
  - (3) Notify EPA within 24 hours of any loss or theft of munitions from the storage area.
  - (4) Inventory wastes annually, conduct inspections quarterly and keep records for at least three years.
  - (5) Limit access to the area to appropriately trained and authorized personnel.

#### **4.2.4 OE Transportation**

In the event that OE items must be transported offsite, the provisions of 49 CFR, DA Pam 385-64 state and local laws must be followed. These additional considerations are provided for the safe transport of OE items:

- (a) Do not transport WP munitions unless they are immersed in water, mud, or wet sand.

- (b) If loose pyrotechnic, tracer, flare, or similar mixtures are to be transported, they will be placed in #10 mineral oil or equivalent to minimize the fire and explosion hazards.
- (c) Incendiary loaded munitions should be placed on a bed of sand and covered with sand to help control the burn if a fire should start.
- (d) If a base-ejection projectile must be transported to a disposal area, the base will be oriented in the vehicle so that it is parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.
- (e) OE with exposed hazardous fillers such as high explosives (HE), will be placed in appropriate containers with packing materials to prevent migration of the hazardous fillers. Padding should be added to protect the exposed filler from heat, shock, and friction.

#### **4.2.5 OE Exclusion Zone Operations**

On OE project sites, it is the responsibility of the UXOSO to establish the exclusion zone for each UXO team. This exclusion zone should not be confused with the safe separation distance that is maintained between teams.

- (a) The purpose of the exclusion zone is for the protection of nonessential project personnel and the public from blast overpressure and fragmentation hazards. There are two criteria for calculating exclusion zones:
  - (1) Intentional Detonations. When destroying ordnance, both the hazards from fragmentation and overpressure must be considered. The minimum separation distances in DOD 6055.9-STD will also be used unless otherwise stated.
  - (2) Unintentional Detonations. If the identification of OE on an OE site is unknown, the minimum separation specified in DOD 6055.9-STD, Chapter 5, Paragraph C5.5.4, will be used to establish the exclusion zones.
- (b) When multiple teams are working onsite, a safe separation distance will be established. The minimum distance maintained between teams will never be less than 200 feet or the K50 overpressure distance. The one that is greater will be used.
- (c) While OE operations are being conducted, only personnel essential for the operation will be allowed in the exclusion zone. When nonessential personnel enter the exclusion zone, all OE operations will cease. In addition to this work stoppage, the following actions will be accomplished:
  - (1) The individuals must receive a safety briefing and sign the visitors' log prior to entering the zone.
  - (2) The individuals will be escorted by a UXO qualified individual.
  - (3) All OE operations will cease within the radius of the exclusion zone for the areas to be visited.
- (d) All personnel working within the exclusion zone must comply with the following:

- (1) There will be no smoking within the exclusion zone, except in areas designated by the UXOSO.
- (2) There will be no open fires for heating or cooking within the exclusion zone, except where authorized by the UXOSO.
- (3) During magnetometer operations, workers will have no metal parts in or on their shoes that would cause the magnetometer to present false indications.

#### **4.2.6 OE Excavation Operations**

- (a) Hand excavation is the most reliable method for uncovering OE, provided the item is near the surface. Hand excavation exposes personnel to the hazard of detonation for longer periods of time than any other method. Taking this into consideration, only UXO qualified personnel will be used to accomplish this task.
- (b) Earth-Moving Machinery (EMM) may be used to excavate overburden from suspected OE. EMM will not be used to excavate within 12 inches of a suspected OE. Once the EMM is within 12 inches of the OE, the excavation will be completed by hand excavation methods. Personnel who are not UXO qualified may operate EMM only when supervised by a UXO Technician III.
  - (1) If more than one EMM is to be used onsite, the same minimum separation distances required for multiple work teams applies.
  - (2) EMM operations will be conducted within the guidelines of HSE-32 "Excavations."
- (c) Excavation operations, whether by hand or EMM, will employ a step-down or offset access method. Under no circumstances will any excavation be made directly over the suspected OE.

#### **4.2.7 OE Disposal Operations**

To avoid MMR regulation, all demolition operations will be conducted on-range in accordance with TM/EODB 60A 1-1-31. Any deviation from this policy must be approved by the UXOSO and ECC. The following are on-range disposal procedures.

- (a) As a general rule, all demolition operations will be accomplished by use of shock tubing or electrical means to assure maximum safety. There are exceptions to this requirement in situations where static electricity or EMR hazards are present.
- (b) The only acceptable disposal method is the one stated in the appropriate TM/EODB 60-series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.
- (c) If a situation dictates, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The CH2M HILL EE&SBG UXOSO will assist in any design work and must review and approve all proposed protective works. As a minimum requirement, all demolition shots will be tamped with clean earth or sand. In accordance with DOD 6055.9-STD the following separation distances will be observed unless otherwise directed:

- (1) Minimum separation distance for nonfragmenting explosive materials will be no less than 1,250 feet.
  - (2) Minimum separation distance for fragmenting explosive ordnance will be no less than 2,500 feet. For bombs and projectiles with a diameter of 5 inches or greater, use a minimum distance of 4,000 feet.
  - (3) Ordnance items with lifting lugs, strong backs, base plates, etc., will be oriented away from personnel, as fragments from these items tends to travel farther than normal.
- (d) Once demolition operations are completed, a thorough search of the demolition area will be conducted with a magnetometer to ensure a complete disposal was accomplished.
  - (e) Inert ordnance will not be disposed of for scrap until the internal fillers/voids have been exposed and unconfined. Heat generated during the reclamation process can cause the inert fillers, moisture, or air to expand and burst the sealed casings. In this situation, Oil Well Perforators can be used for venting these ordnance items that require demilitarization.
  - (f) Inert ordnance to be disposed of as scrap may require certification by the UXOSO and a government representative. This may require further treatment by operation of a portable incinerator, depending on local requirements and acceptance criteria. The UXOSO and ECC will determine if certification and incineration is necessary, along with any permitting requirements during project planning.

#### **4.2.8 OEW Disposal**

When the used or fired munition is managed off-range (i.e., transported off-range and stored, reclaimed, treated or disposed) or disposed of on-range (i.e., buried without treatment), it is subject to regulation as a solid waste under RCRA. This means it may also be subject to regulation as a hazardous waste. Also, munitions that land off-range, and that are not promptly retrieved, are solid wastes. Table 4-1 describes how solid wastes may be characterized as hazardous in these situations. All characterization must be based on field observations by the EE&SBG UXOSO, who is trained in the proper identification of waste ordnance items and meet the requirements for an “emergency response expert” under RCRA. In the event the OEW is regulated as hazardous waste, refer to the Hazardous Waste SOP, HSE-80 for RCRA hazardous waste management requirements.

**Table 4-1 Waste Characterization**

<b>Item</b>	<b>Characterization</b>	<b>Waste Code</b>
Uncontaminated Metal Debris	If visual inspection determines if item does not contain waste residue, waste is non-hazardous scrap metal, excluded from RCRA regulation under 40 CFR 261.6(a)(3). Waste may be subject to further incineration and certification requirements.	None
Contaminated Metal Debris	If visual inspection determines item contains hazardous waste residue, manage as potential hazardous waste.	Potential D003 and/or D008
Ordnance Items Less than 0.5 Caliber	Small-arms ammunition is not considered reactive hazardous waste in accordance with EPA policy (November 30, 1984 Memorandum, John Skinner, OSWER Director).	None
Ordnance Items Greater than 0.5 Caliber	Untreated UXO presumed to be reactive hazardous waste using generator knowledge under 40 CFR 261.23.	D003
Ordnance Items Greater than 0.5 Caliber w/ Lead Projectiles	Ordnance containing lead projectiles will be presumed to be toxic hazardous waste under 40 CFR 261.24.	D008

**4.3 Forms/Permits**

- (a) **Type-33 User of High Explosives License/Permit** issued by the BATF? is required for the purchase, storage, and use of high explosives (HE) in support of OE operations, construction projects, and demolition and disposal (D&D) projects. Written authorization designating the individuals who can purchase, store, or use explosives must be included in the site-specific work plans.
- (b) **State and Local Explosive Permits** may be required for the purchase, storage, and use of HE in support of OE operations, construction projects, and D&D projects.

**4.4 Self-Assessment Checklists**

The “HS&E Self-Assessment Checklist – OE Operations” found in Attachment 2 is provided as a method of verifying compliance with established safe work practices, regulations, and industry standards pertaining to OE operations. CH2M HILL’s project UXOSO/EE&SBG UXOSO shall use this checklist when: 1) CH2M HILL employees are potentially exposed to hazards associated with OE operations, and/or 2) CH2M HILL oversight of an OE subcontractor is required. The EE&SBG UXOSO shall specify the frequency in which this checklist shall be completed and provide this information in the project’s written safety plan. Completed checklists shall be sent to the EE&SBG UXOSO for review. The EE&SBG UXOSO shall assist the Site UXOSO in resolving any deficiencies identified during the self-assessment.

## **5.0 Attachments**

Attachment 1: Subcontractor Safety Procedure Criteria for OE Operations

Attachment 2: H&S Self-Assessment Checklist for OE Operations

## **Ordnance Explosives (OE)**

### **Standard of Practice HSE-91**

#### **Attachment 1: Subcontractor Safety Procedure Criteria for OE Operations**

Pending. Contact the CH2M HILL EE&SBG UXO Safety Officer for assistance.

