DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

February 12, 2014

CESAJ-PM-M

MEMORANDUM FOR SEE DISTRIBUTION LIST

SUBJECT: Final Work Plan for Environmental Baseline Survey (Phases 2 & 3) at Munitions Response Sites 09 & 13 (Water Areas), Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) Property No. I02PR0068, Culebra, Puerto Rico

The Jacksonville District, U.S. Army Corps of Engineers (USACE) is enclosing for your information and records the Final Work Plan for the Environmental Baseline Survey (Phases 2 & 3) of the Remedial Investigation / Feasibility Study (RI/FS) for the Munitions Response Sites (MRSs) 09 and 13 (Water Areas) associated with the DERP-FUDS Property No. I02PR0068, Culebra, Puerto Rico. This version contains updates based on comments provided by various offices.

Should you need additional information, please contact me at (904) 232-1758 or by e-mail at John.E.Keiser@usace.army.mil.

Sincerely,

KEISER.JOHN.EDWIN.1154182663
Digitally signed by KEISER.JOHN.EDWIN.1154182663
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=KEISER.JOHN.EDWIN.1154182663
Date: 2014.02.12 12:03:11 -05'00'

John E. Keiser, P.E.
FUDS Program Manager
Military / Interagency and
International Services Branch

Enclosure

Distribution List Final Work Plan for Environmental Baseline Survey (Phases 2 & 3) at Munitions Response Sites 09 & 13 (Water Areas) (12 Feb 2014)	
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Dr. Lisamarie Carrubba (1 report w/disc) NOAA Fisheries Caribbean Field Office Road 301, Km 5.1 Boquerón, PR 00622	Dr. Craig Lilyestrom (2 reports w/discs) Director Marine Resources Division Department of Natural & Environmental Resources 1375 Ponce de Leon Avenue San Juan, PR 00926
Mr. Julio Vazquez (1 report w/disc) US EPA Region 2 Special Project Branch/Federal Facilities Section 290 Broadway – 18th Floor New York, NY 10007-1866	Ms. Diane Wehner (1 report w/disc) NOAA 85 Central Avenue Providence, NJ 07974
Ms. Ana Roman (1 report w/disc) US Fish and Wildlife Service Culebra National Wildlife Refuge Manager Road 301, Km 5.1 Boquerón, PR 00622	Mr. Richard Henry (1 report w/disc) US Fish and Wildlife Service 2890 Woodbridge Ave. Edison, NJ 08837
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Mr. Roland Belew (4 reports w/discs) USACE Huntsville	Mr. Jose Rivera (1 report w/disc) NOAA Fisheries c/o USACE Antilles Office 400 Fernandez Juncos-Parada 7.5 Puerta de Tierra, PR 00901-3299

USA Environmental, Inc.

24 February 2014 USA-CE-MRS-1847

Ms. Janice J. Jamar (CEHNC-CT-E)
Huntsville Center, Corps of Engineers
4820 University Square
Huntsville, AL 35816-1822

Subject: Culebra RI/FS MRS 09 and 13 Phase 2 and 3 Work Plan (Final),
Contract No. W921DY-04-D-0006, Task Order 0022

Dear Ms. Jamar:

USA Environmental, Inc. is submitting the Final Culebra RI/FS MRS 09 and 13 Phase 2 and 3 Work Plan, Contract No. W921DY-04-D-0006, Task Order 0022.

If you have any questions please contact me at (941) 746-5375, Cell: (808) 255-2320, email: tbourque@usatampa.com.

Sincerely,

Thomas Bourque
Project Manager

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Munitions Response Work Plan

Underwater Remedial Investigation/Feasibility Study
MRS 09 Soldado Pt. Mortar & Bombing Area
MRS 13 Cayo Luis Pena Impact Area

Culebra Island Site, Puerto Rico
Volume I of II

Contract No. W912DY-04-D-0006
Task Order No. 0022
Project No. I02PR0068

Prepared For
U.S. Army Engineering & Support Center, Huntsville

Geographical District:
U.S. Army Corps of Engineers, Jacksonville

Prepared By
USA Environmental, Inc.
720 Brooker Creek Boulevard, Suite 204
Oldsmar, Florida 34677

Reviewed By

Robert Crownover
Corporate Quality Manager

Final
February 2014

Munitions Response Work Plan

Underwater Remedial Investigation/Feasibility Study
MRS 09 Soldado Pt. Mortar & Bombing Area
MRS 13 Cayo Luis Pena Impact Area

Culebra Island Site, Puerto Rico
Volume I of II

Contract No. W912DY-04-D-0006
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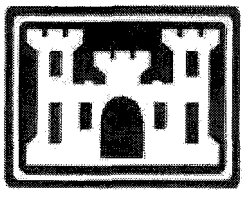
Project No. I02PR0068

Prepared For
U.S. Army Engineering & Support Center, Huntsville



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Munitions Response Work Plan

Underwater Remedial Investigation/Feasibility Study
MRS 09 Soldado Pt. Mortar & Bombing Area
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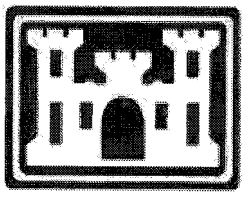

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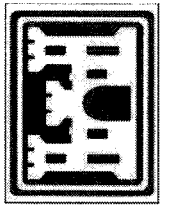
Final
February 2014

USA Environmental, Inc.

Final Work Plan
Munitions Response Sites MRS 09 and MRS 13
Phase 2 and Phase 3 Underwater
Remedial Investigation/Feasibility Study (RI/FS)

Culebra Island Site, Puerto Rico
Contract No. W912DY-04-D-0006
Task Order No. 0022
February 2014
Volume I of II



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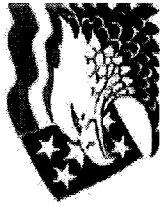

USA Environmental, Inc.

Final Work Plan
Munitions Response Sites MRS 09 and MRS 13
Phase 2 and Phase 3 Underwater
Remedial Investigation/Feasibility Study (RI/FS)

Culebra Island Site, Puerto Rico
Contract No. W912DY-04-D-0006
Task Order No. 0022
February 2014

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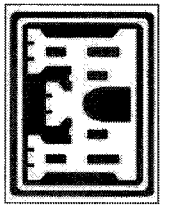

U.S. Army Engineering & Support Center, Huntsville

Munitions Response Work Plan

Underwater Remedial Investigation/Feasibility Study
MRS 09 Soldado Pt. Mortar & Bombing Area
MRS 13 Cayo Luis Pena Impact Area

Culebra Island Site, Puerto Rico
Volume I of II

Contract No. W912DY-04-D-0006
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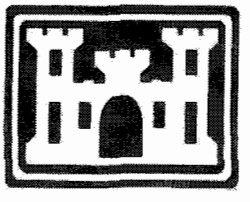
U.S. Army Engineering & Support Center, Huntsville



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Reviewed By

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Corporate Quality Manager

Final
February 2014

TABLE OF CONTENTS

APPENDICES

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LIST OF FIGURES

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LIST OF TABLES

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ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Plan
APP	Accident Prevention Plan
ARARS	Applicable or Relevant and Appropriate Requirements
ASI	Aqua Survey Inc.
ASR	Archives Search Report
BSI	Blind Seed Item
EBSR	Environmental Baseline Survey Report
CDSQ	Corporate Director of Safety and Quality
CESAJ	Corps of Engineers, South Atlantic Division, Jacksonville District
CFR	Code of Federal Regulation
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DFW	Definable Feature of Work
DGPS	Differential GPS
DID	Data Item Description
DMM	Discarded Military Munitions
DN	Deficiency Notice
DNER	Department of Natural and Environmental Resources
DA	Department of the Army
DoD	Department of Defense
DQO	Data Quality Objective
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineering Manual
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EQB	Environmental Quality Board
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
EZ	Exclusion Zone
FSW	Feet of Salt Water
FUDS	Formerly Used Defense Site
GIS	Geographical Information System
GPS	Global Positioning System
GSA	General Services Administration
HE	High Explosive
HTRW	Hazardous, Toxic, and Radioactive Waste
IAW	In Accordance With
IHO	International Hydrographic Organization