**Ordnance Explosives (OE)  
Standard of Practice HSE-91  
Attachment 2: HS&E Self-Assessment Checklist - OE  
Operations**

Pending. Contact the CH2M HILL EE&SBG UXO Safety Officer for assistance.



# ATTACHMENT 6-4

## CH2MHILL

### CHEMICAL-SPECIFIC TRAINING FORM

Location:	Project # :
HCC:	Trainer:

#### TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

#### REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:


The HCC shall use the product MSDS to provide the following information concerning each of the products listed above.

- Physical and health hazards
- Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants shall have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program shall be made available for employee review in the facility/project hazard communication file.

## **ATTACHMENT 6-5: APPLICABLE MATERIAL SAFETY DATA SHEETS**

To be inserted at project start up.

## **ATTACHMENT 6-6: LEAD AWARENESS**

### **Lead Exposure Training Instructions**

This module was designed for employees who work in areas with percent levels of inorganic lead or areas where there is a potential lead exposure above the action level of 30  $\mu\text{g}/\text{m}^3$ .

#### **Lead Exposure Training Program**

The OSHA lead standard (29 CFR 1910.1025) requires employers to provide lead training for those employees who may be exposed to inorganic lead above the action level of 30  $\mu\text{g}/\text{m}^3$ . This training program satisfies this OSHA requirement and is provided to assist employees in recognizing lead exposure hazards and understanding the procedures to be followed to minimize exposure.

#### **Objectives**

- Inform employees of the possible adverse health effects of lead exposure
- Inform employees of the regulatory requirements when working with or around lead
- Identify how lead exposures could occur on CH2M HILL projects

#### **How to complete this training**

Employees are required to read the training materials that follow and complete a short quiz. The training materials must be read thoroughly and understood before completing the quiz; you will have only one chance at answering each question.

Quiz scores will automatically be sent to the Health and Safety Training Administrator. A minimum score of 70 percent must be obtained to receive credit for this training. If a passing score is obtained, the H&S Training Administrator will issue you a certificate of completion. If a passing score is not obtained, you are required to contact your regional health and safety program manager to discuss the training material directly.

# Lead Exposure Training

## 1. Uses And Occurrences

Lead is a well-known naturally-occurring metal found in the earth's crust, often associated with silver and zinc. It has had a variety of uses since antiquity, but its greatest use today is in car batteries. It was formerly used in gasoline, water pipes, pottery glazes, paint, solder, and as metal alloy. It currently has a variety of other uses such as radiation shielding, as vibration dampening material, in explosives, bullets, magnets, and in electronic equipment. It is also a common contaminant at hazardous waste sites.

## 2. Physical Characteristics

Lead exist as the familiar soft, dull gray metal, as a white or red solid as lead oxide, a gray or black solid as lead sulfide (galena), a white solid as lead sulfate, all which are insoluble in water. There are numerous other forms of inorganic lead. The organic forms, tetraethyl lead and tetramethyl lead, used in the past in fuels, are flammable colorless liquids also insoluble in water.

## 3. Toxicity and Hazards

Lead is a highly toxic substance that has a variety of adverse health effects from both chronic and acute exposure. An acute exposure to high levels of lead can cause a brain condition known as encephalopathy which can lead to death in a few days. The more common chronic exposure can also cause brain damage, blood disorders (anemia), kidney damage, damage to the reproductive system of both men and women and toxic effects to fetuses. Lead is stored in the bones and eliminated from the body very slowly. Consequently, exposures to low levels over many years can cause these adverse health effects. Lead is toxic by inhalation and ingestion, but is not absorbed through the skin. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in mouth, anxiety, insomnia and muscle and joint pain or soreness.

## 4. Regulations

Inorganic lead has been specifically regulated in general industry by OSHA since 1981 (29 CFR 1910.1025) and in construction (29 CFR 1926.62) since 1994. The 8-hour permissible exposure limit is  $50 \mu\text{g}/\text{m}^3$ . There is no short-term exposure limit. OSHA also specifies an action level of  $30\mu\text{g}/\text{m}^3$ . These limits apply to both general industry and construction. Initial air monitoring must be done whenever there are indications of lead exposure above the action level. If the action level is not exceeded, air monitoring can cease. If the action level is exceeded, initial blood lead level monitoring must be made available. If exposed above the action level for more than 30 days in a year, medical surveillance must be provided which includes further blood lead level monitoring and a medical examination. If specified blood levels are exceeded, the employee must be removed from the job or task where lead exposure occurs. Training must also be provided. If the PEL is exceeded, engineering controls must be implemented to reduce exposure. If engineering controls are not feasible or ineffective, respirators must be provided and worn. Air-purifying respirators with high-efficiency (HEPA) filters can be worn when airborne levels are as high as  $500 \mu\text{g}/\text{m}^3$ . If levels exceed this amount, supplied air respirators must be worn. In addition, if the PEL is

exceeded, OSHA requires the establishment of regulated areas, showers, change rooms, separate clean lunchrooms and warning signs. Regulated areas are demarcated from the rest of the workplace to limit access to authorized personnel who have received lead training. To enter a regulated area you must also wear protective clothing. Tetraethyl and tetramethyl lead each have separate PELs of 100  $\mu\text{g}/\text{m}^3$  and 150  $\mu\text{g}/\text{m}^3$  respectively, and are not covered under the inorganic lead regulation.

## 5. How Exposures Can Occur At CH2M HILL Projects

Exposure to lead can occur at hazardous waste sites where lead is found in soil or groundwater and at old mining sites or former smelter sites. Exposure to lead-containing dust could occur during drilling, heavy equipment movement or other soil-disturbing activities. Dust formation can be minimized by wetting soils. Exposure could also occur during lead paint removal activities, during welding on metal surfaces with lead-containing paint, or in project work in smelters, battery recycling or manufacturing plants or at some mines.

## 6. Additional Information

Persons working at hazardous waste sites with known high amounts in soils (3 percent or 30,000 ppm) should have blood lead draws taken before and after site work. Air sampling should be done during soil disturbing activities at the site. Person working at non-hazardous waste site who have information or suspect they have been exposed to lead above the action level should contact a health and safety manager to determine if medical monitoring is needed or other regulatory requirements apply.

## Lead Quiz

1. Which of the following is not a mode of entry of lead?
  - A. Inhalation
  - B. Ingestion
  - C. Skin absorption
  - D. All of the above are modes of entry
2. Which of the following is not a common symptom of lead exposure?
  - A. Loss of appetite
  - B. Metallic taste in mouth
  - C. Muscle and joint pain or soreness
  - D. All are common symptoms of lead exposure
3. What are the OSHA exposure limits for lead (PEL and action level)?
  - A. 50  $\mu\text{g}/\text{m}^3$  and 25  $\mu\text{g}/\text{m}^3$  respectively
  - B. 50 ppm and 25 ppm respectively
  - C. 50 ppm and 30 ppm respectively
  - D. 50  $\mu\text{g}/\text{m}^3$  and 30  $\mu\text{g}/\text{m}^3$  respectively
4. When is air monitoring required for lead exposures?
  - A. When exposed to lead for 30 days or more in a year
  - B. Anytime lead is present in the workplace
  - C. When there are indications of lead exposure above the action level
  - D. When the PEL is exceeded
5. When must medical surveillance be made available for lead exposures?
  - A. When the action level is exceeded
  - B. When the action level is exceeded for 30 days in a year
  - C. When the PEL is exceeded
  - D. When the PEL is exceeded for 30 days in a year

6. When is respiratory protection required for lead exposures?
  - A. When the action level is exceeded
  - B. When the action level is exceeded for 30 days in a year
  - C. When engineering controls do not reduce exposure below the PEL
  - D. When the PEL is exceeded for 30 days in a year
  
7. What respiratory protection is considered acceptable for protection against lead exposures?
  - A. Air-purifying with organic vapor cartridge
  - B. Air-purifying with HEPA cartridge
  - C. Air-purifying with lead cartridge
  - D. Supplied-air respirator is the only acceptable respiratory protection
  
8. What are the requirements for entering a lead-regulated area?
  - A. Must be an authorized person
  - B. Must complete lead training
  - C. Must wear protective clothing
  - D. All of the above
  
9. What control measure should be used to minimize dust formation when disturbing lead-containing soil?
  - A. Training
  - B. Wetting the soil
  - C. Air purifying respirators
  - D. None of the above
  
10. What level of lead in the soil might require a lead blood test?
  - A. 1% or 10,000 ppm
  - B. 3% or 30,000 ppm
  - C. 5% or 50,000 ppm
  - D. None of the above

## SECTION 7

# Location Surveys and Mapping Plan

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Survey and mapping tasks are key components of the OE investigations for identifying the location of each OE and MEC component in the field, reporting the locations of these components on maps and in spatial queries conducted in the GIS, and assisting with disposition of OE and MEC components. The Location Surveys and Mapping Plan describing the methods, equipment, and accuracy requirements for location surveys and mapping for the OE and MEC survey and anomaly reacquisition at the Former NASD is described in detail in Section 7 of the *Draft Final OE Master Work Plan*.