ISO	Industry Standard Object
LLP	Lessons Learned Program
MBS	Multibeam Bathometry Survey
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MPPEH	Material Potentially Presenting an Explosive Hazard
MRS	Munitions Response Site
NATO	North Atlantic Treaty Organization
NAUI	National Association of Underwater Instructors
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWRS	National Wildlife Refuge System
OSHA	Occupational Safety and Health Administration
PADI	Professional Association of Diving Instructors
PDA	Personal Digital Assistant
PDT	Project Delivery Team
PLS	Professional Licensed Surveyor
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
PR	Puerto Rico
QC	Quality Control
QCP	Quality Control Plan
RAB	Restoration Advisory Board
RI/FS	Remedial Investigation/Feasibility Study
ROV	Remotely Operated Vehicle
RTK-DGPS	real-time kinematic differential GPS
SI	Site Inspection
SLRA	screening level risk assessment
SS	Snorkeling Supervisor
SSHP	Site Health and Safety Plan
SP	Snorkeling Plan
SOP	Standard Operating Procedure
SSS	Side Scan Sonar
Team Leader	Senior UXO Supervisor
TIFF	Tagged Image File Format
TM	Technical Manager
TP	Technical Paper
TPP	Technical Project Planning
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USA	USA Environmental, Incorporated
USCG	United States Coast Guard

USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer
UXOTIII	Unexploded Ordnance Technician III
WP	Work Plan

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1.0 INTRODUCTION

This Work Plan (WP) describes field activities planned for a Remedial Investigation (RI) at the Munitions Response Sites (MRS) located at MRS 09 Soldado Point Mortar and Bombing Area and MRS 13 Cayo Luis Pena Impact Areas, on the island of Culebra, Puerto Rico (see Figure 1-1). The RI consists of underwater surface and subsurface investigation of transects, to determine the extent of hazards posed by Munitions and Explosives of Concern (MEC) and Munitions Constituents (MC).