## SECTION 8

# Sampling and Analysis Plan

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Sampling and analysis procedures for projects at the Former NASD were documented in the *Master Work Plan for the Former NASD* (CH2M HILL, January 2001). Environmental sampling at OE sites will be conducted in accordance with the January 2001 *Master Work Plan*. Environmental sampling locations will be identified in the site-specific CERCLA Investigation Work Plan that will be developed for each site after completion of the MEC survey. A copy of the January 2001 *Master Field Sampling Plan* was provided in Appendix A of the *Draft Final Master OE Work Plan* for reference.

No environmental sampling will occur until the remedial investigation (RI) for SWMU 4 has begun. All MEC investigations will be completed prior to the RI.

## SECTION 9

# Quality Control Plan

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The *Quality Control Plan* (QCP) for OE investigation actions at the Former NASD is documented in Section 9 of the *Final Master OE Work Plan for the Former NASD* (CH2M HILL, June 2003). All elements of the QCP detailed in that section will be referenced for QC procedures associated with OE investigation actions at SWMU 4. Field teams working at SWMU 4 will have a copy of the *Final Master OE Work Plan for the Former NASD* on site at all times for referencing QC guidelines, methodologies, and implementation procedures as defined in that Plan including:

- Identifying the project QC organization and defines each individual's respective authority, responsibilities, and qualifications.
- Defines project communication, documentation, and record keeping procedures.
- Establishes QC procedures, including the necessary supervision and tests, to ensure that work meets applicable specifications and drawings.

The QCP plan for SWMU 4 covers a number of work related disciplines executing a series of definable features of work under a three phase inspection process with QC that includes:

- Preparatory phase
- Initial phase
- Follow-up phase

QC testing on the three phases of work for the various disciplines working on -site is performed according to pre-determined schedules as outlined in Section 9.7 and Figure 9-1 of the Master OE Work Plan for the Former NASD.

Résumés of key personnel included in this program are provided in Appendix B of this site-specific work plan. Quality Control forms (Form 9-1 through 9-10) are provided as Appendix C to this document.

## 9.1 Project Schedule

The proposed schedule for implementation of each stage of the MEC investigation is presented below. The duration of each stage of the project schedule corresponds to Table 5-1 of the *Draft Final Site Management Plan for SWMU 4* (CH2M HILL, August 2001) and is expressed in calendar days.

**Project Startup.** This stage includes preparation of project submittals that include this Work Plan. This Work Plan includes the Site Safety and Health Plan, the Explosives Management Plan, IDW Management Plan, QCP, and Project Schedule. Estimated Duration – 60 Days.

**Preparatory Activities.** This stage includes any permitting or subcontractor procurements as necessary. Estimated Duration – 60 Days.

**Field Investigations.** This stage includes mobilization, geophysical survey, ordnance identification, certification, and disposal of OE/MEC materials, OE/MEC related scrap, and no OE/MEC related scrap. Estimated Duration – 180 days.

**Site Restoration.** This stage includes grading and re-vegetation activities at excavation areas. Estimated Duration – 7 Days.

**Project Closeout Report.** This stage includes preparation of a report documenting the results of all OE/MEC activities conducted at SWMU 4. Estimated duration – 120 Days.

## 9.2 Geophysical Plan

The geophysical plan and associated qualifications for site geophysical personnel working at SWMU 4 is presented in Section 5 and Appendix B of this document. The geophysical SOP for work at SWMU 4 is also provided in Section 5 of this document.

**SECTION 10**

# **Environmental Protection Plan**

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Based on the findings of the habitat characterization study conducted during the *Phase I Expanded PA/SI for the Former NASD*, no threatened or endangered plant or animal species are expected to be impacted by the proposed MEC work at SWMU 4.

In the event that any natural or archeological resource is to be impacted by the investigation, the Environmental Resource Manager (DoI) will be contacted. For a description of the environmental features of the Former NASD, refer to the *Draft Final OE Master Work Plan*.

## SECTION 11

# Investigation-Derived Waste Management Plan

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This *IDW Management Plan* describes the handling of materials during OE removal and HTRW activities, and was developed in accordance with NAVSEA OP5, Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping and DoD 4160.21-M, Defense Reutilization and Marketing Manual. IDW procedures for environmental investigations at the Former NASD were addressed in the *Final Master Work Plan for NASD* (CH2M HILL, January 2001). Additional information for the MEC investigations is provided in the *Draft Final OE Master Work Plan* and should be referenced accordingly for appropriate IDW handling procedures. IDW management will not be applicable until implementation of the RI at SWMU 4. Detailed information on the handling of scrap metal and ordnance related scrap is included in Appendix A.

## SECTION 12

# Geographical Information System Plan

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The *GIS Plan* provided in Section 12 of the *Draft Final OE Master Work Plan* describes the incorporation of GIS into the data management phases of OE anomaly validation actions at the Former NASD. This plan was developed in accordance with OE MCX data item description (DID) OE-005-14. A comprehensive presentation of the database deliverables is presented in the *Draft Final OE Master Work Plan*.

## SECTION 13

# References

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A.T. Kearney, Inc. and K.W. Brown & Associates, Inc. *Phase II RCRA Facility Assessment of the Naval Ammunition Facility, Vieques Island, Puerto Rico.* October 1988.

CH2M HILL, Inc. *Draft Final Ordnance/Explosives Master Work Plan, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* October 2001.

CH2M HILL, Inc. *Draft Magazine Siting Plan for Solid Waste Management Unit-4, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* October 2001.

CH2M HILL, Inc. *Draft Final Site Management Plan, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* August 2001.

CH2M HILL, Inc. *Final Master Work Plan, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* January 2001.

CH2M HILL, Inc. *Findings of Suitability of Early Transfer, Former U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* November 2000.

CH2M HILL, Inc. *Phase I Expanded Preliminary Assessment/Site Investigation, U.S. Naval Ammunition Support Detachment, Vieques Island, Puerto Rico.* October 2000.

Greenleaf/Telesca Planners, Engineers, Architects, Inc., and Ecology and Environment, Inc. *Initial Assessment Study: Naval Station Roosevelt Roads, Puerto Rico.* September 1984.

NASD. *Federally Listed Species Occurring or Potentially Occurring at Vieques, Puerto Rico.* 1996.

Program Management Company. *Environmental Baseline Survey, Naval Ammunition Support Detachment: Vieques Island, Puerto Rico.* October 2000.

**APPENDIX A**

# **ORS Metal Collection and Inspection Procedures**

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# **Ordnance Related Scrap (ORS) Metal Collection and Inspection Procedures**

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## 1.0 Purpose

This SOP is intended to guide MEC Technicians in the safe and efficient handling and disposal of OE/MEC related scrap metal found at CH2M HILL project sites. The inherently dangerous characteristics of AEDA dictate that special precaution be taken to ensure that demilitarization is performed only by properly trained and technically qualified personnel.

## 2.0 Background

During excavation and investigation operations, MEC Technicians will encounter the following types of metallic contamination: MEC items; ordnance related scrap that is contaminated with explosives or other hazardous materials; non-hazardous ordnance related scrap metal; and general metallic debris. Because the metal scrap recovered will ultimately be disposed of offsite, it is imperative that procedures be established to preclude live ordnance or hazardous materials from becoming intermingled with other non-hazardous metal scrap.

Current and past practices have only required the inspection of OE related scrap and a certification by a qualified EOD/MEC technician that it is safe to the best of their knowledge. There are several pitfalls with this approach depending on the type of ordnance being inspected. The following paragraphs provide guidance for avoiding these pitfalls.

### **References:**

DoD 4160.21-M: Department of Defense Reutilization and Marketing Manual

DoD 4160.21-M-1: Department of Defense Demilitarization Manual

TB 700-4: Department of the Army Technical Bulletin - Decontamination of Facilities and Equipment

## 3.0 Collection Procedures

We will use a systematic approach for collecting and inspecting metal scrap. Our approach is designed to ensure that the materials undergo a continual evaluation/inspection process from the time acquired until finally removed from the site.

At the operating site, we will preposition two scrap metal containers. One container will be marked "Non-OE Scrap Metal" and will be used to collect general metal debris. The other container will be marked "Ordnance Related Scrap Metal" and will be used to collect non-hazardous ordnance related scrap metal (i.e. Metal components that do not contain any explosives or other hazardous materials).

Collection procedures begin at the time the metal item is discovered by the MEC Technician. At this point the MEC Technician makes a preliminary determination as to the classification of the item. If the item is identified as non-ordnance related scrap it is placed in a temporary Non-OE scrap pile located within the current operating grid. If the item is identified as

ordnance related scrap it is placed in a temporary ordnance related scrap pile, again this pile is located within the current operating grid.

Upon completion of operations within a grid, the MEC Supervisor for the team that cleared the grid will inspect each of the scrap piles and direct movement of the scrap into the appropriate site collection container. To preclude migration of the material from one pile to the other during movement to the scrap containers, each pile will be moved as a distinct and separate vehicle load.

## 4.0 Removal of Scrap Metal/Range Residue

The MEC Excavation and Disposal Team will collect the scrap piles deposited at the grid corner markers by the MEC Clearance Team, perform an inspection to confirm that segregation of the OE related scrap had been done correctly and that no live MEC has been placed in the OE related scrap pile. The OE related scrap will be inspected and divided into two groups: 1) OE related scrap requiring further demilitarization; and 2) OE related scrap that does not require further demilitarization. **Figure 1** is a Logic Diagram for the Collection and Disposition of OE Related Scrap.

### 4.1 Segregation of Scrap Metal/Range Residue

For purposes of disposal, it shall be segregated and defined as either Group 1a, Group 1b, or Group 2.