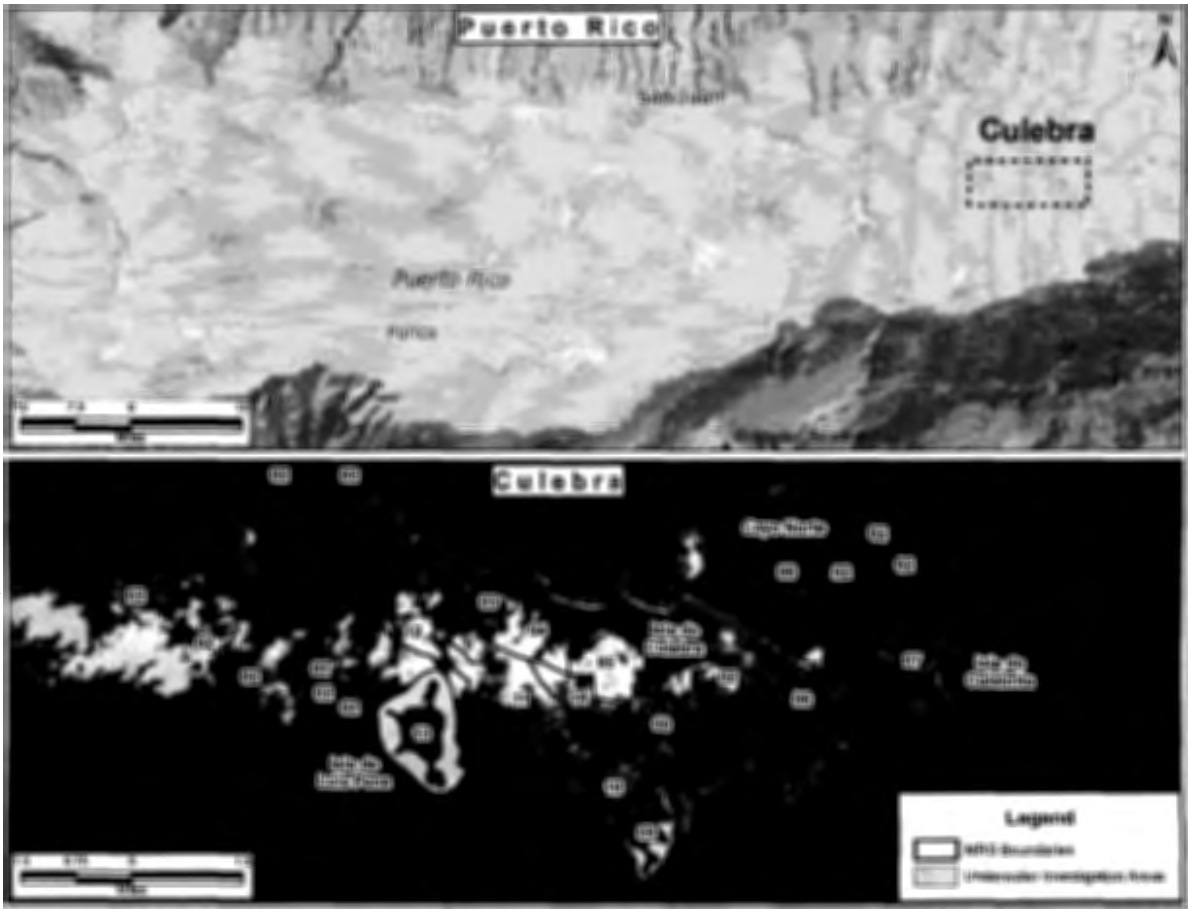

Figure 1-1: Project Location Map

1.1 PROJECT AUTHORIZATION

USA Environmental (USA) has prepared the Culebra Underwater Remedial Investigation/Feasibility Study (RI/FS) WP for Culebra Island, Puerto Rico (PR) [Formerly Used Defense Site (FUDS) Project Number I02PR0068] under Contract No: W912DY-04-D-0006 Task Order No. 0022, from the U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville (USAESCH).

1.2 PURPOSE AND SCOPE

This RI is being performed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of

1986 (SARA), and is part of the overall Remedial Action Process. The primary purpose and scope is to perform an underwater investigation operation which completes a combined land and underwater RI. The underwater investigation is to determine the nature and extent of possible contamination of Material Potentially Presenting an Explosive Hazard (MPPEH)/MC located both on and below the surface of the seafloor resulting from DoD use. The end goal is to gain acceptance of a Decision Document (DD) for the areas investigated for both land and water. The underwater RI task order was added to the RI during the TPP and RI Report review processes, following the completion of the land portion of the RI.

The designated region for underwater operations at each site will commence at the shoreline, and extend seaward to the MRS boundary within the Culebra Island MRS 09 and MRS 13 water areas. This WP outlines the following underwater operations within the MRS 09 and 13 boundaries which will be completed during three phases of work:

1. Phase 1: Environmental Baseline Survey (EBS) with EBS Report. Phase 1 fieldwork EBS Report was completed in October 2013. Phase 1 was separated into two different tasks and mobilizations which are referred to as Phase 1A and Phase 1B.
2. Phase 2: Underwater Geophysical Survey
3. Phase 3: Underwater Intrusive Investigations.

All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with USAESCH, U.S. Army Corps of Engineers (USACE), Department of the Army (DA), Department of Defense (DoD) requirements regarding personnel, equipment, and procedures, and with Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulation (CFR) Part 1910.

1.3 WORK PLAN ORGANIZATION

1.3.1 GUIDANCE DOCUMENTS

This WP follows the directions of Engineer Manual (EM) EM 1110-1-4009 and Data Item Description (DID) listed in Table.