#### 4.1.1 Group 1 Scrap Metal/Range Residue

Group 1 includes property that previously contained explosives or that does not contain items of a dangerous nature and can be certified inert and/or free of explosives or other dangerous materials such as targets, certain expended ordnance, etc.

##### 4.1.1.1 Group 1a Scrap Metal/Range Residue

Group 1a includes firing range expended small arms cartridge and inert metals gleaned from range clean up. Metals gleaned include material for which the only use is for its basic material content (e.g. clean shrapnel, target metal, etc.) And does not include material with any residual utility or capability or that is considered to be MLI or CCLI. Such material is eligible under the Resource Recovery and Recycling Program for disposition by a QRP in accordance with DODI 7514.1, Pollution Prevention. DOD Components may exercise direct sale authority for firing range expended small arms cartridge cases provided that it is crushed, shredded or otherwise destroyed prior to release from DOD control.

##### 4.1.1.2 Group 1b Scrap Metal/Range Residue

Group 1b includes any certifiable material or item not meeting the criteria in 1a above. A determination shall be made as to whether the material/item requires demilitarization. Damaged sustained does not necessarily constitute demilitarization. Destruction shall, at a minimum, satisfy the provisions of DOD 4160.21-M-1. This material is not eligible for a QRP.

#### 4.1.2 Group 2 Scrap Metal/Range Residue

Group 2 includes inherently dangerous items that may potentially contain munitions residue and cannot be certified as inert, such as practice bombs (that is, Aduds,≡ unexploded ordnance (MEC), BDU-33, MK-106, etc.)

## 5.0 Disposition of Munitions List Items (MLI)

Demilitarization should be accomplished by the most cost effective method consistent with adequate security and surveillance as economically as practical in accordance with existing environmental standards, safety and operational regulations, to the point of assuring freedom from explosives, toxic or incendiary materials, smoke content or design hazards by one of the following methods:

- a) By a sales contractor, as a condition of sale. Unless otherwise authorized, property to be demilitarized by this manual must be demilitarized prior to transfer of title to a purchaser.
- b) By the DRMO, generating activity, designated Military Service/Defense Agency or contractor personnel (having qualified MEC personnel).
- c) Under a service/performance contract.

### 5.1 Assignment of Demilitarization Codes

The proper procedure requires that OE scrap be assigned a demilitarization code and that code determines the type of processing required. For almost all OE scrap the assigned code should be AG≡. Assignment of this code is the responsibility of the generating activity (for range maintenance contracts such as Fort Irwin it is the National Training Command; for base realignment and closure (BRAC) removal actions it is the BRAC office; and for formerly used defense sites (FUDS) it is the Corp of Engineers). CH2M HILL as the contractor and expert in OE should assist the generating activity in determining the demilitarization code to be assigned and the method and degree of demilitarization required.

Definition of Demilitarization Code AG≡:

AG≡ MLI -- Demilitarization required - AEDA, Demilitarization, and if required, declassification and/or removal of sensitive markings or information, will be accomplished prior to physical transfer to a DRMO. This code will be used for all ADEA items, including those which also require declassification and/or removal of sensitive marking or information. [When in doubt assign Demilitarization Code AG≡ for all recovered OE related scrap.]

### 5.2 Demilitarization Requirements

Demilitarization and decontamination of OE scrap is based on a system that assigns decontamination levels commensurate with the post treatment use. For metal that is being released to the public as recyclable, 5X is the acceptable degree of decontamination.

Past practices for recovery and certification of OE scrap from range maintenance contracts, BRAC and FUDS removal actions have improperly certified OE scrap as safe for turn-in to

DRMO for recycling based on inspection and certification by MEC/EOD technicians. In most cases this achieves a 3X level of decontamination by de facto. This is not sufficient for resale to the public. Three X=s indicate the equipment or facilities (in this case OE scrap) have been examined and decontaminated by approved procedures and no contamination can be detected by appropriate instrumentation, test solutions, or by visual inspections on easily accessible surfaces or in concealed housings, etc. and are considered safe for the intended use. Items decontaminated to this degree can not be furnished to qualified DOD or Industry users or subjected directly to open flame cutting, welding, high temperature heating devices), or operations which generate extreme heat, such as drilling and machining. Newly implemented certification procedures require two signatures for certification of which only one signature may be from a government contractor.

The only acceptable way to get to 5X decontamination is by partial or complete removal, neutralization, or destruction of explosives/explosive residue by flashing, steaming, neutralization, or other approved desensitizing methods such as shredding. This is often expensive and nullifies the value of the scrap. However to leave OE scrap on a range site increases the possibility of residues such as RDX, HBX, and TNT entering the ground water and causing a more expensive problem.

Technical instructions issued by the Defense Agency or Military Service having procurement responsibility for the item involved and/or instructions provided through the DOD demilitarization Bulletin Board System, will determine and identify the method of demilitarization and the degree to which additional demilitarization is necessary to meet the requirements in their respective areas. For additional information contact the following:

- a) For ammunition procured by the Department of the Army, technical instructions relating to ballistic missiles, and large rockets, will be furnished by the Commander, U.S. Army Aviation and Missile Command (AMCOM), Attn: AMSAM-DSA-WO, Redstone Arsenal, AL 35898-5239
- b) For conventional, chemical, and all other types of ammunition excluding lethal chemical agents and waste munitions, technical instructions will be provided by the U.S. Army Industrial Operations Command, Attn: AMSIO-SMK, Rock Island, IL 61299-6000
- c) For lethal chemical agents including vesicants and nerve agents and their carriers, technical instructions will be furnished by the U.S. Army Armament Material Readiness Command Program Manager for the demilitarization of Chemical Material, Edgewood Arsenal, Aberdeen proving Ground, Maryland 21010
- d) For ammunition procured by the Department of the Navy, technical instructions will be issued by the Commander, Naval Sea Systems Commander or by the Commander Naval Air Systems Command, department of the Navy, Washington, D.C.
- e) For ammunition procured by the Department of the Air Force, technical instructions will be issued by the Engineering and Reliability Branch (MMWR), Ogden Air Logistics Center, Ogden, UT 84056-5609.

The following paragraphs provide guidance for the method and degree of required demilitarization for most types of OE items:

### 5.2.1 Category III. Ammunition - Method and Degree of Required Demilitarization

- a) **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuse cavity threads or score or deform bourrelet or gas check band. Burn propellant unless otherwise instructed to retain for sale or other purposes. Deform fin assembly threads or fin blades. Cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of 3/4 inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.
- b) **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the closure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent reloading or resealing.

**NOTE:** For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, Melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuse well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

- c) **Ammunition and Components Which Have Been Fired or Expended, Range Residue and Other Non-Explosive Items.** All items will be rendered free of energetic materials prior to accomplishment of demilitarization. Range residue will be processed in accordance with the defense Material Disposition Manual, DOD 4160.21-M, Chapter 4, paragraph B.3, after all required demilitarization is accomplished.
  1. **Artillery/Mortar Ammunition Components and Similar Items of All Types.**  
Remove rotating band and deform fuse cavity threads or score or deform bourrelet or gas check band. Score practice round with a torch, displacing a minimum of one cubic inch of metal or shear into two pieces. Deform fin assembly threads and fin blades.
  2. **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent relocating or resealing. **NOTE:** For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler

may be exposed by removal of the fuse well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

- 3. Other Nonexplosive Filled Items** which perform a major function essential to the basic mission of the end item. Cut, crush, or process through a deactivation furnace. Burn or cut cartridge case lines and propelling charge bags. Cut, burn, or crush aircraft and ground signal cases. Crush or detonate piezoelectric (lucky) elements.

d) **Technical data** will be demilitarized by burning, shredding, or pulping.

5.2.2 Category V. Military Explosives, Solid and Liquid Propellants, Bombs, Mines, Incendiary Agents, and their Constituents - Method and Degree of Required Demilitarization

- a) **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuse cavity threads or score or deform bourrelet or gas check band. Burn propellant unless otherwise instructed to retain for sale or other purposes. Deform fin assembly threads or fin blades. Cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of 3/4 inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.
- b) **Inert Loaded Projectiles, Warheads and Similar Items of All Types** loaded with inert filler to simulate service item. Remove fuse and/or spotting charge, where applicable, and burn or detonate. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent reloading or resealing.
- c) **Bombs and Similar Items of All Types**, including but not limited to high explosive, practice, inert loaded, incendiary and photo flash fillers, military explosive excavating devices, demolition blocks, and grenades. Demilitarization will be accomplished by removal of explosive filler in an approved manner (e.g., wash-out, burn-out, etc.) And by deforming fuse cavity threads or removing base plate by other than normal disassembly (such as sawing) or by detonation. Grenades will be demilitarized by cutting or crushing (a minimum of 75% compression) the grenade body after item has been defused and explosive removed or by detonation.
- d) **Small Explosive Items**, including but not limited to fuses, boosters, primers, detonators, firing devices, ignition cartridges, blasting caps, grenade cartridges, tracer assemblies, and similar components. Demilitarization can be accomplished by processing through a deactivation furnace at settings of 1150 degrees at burner end and 450 to 500 degrees at stack end or by mutilation. Incendiary projectiles will normally be decored to expose and assist in the complete burning of the incendiary composition. Where decoring of projectile is not necessary, processing through the deactivation furnace is adequate. Burn out 20mm HE projectiles by processing through the deactivation furnace or detonate. Processing complete small arms ammunition cartridges, all caliber's, through the

deactivation furnace at controlled temperatures will result in adequate demilitarization. Fuses and boosters can be disposed of by disassembly and cutting, drilling, or punching to deform metal parts. Explosive components generated through disassembly are to be burned or detonated. Fuses may also be processed through a deactivation furnace as a complete item when disassembly is not feasible. For grenades demilitarization may be accomplished by removal of explosive components by crushing, cutting, breaking, melting, burning, or otherwise to fully preclude their rehabilitation or further use as grenade components. Demilitarization may also be accomplished by detonation or burning as appropriate for the particular item involved.

- e) **Rocket Motors, Warheads, Components and Similar Items of All Types**, including high explosive, inert, loaded, practice and smoke. Wash out or burn out rocket warhead filler and mutilate casing by crushing or cutting by torch and deforming threaded area. Disassemble and remove or burn out rocket motor propellant and cut or crush case, and deform threaded area of cases. Rocket motors and warheads may also be detonated.
- f) **Mines, Anti-Personnel/Anti-Tank Explosive, Components and Similar Items of All Types** including high explosive, practice, inert loaded associated explosive components. Wash out or burn out filler and mutilate by crushing, cutting by torch, deforming threaded area or detonate. Process mine fuses, activators, and firing devices through a deactivation furnace, burn in a cage or detonate. Mine firing such as the M56 or M61 types should be crushed, cut, or burned.
- g) **Ammunition and Components Which Have Been Fired or Expended, Range Residue and Other Non-Explosive Items**. All items will be rendered free of energetic materials prior to accomplishment of demilitarization. Range residue will be processed in accordance with the defense Material Disposition Manual, DOD 4160.21-M, Chapter 4, paragraph B.3, after all required demilitarization is accomplished.
  - 1. **Artillery/Mortar Ammunition Components and Similar Items of All Types** including but not limited to high explosive, practice, inert loaded, incendiary, and smoke fillers. Remove explosive filler from projectile (wash out, burn out, etc.). Remove rotating band and deform fuse cavity threads or score or deform bourrelet or gas check band. Score practice round with a torch, displacing a minimum of one cubic inch of metal or shear into two pieces. Deform fin assembly threads and fin blades. Defective cartridge cases will be deformed by off-center punch-out of primer or split case neck or puncture the lower sidewall with a minimum of ¼ inch hole or deform lower sidewall, which will prevent chambering, or crush or press. Burn out smoke mixture or detonate smoke canister.
  - 2. **Inert Loaded Ammunition, Projectiles, and Similar Items of All Types** loaded with inert filler to simulate service item. Remove rotating band from artillery projectiles and open the enclosure of the projectile body to expose the inert filler. On items without rotating bands, open the body closure to expose the inert filler and damage the closure surface to prevent relocating or resealing. **NOTE:** For inert loaded items (concrete, sand, plaster) a potential explosive safety hazard exists when the internal filler is not exposed or unconfined during burning, melting, or cutting. Heat generated from a demilitarization process can cause the filler, moisture and air to

expand and burst sealed casings. For this reason, DRMOs will not accept inert loaded items unless the internal filler is exposed and unconfined. The internal filler may be exposed by removal of the fuse well from the cavity, removal of base plates, or by puncturing/drilling holes in the bomb casing.

3. **Bombs and Similar Items of All Types**, including but not limited to high explosive, practice, inert loaded, incendiary and photoflash fillers, military explosive excavating devices, demolition blocks and grenades. Demilitarization will be accomplished by deforming fuse cavity threads or removing base plate by other than normal disassembly (such as sawing) or by detonation. Grenades will be demilitarized by cutting or crushing (a minimum of 75% compression) the grenade body after item has been defused and explosive removed or by detonation.
4. **Rocket Motors, warheads, Components and Similar Items of All Types**, including high explosive, inert loaded, practice and smoke. Demilitarize casing by crushing or cutting by torch or deforming threaded area. Cut, crush case, or deform threaded area of rocket motor cases.
5. **Mines, Anti-Personnel/Anti-Tank, and Similar Items of All Types** including high explosive, practice, inert loaded and associated components. Demilitarize casing by crushing, or cutting by torch, and deforming threaded area or detonate. Mine firing devices such as the M56 or M61 types should be crushed, cut, or burned.

h) Instructions For Specific Ordnance Items:

1. BDU-50 Practice Bomb:

- (a) Each bomb must be inspected by qualified EOD/MEC personnel to ensure that bombs are BDU-50s and that the bomb is expended. If the EOD/MEC personnel cannot verify both fuse wells, or absence thereof, it must be op-opened remotely by detonation.
- (b) A 1/4 inch hole will be punched in each of the two spanner wrench receptacles, fracturing the metal to a depth in excess of 1/10 inch into the concrete filler material.
- (c) A 1/4 inch punch will be utilized to further damage the threads of the nose plate, ensuring that the plate cannot be removed and replaced.
- (d) Fins will be deformed or broken and paint will then be used to place a mark of contrasting color on the bomb or near the nose.

i) **Technical data** will be demilitarized by burning, shredding, or pulping.

5.2.3 Venting of OE-Related Scrap

Prior and current practices have taken this to mean that if the OE item is intact and resembles a piece of military ordnance, such as a 105mm HEAT (Practice) projectile, it should have a hole punched through the side to expose the filler as non-explosive. This is typically accomplished through the use of a shape charge attack. The explosively created hole exposes the filler and disfigures the projectile so that it could not be used again. For a 105 mm HEAT

(Practice) round this approach is sufficient because the projectile never contained any explosives or energetic material used as a spotting charge. For a MK- 82 LDGP Bomb (Practice) this approach may not be sufficient because the bomb can contain various types of explosively activated spotting charges that have the capability to cause injury or death if exposed to the right elements such as flame from a cutting torch. And there is always the possibility that a shape charge attack may punch a hole in an explosive ordnance item exposing the filler but not causing a detonation. Because some explosive fillers look like inert fillers the possibility for misidentification and improper certification is real.

MEC known or suspected to be inert (filled with an inert substance to simulate the weight of an explosive filler) will be explosively vented with conical-shaped charges. For the purpose of determining the fragmentation hazard area for explosive venting, it will be assumed that the MEC has an explosive filler and that a high-order detonation will occur. Venting will be considered successful when the inert filler is exposed. The vented inert ordnance item can be treated and disposed as scrap after the venting and demilitarization process is complete.

## 6.0 Certification/Disposal of Scrap Metal

The generating activity will ensure that the quantities of demilitarized property turned in to the DRMO are accurate and that these quantities are readily verifiable by the DRMO. DRMOs will not accept any property unless the DD Form 1348-1A contains the demilitarization code or clear text statement of the demilitarization required. An example of the DD Form 1348-1A is included as Form 2-5. The generating activity is responsible for issuing a letter specifying who is authorized to sign the statement of inert certification. This letter will be kept in the project files, at the local DRMO, and with the generating activity. It must be updated as needed.

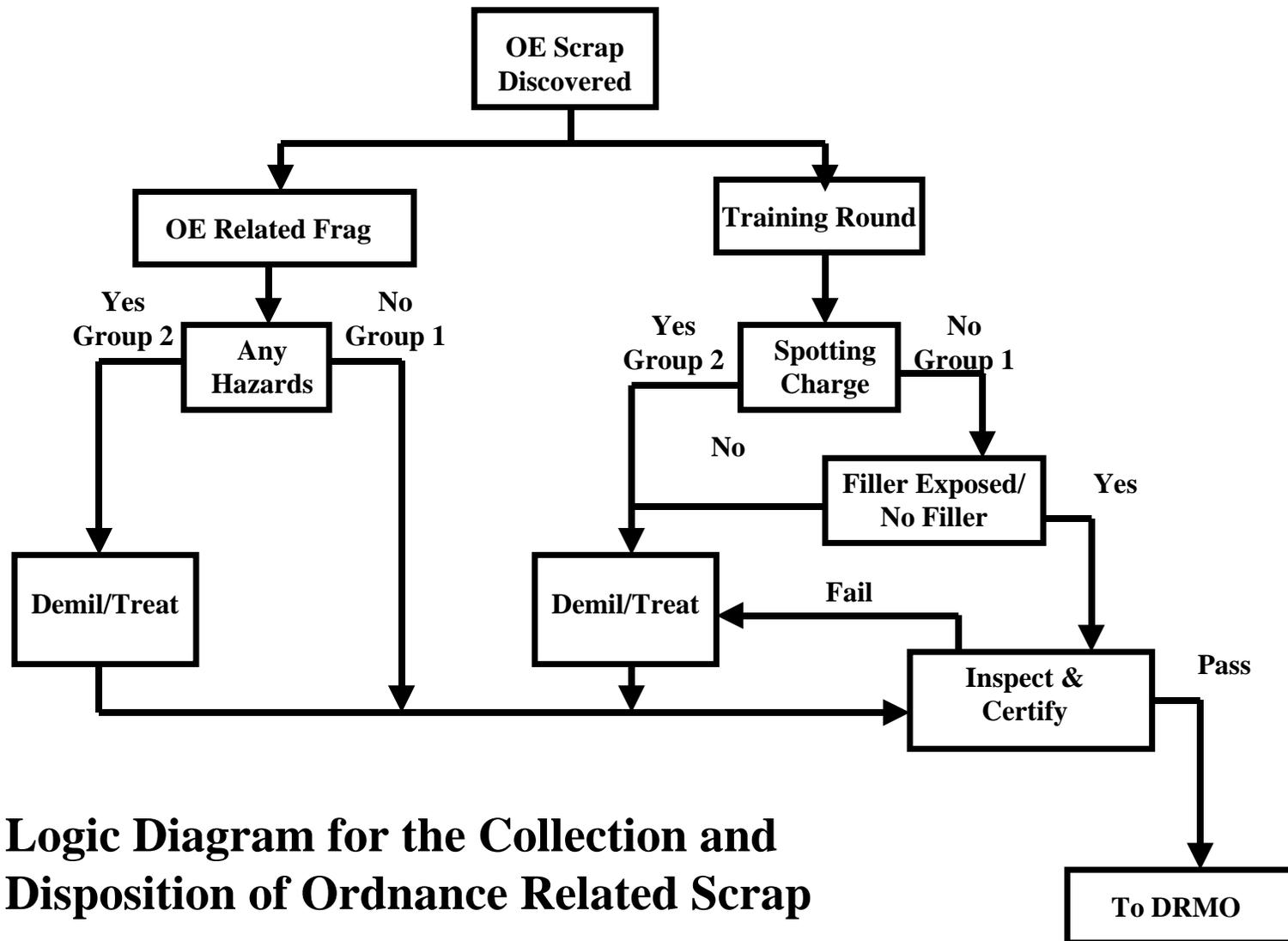
All material generated from the firing and/or demilitarization of AEDA will be rendered **free from explosives** before being referred to a DRMO for sale. All scrap metal, generated at the site, will be disposed of through the local DRMO or when appropriate and approved to a local scrap metal dealer, and will be transferred using DD Form 1348-1A. Prior to release of the material, the Senior MEC Supervisor will physically inspect the material in the containers to ensure that they are free of dangerous items or conduct demilitarization operations. The Senior MEC Supervisor will sign the certificate, typed on the DD Form 1348-1A, which states:

“This certifies and verifies that the AEDA residue, Range Residue, and/or explosive contaminated property listed, has been 100 percent properly inspected, and to the best of our knowledge and belief, are inert and/or free of explosives or related materials.”

The certification will be verified (countersigned) by a technically qualified U.S. government representative (U.S. citizen) designated by the responsible commander/generating activity.

Scrap will be segregated into like metals (mainly steel, aluminum, and mixed metal) and placed into palletized wooden shipping boxes. Each item placed into an inert-certified box will be inspected. The boxes will be filled, the covers will be nailed on, and a lead seal will be affixed. A Statement of Inert Certification will then be attached to the box. The box can then be picked up by a local scrap yard for disposal or recycling.

Using these procedures ensures that the collected scrap metal is properly inspected and classified. Our method includes three distinct inspections which are performed by persons of increasing levels of responsibility. The first inspection is performed at the operating grid by a qualified MEC Technician, the second is performed by the supervisor responsible for the operating grid, and the final inspection is performed by the Senior MEC Supervisor who is vested with overall responsibility.



**Logic Diagram for the Collection and Disposition of Ordnance Related Scrap**

**Figure 1**

# FORM 2-5

## SCRAP CERTIFICATION FORM

USE  TYPEWRITER OR BALL POINT  PEN  
 PRESS HERE TO ASSURE LEGIBILITY ON ALL COPIES

D O D SINGLE LINE ITEM

DD FORM 1348 JUL 91 (EG) REQUISITION SYSTEM DOCUMENT (MANUAL)

DOC. ROUT. 1		FSC 3		NIN 4		ADD. UNIT 5		QUANTITY 6		DATE 7		SERIAL 8		REQUISITION NUMBER 9		DOCUMENT NUMBER 10		REQUISITION IS FROM:	
SEND TO:		FSC 11		NIN 12		ADD. UNIT 13		QUANTITY 14		DATE 15		SERIAL 16		REQUISITION NUMBER 17		DOCUMENT NUMBER 18		REQUISITION IS FROM:	
DOC. ROUT. 19		FSC 20		NIN 21		ADD. UNIT 22		QUANTITY 23		DATE 24		SERIAL 25		REQUISITION NUMBER 26		DOCUMENT NUMBER 27		REQUISITION IS FROM:	
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DOC. ROUT. 649		FSC 650		NIN 651		ADD. UNIT 652		QUANTITY 653		DATE 654		SERIAL 655		REQUISITION NUMBER 656		DOCUMENT NUMBER 657		REQUISITION IS FROM:	
DOC. ROUT. 659		FSC 660		NIN 661		ADD. UNIT 662		QUANTITY 663		DATE 664		SERIAL 665		REQUISITION NUMBER 666		DOCUMENT NUMBER 667		REQUISITION IS FROM:	
DOC. ROUT. 669		FSC 670		NIN 671		ADD. UNIT 672		QUANTITY 673		DATE 674		SERIAL 675		REQUISITION NUMBER 676		DOCUMENT NUMBER 677		REQUISITION IS FROM:	
DOC. ROUT. 679		FSC 680		NIN 681		ADD. UNIT 682		QUANTITY 683		DATE 684		SERIAL 685		REQUISITION NUMBER 686		DOCUMENT NUMBER 687		REQUISITION IS FROM:	
DOC. ROUT. 689		FSC 690		NIN 691		ADD. UNIT 692		QUANTITY 693		DATE 694		SERIAL 695		REQUISITION NUMBER 696		DOCUMENT NUMBER 697		REQUISITION IS FROM:	
DOC. ROUT. 699		FSC 700		NIN 701		ADD. UNIT 702		QUANTITY 703		DATE 704		SERIAL 705		REQUISITION NUMBER 706		DOCUMENT NUMBER 707		REQUISITION IS FROM:	
DOC. ROUT. 709		FSC 710		NIN 711		ADD. UNIT 712		QUANTITY 713		DATE 714		SERIAL 715		REQUISITION NUMBER 716		DOCUMENT NUMBER 717		REQUISITION IS FROM:	
DOC. ROUT. 719		FSC 720																	

**APPENDIX B**

# Key Personnel Résumés

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This section contains sensitive information which is protected by the Privacy Act of 1974, 5 U.S. C. 552a. To see this section, please contact:

Public Affairs Office  
NAVFAC Atlantic  
6506 Hampton Blvd.  
Norfolk, VA 23508-1278

757-322-8005  
NFECL PAO@navy.mil

APPENDIX C

# Quality Control Verification Forms

---

FORM 2-1

UXO INFORMATION FORM

DATE/TIME: \_\_\_\_\_ TRACKING NUMBER: \_\_\_\_\_  
LOCATION: \_\_\_\_\_

1. ITEMS REMOVED FROM SITE (YES/NO)

2. WHO REMOVED THE ITEM(S)?

Name: \_\_\_\_\_ Organization: \_\_\_\_\_

3. IF ITEMS WERE REMOVED, WHERE WERE THEY TAKEN? \_\_\_\_\_  
\_\_\_\_\_

4. ITEMS DESTROYED ONSITE (YES/NO)

5. WHO DESTROYED ITEM(S)?

Name: \_\_\_\_\_ Organization: \_\_\_\_\_  
Time of Detonation: \_\_\_\_\_ UXO Down Time: \_\_\_\_\_

6. ORDNANCE ITEMS ENCOUNTERED:

Type	Quantity	Condition	Disposition

7. US NAVY NOTIFIED AT (TIME): \_\_\_\_\_ REP: \_\_\_\_\_

8. CH2MHILL PERSONNEL NOTIFIED AT (TIME): \_\_\_\_\_ REP: \_\_\_\_\_

9. COMMENTS (Significant events or findings): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
CH2MHILL UXO Representative (Signature)

\_\_\_\_\_  
CH2MHILL UXO Representative (Print Name)

CHECKED BY _____	APPROVED BY _____
------------------	-------------------







# FORM 2-5

## SCRAP CERTIFICATION FORM

USE  TYPEWRITER OR BALL POINT  PEN  
 PRESS HERE TO ASSURE LEGIBILITY ON ALL COPIES

D O D SINGLE LINE ITEM

DD FORM 1348 JUL 91 (EG) REQUISITION SYSTEM DOCUMENT (MANUAL)