Table 1-1: Data Item Descriptions

DID	DID Title
WERS-001.01	Work Plans
WERS-002.01	Explosive Management Plan
WERS-003.01	Explosive Site Plan
WERS-004.01	Geophysics
WERS-005.01	Accident Prevention Plan
WERS-007.01	Geospatial Information and Electronic Submittals
WERS-009.01	Munitions Constituents Chemical Data Quality Deliverables
WERS-011.01	Accident / Incident Reports
WERS-012.01	Personnel Qualifications Certification Letter
WERS-014.01	Reports / Minutes, Record of Meeting
WERS-015.01	Telephone Conversations / Correspondence Records
WERS-016.02	Periodic Status Report

1.3.2 WP ORGANIZATION

This WP has been divided into Chapters 1 through 10 with associated documents provided either as appendices herein or as standalone documents. Together, the WP and associated documents present the project history, work elements, and requirements in an organized manner. Table 1-2 describes the general structure and organization of this WP. References are frequently made between various sections in the WP and the associated documents.

Table 1-2: Work Plan Structure

Chapter Number	Descriptor	Information
1	Introduction	A statement of the project objectives, project authorization, purpose and scope; summary of work plan organization, project location, and site descriptions.
2	Technical Management Plan	Summary of project objectives, project organization, communication and reporting, project deliverables, project schedule, public relations support, subcontractor management, and management of field operations.
3	Field Investigation Plan	Describes the approach and procedures that will be followed in performing the geophysical survey of transects and the intrusive investigation, and reporting activities, and includes discussion of project goals, data quality objectives.
4	Quality Control Plan	Describes the standard processes that will be used to monitor, inspect, and control daily field activities to ensure quality performance, processes to correct quality issues, quality control of contract deliverables, and QC reporting requirements.
5	Explosives Management Plan	The Explosives Management Plan will be used to provide details for management of explosives in accordance with applicable regulations.
6	Environmental Protection Plan	Describes the approach, methods and operational procedures that will be employed during onsite activities to protect the natural environment.
7	Property Management Plan	This chapter is not used. The Property Management Plan is not required for this Task Order.
8	Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel	This chapter is not used. The Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel is not required for this Task Order.
9	Physical Security Plan for Recovered Chemical Warfare Sites	This chapter is not used. The Physical Security Plan for Recovered Chemical Warfare Sites is not required for this Task Order.
10	References	Citation of documents referenced within this Work Plan

1.4 PROJECT LOCATION

The project location is Culebra Island, PR. Culebra is approximately 17 miles east of the main island of Puerto Rico and also includes surrounding islands. Cayo Luis Pena (MRS 13), is located approximately one-quarter mile off the western coast of Culebra Island. Soldado Point (MRS 09), is located on the southern peninsula of Culebra Island.

1.5 SITE DESCRIPTION

1.5.1 LOCATION

MRS 9 and 13 boundaries and location are shown in Figure 1-2.