DOC. ROUT. 1 2		FSC 3		NIN 4		ADD. UNIT 5		QUANTITY 6		DATE 7		SERIAL 8		REQUISITION NUMBER 9		DOCUMENT NUMBER 10		REQUISITION IS FROM: 11		STOCK NUMBER 12		FSC 13		ADV. 14		UNIT OF 15		QUANTITY 16	
IDENT. 17		18		19		20		21		22		23		24		25		26		27		28		29		30		31	
SEND TO:		32		33		34		35		36		37		38		39		40		41		42		43		44		45	
46		47		48		49		50		51		52		53		54		55		56		57		58		59		60	
61		62		63		64		65		66		67		68		69		70		71		72		73		74		75	
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106		107		108		109		110		111		112		113		114		115		116		117		118		119		120	
121		122		123		124		125		126		127		128		129		130		131		132		133		134		135	
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316		317		318		319		320		321		322		323		324		325		326		327		328		329		330	
331		332		333		334		335		336		337		338		339		340		341		342		343		344		345	
346		347		348		349		350		351		352		353		354		355		356		357		358		359		360	
361		362		363		364		365		366		367		368		369		370		371		372		373		374		375	
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541		542		543		544		545		546		547		548		549		550		551		552		553		554		555	
556		557		558		559		560		561		562		563		564		565		566		567		568		569		570	
571		572		573		574		575		576		577		578		579		580		581		582		583		584		585	
586		587		588		589		590		591		592		593		594		595		596		597		598		599		600	
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616		617		618		619		620		621		622		623		624		625		626		627		628		629		630	
631		632		633		634		635		636		637		638		639		640		641		642		643		644		645	
646		647		648		649		650		651		652		653		654		655		656		657		658		659		660	
661		662		663		664		665		666		667		668		669		670		671		672		673		674		675	
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736		737		738		739		740		741		742		743		744		745		746		747		748		749		750	
751		752		753		754		755		756		757		758		759		760		761		762		763		764		765	
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781		782		783		784		785		786		787		788		789		790		791		792		793		794		795	
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841		842		843		844		845		846		847		848		849		850		851		852		853		854		855	
856		857		858		859		860		861		862		863		864		865		866		867		868		869		870	
871		872		873		874		875		876		877		878		879		880		881		882		883		884		885	
886		887		888		889		890		891		892		893		894		895		896		897		898		899		900	
901		902		903		904		905		906		907		908		909		910		911		912		913		914		915	
916		917		918		919		920		921		922		923		924		925		926		927		928		929		930	
931		932		933		934		935		936		937		938		939		940		941		942		943		944		945	
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961		962		963		964		965		966		967		968		969		970		971		972		973		9			

**Form 3-1**

**MOTOR VEHICLE INSPECTION**  
(TRANSPORTING HAZARDOUS MATERIAL)

GBL. NO.	ORIGIN	DESTINATION
NAME OF CARRIER		
NAME OF DRIVER		
DATE AND HOUR		
INSTALLATION/ACTIVITY		
DIVER=S STATE PERMIT NO.		
MEDICAL EXAMINER=S CERTIFICATE AND DATE		

**VEHICLE**

<b>TYPE OF VEHICLE</b> _ TRUCK Q TRUCK AND FULL TRAILER Q TRACTOR AND DOUBLE TRAILERS Q TRACTOR AND CLOSED SEMI-TRAILER Q TRACTOR AND FLAT-BED TRAILER	TRUCK NUMBER	TRAILER(S) NUMBER	SLEEPER CAB Q YES                      _ NO
	ORIGIN	ORIGIN	VALID LEASE _ YES                      Q NO
	DESTINATION	DESTINATION	I.C.C. NUMBER

*NOTE: All of the following items shall be checked on empty equipment prior to loading.  
Items with an asterisk (\*) shall be checked on incoming loaded equipment.*

ITEM NO.	CHECK APPROPRIATE COLUMN <i>(See reverse side for explanatory notes)</i>	ORIGIN		DESTINATION		REMARKS <i>(Explain unsatisfactory items; use reverse side if necessary)</i>
		SAT	UNSAT	SAT	UNSAT	
1.	ENGINE, BODY, CAB AND CHASSIS CLEAN					
2.	STEERING MECHANISM					
3.	HORN OPERATIVE					
4.	WINDSHIELD AND WIPERS					
5.	SPARE ELECTRIC FUSES AVAILABLE					
6.	REAR VIEW MIRRORS INSTALLED					
7.	HIGHWAY WARNING EQUIPMENT					
* 8.	FULL FIRE EXTINGUISHER INSTALLED (2)					
9.	LIGHTS AND REFLECTORS OPERATIVE					
10.	EXHAUST SYSTEM					
* 12.	FUEL TANK, LINE AND INLET					
* 14.	ALL BRAKES OPERATIVE					
16.	SPRINGS AND ASSOCIATED PARTS					
* 17.	TIRES					
18.	CARGO SPACE					
* 19.	ELECTRIC WIRING					
* 20.	TAIL GATE AND DOORS SECURED					
22.	ANY OTHER DEFECTS <i>(Specify)</i>					

Q APPROVED *(If rejected give reasons on reverse under ARemarks. @ Equipment shall be approved if deficiencies are corrected prior to loading.)*

Q REJECTED

SIGNATURE *(of Inspector)*  
ORIGIN

SIGNATURE *of Inspector)*  
DESTINATION

ITEMS TO BE CHECKED PRIOR TO RELEASE OF LOADED VEHICLE		ORIGIN	DESTINATION
23.	MIXTURES OF MATERIAL PROHIBITED BY DOT REGS. ARE NOT LOADED ONTO THIS VEHICLE		
* 24.	LOAD IS SECURED TO PREVENT MOVEMENT		
25.	WEIGHT IS PROPERLY DISTRIBUTED AND VEHICLE IS NOT OVERWEIGHT		
* 27.	SPECIAL INSTRUCTIONS <i>(DD Form 836)</i> FURNISHED DRIVER		
* 28.	COPY OF VEHICLE INSPECTION <i>(DD Form 626)</i> FURNISHED DRIVER		
* 29.	PROPER PLACARDS APPLIED		
* 30.	SHIPMENT MADE UNDER DOT EXCEPTION 868		
SIGNATURE <i>(of Inspector)</i> ORIGIN		SIGNATURE <i>of Driver)</i> ORIGIN	
SIGNATURE <i>(of Inspector)</i> DESTINATION		SIGNATURE <i>of Driver)</i> DESTINATION	





FORM 9-1  
PERSONNEL QUALIFICATION VERIFICATION FORM

CANDIDATE: \_\_\_\_\_  
CONTRACT: N62470-95-D

POSITION: \_\_\_\_\_

REVIEW ITEMS		CANDIDATE QUALIFICATIONS	VERIFIED BY/DATE
EXPERIENCE	REQUIRED: AREA AND YEARS		
	ACTUAL: AREA AND YEARS		
EDUCATION	REQUIRED		
	ACTUAL		
CERTIFICATIONS & REGISTRATIONS	REQUIRED		
	ACTUAL		
TRAINING	REQUIRED		
	ACTUAL		
OTHER	REQUIRED		
	ACTUAL		



**FORM 9-2**

**DOCUMENT REVIEW AND RELEASE FORM**

Client:		Author:				Submittal Register Item No.:				Date:			
Document Title:								Revision:					
Reviewer ( <i>print</i> )		Reviewer initial & date		Technical	Project Manager	CQC System Mgr.	Health & Safety	Editorial	Chemistry	Construction	Reviewer Comments Resolved ( <i>Signature &amp; Date</i> )		
Same as Technical Reviewer Above				X	Topic outline with objectives for each section submitted prior to Rev. A								
<i>Program Reviewer's Acceptance for Document Submittal</i>										Signature		Yes	No
1) Technical Conclusions adequately supported by text and data?													
2) Tables and Figures are in the proper format and checked and approved?													
3) The Table of Contents consistent with text information?													
4) Technical Reviewers are qualified and accepted by Program Technical Manager?													
5) A document Distribution List been prepared and submitted with document?													

Approval:

\_\_\_\_\_  
*Project Manager*

Approval:

\_\_\_\_\_  
*Program CQC System Manager*



**FORM 9-3**

**PREPARATORY INSPECTION CHECKLIST  
(PART I)**

Contract No.: N62470-95-D  
Task Order No. 205  
NASD, Vieques

Date: \_\_\_\_\_

Title and No. of Technical Section: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reference Contract Drawings: \_\_\_\_\_

A. Planned Attendants:

	<u>Name</u>	<u>Position</u>	<u>Company</u>
1)	_____	_____	_____
2)	_____	_____	_____
3)	_____	_____	_____
4)	_____	_____	_____
5)	_____	_____	_____
6)	_____	_____	_____
7)	_____	_____	_____
8)	_____	_____	_____
9)	_____	_____	_____
10)	_____	_____	_____
11)	_____	_____	_____

B. Submittals required to begin work:

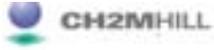
	<u>Item</u>	<u>Submittal No.</u>	<u>Action Code</u>
1)	_____	_____	_____
2)	_____	_____	_____
3)	_____	_____	_____
4)	_____	_____	_____
5)	_____	_____	_____
6)	_____	_____	_____
7)	_____	_____	_____
8)	_____	_____	_____

I hereby certify, that to the best of my knowledge and belief, that the above required materials delivered to the job site are the same as those submitted and approved.

\_\_\_\_\_  
Contractor Quality Control Systems Manager

(continued):

**FORM 9-3**



**PREPARATORY INSPECTION CHECKLIST  
(PART I)**

Contract No.: N62470-95-D  
Task Order No. 205  
NASD, Vieques

Date: \_\_\_\_\_

C. Equipment to be used in executing work:

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

D. Work areas examined to ascertain that all preliminary work has been completed:

\_\_\_\_\_  
\_\_\_\_\_

E. Methods and procedures for performing Quality Control, including specific testing requirements:

\_\_\_\_\_  
\_\_\_\_\_

The above methods and procedures have been identified from the project plans and will be performed as specified for the Definable Feature of Work.

\_\_\_\_\_  
Contractor Quality Control Systems Manager





FORM 9-4

INITIAL PHASE INSPECTION CHECK LIST

Contract No.: N62470-95-D
Task Order No. 205
NASD, Vieques

Date: \_\_\_\_\_

Title and No. of Technical Section: \_\_\_\_\_

Description and Location of Work Inspected: \_\_\_\_\_

Reference Contract Drawings: \_\_\_\_\_

A. Key Personnel Present:

Table with 3 columns: Name, Position, Company. Rows 1) through 5) with blank lines for entry.

B. Materials being used are in strict compliance with the contract plans and specifications: Yes \_\_\_ No \_\_\_

If not, explain: \_\_\_\_\_

C. Procedures and/or work methods witnessed are in strict compliance with the contract specifications: Yes \_\_\_ No \_\_\_

If not, explain: \_\_\_\_\_

D. Workmanship is acceptable: Yes \_\_\_ No \_\_\_

State where improvement is needed: \_\_\_\_\_

E. Workmanship is free of safety violations: Yes \_\_\_ No \_\_\_

If no, corrective action taken: \_\_\_\_\_

Contractor Quality Control Representative











FORM 9-7

INSPECTION SCHEDULE AND TRACKING FORM

Project: NASD, Vieques	Project Manager:	CQC System Manager:
------------------------	------------------	---------------------

Reference Number	Definable Feature of Work	Preparatory		Initial		Follow-Up		Completion		Status
		Date Planned	Actual Date	Date Planned	Actual Date	Planned Begin/End	Actual Dates	Planned Begin/End	Actual Dates	



**FORM 9-8  
CORRECTIVE ACTION REQUEST**

(2) CAR #:	(3) PRIORITY: <input type="checkbox"/> HIGH <input type="checkbox"/> NORMAL	(4) DATE PREPARED:
------------	---	--------------------

**PART A: NOTICE OF DEFICIENCY**

(5) PROJECT: SWMU 4 NASD, Vieques		CTO #: 205
(6) PROJECT MANAGER:	(7) CQC SYSTEM MANAGER:	
(8) WORK UNIT:	(9) WORK UNIT MANAGER:	
(10) ISSUED TO (INDIVIDUAL & ORGANIZATION):		
(11) REQUIREMENT & REFERENCE:		
(12) PROBLEM DESCRIPTION & LOCATION:		
(13) CAP REQUIRED? <input type="checkbox"/> YES <input type="checkbox"/> NO	(14) RESPONSE DUE:	
(15) ISSUED BY (PRINTED NAME & TITLE):	(16) MANAGEMENT CONCURRENCE:	
SIGNATURE: _____		
DATE: _____		

**PART B: CORRECTIVE ACTION**

(17) PROPOSED CORRECTIVE ACTION/ACTION TAKEN:	
NOTE: SUPPORTING DOCUMENTATION MUST BE LISTED ON THE BACK OF THIS FORM AND ATTACHED.	
(18) PART B COMPLETED BY (NAME & TITLE):	(19) QC CONCURRENCE:
SIGNATURE: _____	
DATE: _____	

**PART C: CORRECTIVE ACTION VERIFICATION**

(20) CAR VERIFICATION AND CLOSE-OUT: (CHECK ONLY ONE & EXPLAIN STIPULATIONS, IF ANY)	
<input type="checkbox"/> APPROVED FOR CLOSURE WITHOUT STIPULATIONS	
<input type="checkbox"/> APPROVED FOR CLOSURE WITH FOLLOWING STIPULATIONS	
COMMENTS/STIPULATIONS:	
(21) CLOSED BY (PRINTED NAME & TITLE):	
SIGNATURE: _____	DATE: _____

## CORRECTIVE ACTION REQUEST (CAR) INSTRUCTION SHEET

- (1) **CQC System Manager:** Verify that the total number of pages includes all attachments.
- (2) **CQC System Manager:** Fill in CAR number from CAR log.
- (3) **CQC System Manager:** Fill in appropriate priority category. **High** priority indicates resolution of deficiency requires expediting corrective action plan and correction of deficient conditions noted in the CAR and extraordinary resources may be required due to the deficiency's impact on continuing operations. **Normal** priority indicates that the deficiency resolution process may be accomplished without further impacting continuing operations.
- (4) **CAR Requestor:** Fill in date CAR is initiated.
- (5) **CAR Requestor:** Identify project name, number, CTO, and WAD.
- (6) **CAR Requestor:** Identify Project Manager
- (7) **CAR Requestor:** Identify CQC System Manager.
- (8) **CAR Requestor:** Identify project organization, group, or discrete work environment where deficiency was first discovered.
- (9) **CAR Requestor:** Identify line manager responsible for work unit where deficiency was discovered.
- (10) **CQC System Manager:** Identify responsible manager designated to resolve deficiency (this may not be work unit manager).
- (11) **CAR Requestor:** Identify source of requirement violated in contract, work planning document, procedure, instruction, etc; use exact reference to page and, when applicable, paragraph.
- (12) **CAR Requestor:** Identify problem as it relates to requirement previously stated. Identify location of work activities impacted by deficiency.
- (13) **CQC System Manager:** Identify if Corrective Action Plan (CAP) is required. CAP is typically required where one or more of the following conditions apply: CAR priority is **High**; deficiency requires a rigorous corrective action planning process to identify similar work product or activities affected by the deficiency; or deficiency requires extensive resources and planning to correct the deficiency and to prevent future recurrence.
- (14) **CQC System Manager:** Identify date by which proposed corrective action is due to QC for concurrence.
- (15) **CQC System Manager:** Sign and date CAR and forward to responsible manager identified in (10) above.
- (16) **Responsible Manager:** Initial to acknowledge receipt of CAR.
- (17) **Responsible Manager:** Complete corrective action plan and identify date of correction. Typical corrective action response will include statement regarding how the condition occurred, what the extent of the problem is (if not readily apparent by the problem description statement in [12]), methods to be used to correct the condition, and actions to be taken to prevent the condition from recurring. If a CAP is required, refer to CAP only in this section.
- (18) **Responsible Manager:** Sign and date corrective action response.
- (19) **CQC System Manager:** Initial to identify concurrence with corrective action response from responsible manager.
- (20) **CQC System Manager:** Check appropriate block to identify if corrective action process is complete so that CAR may be closed. Add close-out comments relevant to block checked.
- (21) **CQC System Manager:** Indicate document closeout by signing and dating.



FORM 9-9

CORRECTIVE ACTION PLAN

Attach clarifications and additional information as needed. Identify attached material in appropriate section of this form.

PART A: TO BE COMPLETED BY PROJECT MANAGER OR DESIGNEE

(1)PROJECT: SWMU 4 NASD, Vieques		
(2)PROJECT MANAGER:	(3)CQC SYSTEM MANAGER:	
(4)CAR NO(S) AND DATE(S) ISSUED:		
(5)DEFICIENCY DESCRIPTION AND LOCATION:		
(6)PLANNED ACTIONS	(7)ASSIGNED RESPONSIBILITY	(8) COMPLETION DUE DATE
(9)PROJECT MANAGER SIGNATURE:		DATE:

PART B: TO BE COMPLETED BY CQC SYSTEM MANAGER OR DESIGNEE

(10)CAP REVIEWED BY:	DATE:
(11)REVIEWER COMMENTS:	
(12)CAP DISPOSITION: (CHECK ONLY ONE AND EXPLAIN STIPULATIONS, IF ANY) <input type="checkbox"/> APPROVED WITHOUT STIPULATIONS <input type="checkbox"/> APPROVED WITH STIPULATIONS <input type="checkbox"/> APPROVAL DELAYED, FURTHER PLANNING REQUIRED  COMMENTS:	
(13)CQC SYSTEM MANAGER SIGNATURE:	DATE:



FORM 9-10

WEEKLY QUALITY CONTROL REPORT

Contract No. N62470-95-D  
Task Order No. 205  
Project No. \_\_\_\_\_

Date: \_\_\_\_\_

Report No: \_\_\_\_\_

LOCATION OF WORK: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

WEATHER: (CLEAR) (FOG) (P.CLOUDY) (RAIN) (WINDY)

TEMPERATURE: MIN \_\_\_ °F    MAX \_\_\_ °F

1. Work performed today:

\_\_\_\_\_  
\_\_\_\_\_

2. Work performed today by CH2MHILL subcontractor(s):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Preparatory Phase Inspections performed today (include personnel present, specification section, drawings, plans, and submittals required for definable feature of work):

\_\_\_\_\_  
\_\_\_\_\_

4. Initial phase Inspections performed today (include personnel present, workmanship standard established, material certifications/test are completed, plans and drawings are reviewed):

\_\_\_\_\_  
\_\_\_\_\_

5. Follow-up Phase Inspections performed today (include locations, feature of work and level of compliance with plans and procedures):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



FORM 9-10

WEEKLY QUALITY CONTROL REPORT

Contract No. N62470-95-D  
Task Order No. 205  
Project No. \_\_\_\_\_

Date: \_\_\_\_\_

Report No: \_\_\_\_\_

6. List tests performed, samples collected, and results received:

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6. Verbal instructions received (instructions given by Government representative and actions taken):

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7. Non-conformances/deficiencies reported:

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8. Site safety monitoring activities performed today:

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9. Remarks:

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CERTIFICATION: I certify that the above report is complete and correct and that I, or my representative, have inspected all work identified on this report performed by CH2M HILL and our subcontractor(s) and have determined to the best of my knowledge and belief that noted work activities are in compliance with the plans and specifications, except as may be noted above.

\_\_\_\_\_  
Contractor Quality Control Systems Manager