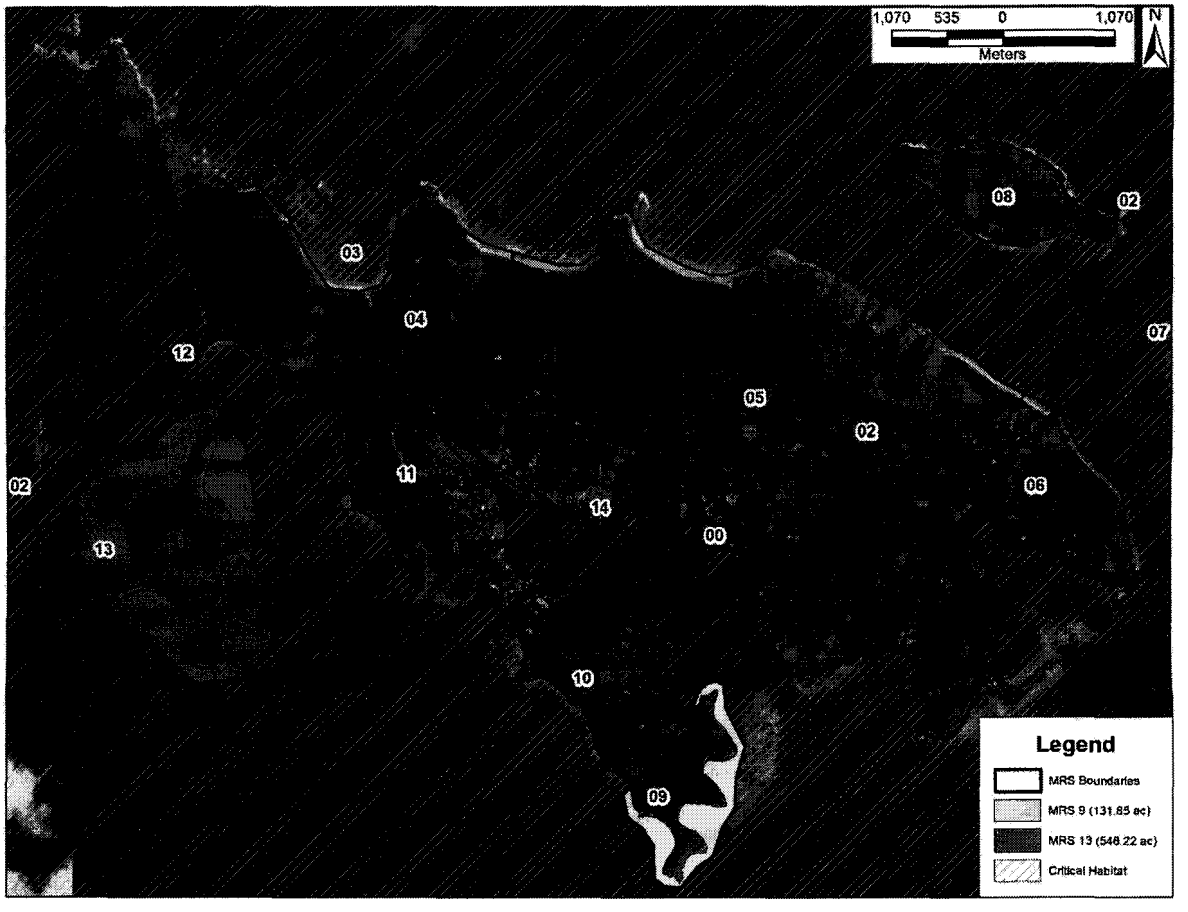

Figure 1-2: Site Location Map

1.5.2 TOPOGRAPHY

Culebra Island and the surrounding cayos are comprised of sandy beaches, irregular rugged coastlines, lagoons, coastal wetlands, steep mountains, and narrow valleys. Ninety percent of the island is mountainous. The highest point on Culebra is Mount Resaca at approximately 630 feet above sea level.

Culebra Island is underlain by both intrusive and extrusive volcanic rock of the Upper Cretaceous age. The volcanic rock exhibits little or no porosity because of compaction and filling of the pores with quartz and calcite.

Cayo Luis Pena (MRS 13) is comprised of sandy beaches, irregular rugged coastlines and steep mountains. A peak of 476 feet above sea level is located in the center of the Cayo Luis Pena and a smaller peak of 171 feet above sea level exists on its northern peninsular.

1.5.3 CLIMATE

The weather on Culebra Island is generally warm year round due to its tropical marine climate. Yearly average rainfall is approximately 36 inches. The months of August through November are considered the wet season, and the driest months are January through April. The average daily temperatures are 80 degrees Fahrenheit (°F); the average maximum is 86 °F with an average low of 74 °F. Winds are generally from the east-northeast during November through January and from the east during February through October. Yearly average wind speed is 8 knots. Hurricane season is June through November, and severe hurricanes hit Culebra every 10 to 20 years. The yearly average rainfall for Culebra is provided in Table 1-3 (source: www.weather.com).

Phase 1A fieldwork was executed during the month of November of 2012. Sea state is often the limiting factor for marine operations. The combination of wave swells and waves generated by winds did not impact the field work for Phase 1A as the winds averaged 10-14 knots. However, for Phase 1B the winds averaged 15-20 knots creating small craft warnings throughout the duration of the project. To take full advantage of the weather conditions, the field teams worked on the lee of the islands when the sea state was high, and when the sea state was light or moderate, the field teams concentrated their efforts on the windward side of the MRSs.

Table 1-3: Average Rainfall, Culebra Island

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
mm	48.6	34.6	37.7	51.7	91.2	80.9	78.5	98.2	119.1	122.6	104.2	62.8	931.1
inches	1.9	1.4	1.5	2.0	3.6	3.2	3.1	3.9	4.7	4.8	4.1	2.5	36

1.5.4 SENSITIVE ENVIRONMENTS

1.5.4.1 Threatened and Endangered Species

The main island of Puerto Rico and its associated islands support 75 federally listed threatened and endangered species consisting of 26 animals and 49 plants. Among this diverse group of fauna and flora are multiple species that are known to exist, potentially exist, or temporarily use areas within the Culebra Island archipelago. Of the 75 federally listed species, nine are known, or are suspected to occupy, Culebra Island and/or the associated cayos. In addition to the federally listed species, two state-listed species are known to occupy Culebra Islands. The federally and state-listed species include both terrestrial and marine life. The federally listed species of most concern for the wildlife refuge are the green sea turtle, hawksbill sea turtle, leatherback sea turtle, and loggerhead sea turtle. Due to declining populations, the elkhorn and staghorn corals in the surrounding waters are federally listed as threatened and endangered species. In addition to the species listed under the Endangered Species Act (ESA), the Center for Biological Diversity petitioned National Marine Fisheries Service (NMFS) on 20 October 2007 to list 83 species of corals as threatened or endangered under the ESA, and to designate critical habitat for these corals. NMFS received and reviewed the petition and determined that the requested listing actions may be warranted for 82 of the 83 coral species. The completed status review and management report (NOAA Technical Memorandum NMFS-PIFSC-27) was issued in September of 2011. All of the Atlantic coral species have the potential to be found in waters around Culebra.

1.5.4.2 National Wildlife Refuge (NWR)

According to the National Wildlife Refuge (NWR) System, portions of Culebra Island and 22 of the associated cayos are considered NWR area. The three largest cayos are Culebrita, Cayo Norte (privately owned), and Luis Pena. These resemble Culebra in that they all have sandy beaches, rugged coastline, and gentle to steep hills. Vegetation ranges from moderate to extremely dense. The smaller cayos are primarily solid rock with sparse or no vegetation. A few of the smaller cayos have small beaches; however, most are rugged rock all around.

1.5.4.3 Conservation Priority Areas

According to the PR Department of Natural and Environmental Resources (DNER), the conservation priority areas for Culebra and associated cayos are as follows:

- Designated Critical Habitat
- All of the lagoons on Culebra
- Monte Resaca
- All beaches around Culebra
- The designated critical habitat area for the Virgin Islands Boa
- Flamenco Peninsula
- Puerto del Manglar
- Los Canos
- Punta Soldado
- Ensenada del Cementerio
- All cayos around Culebra
- The Canal Luis Pena Natural Reserve

1.6 SITE HISTORY

Spain ceded all of Puerto Rico to the United States in 1898 following the Spanish American War. The public lands in the Culebra Island Archipelago were placed under the control of the U.S. Department of Navy in 1901. The Culebra Island Archipelago was used for training purposes by the U.S. Navy and U.S. Marines, and was later used by the North Atlantic Treaty Organization (NATO). The U.S. Marines used portions of Culebra Island as a training facility from 1902 through 1941. Culebra Island was used as a bombing and gunnery range from 1935 through 1975. To support the increased training needs during Viet Nam operations, the Navy acquired additional training areas on cayos east and west of Culebra Island for use as air-to-ground ranges. Live ordnance operations reached their peak in 1969, as the fleet was training pilots for Viet Nam. Aircraft bombing and strafing of the Flamenco Peninsula ended around 1970, while the use of live rounds for naval gunfire support training ended in 1971. Subsequent naval support training was conducted using quieter practice rounds until ordnance use was terminated on September 30, 1975. Between 1975 and 1982, the facilities were turned over to the General Services Administration (GSA).

During military use of the land the island was inhabited by many residents centralized around the town of Dewey on the west central portion of the island. Currently, the site includes municipal, residential, and recreational areas. Most of the main island of Culebra, as well as Cayo Norte, are privately owned, while the surrounding cayos are managed by the U.S. Fish and Wildlife Service (USFWS). The Puerto Rico DNER also manages land and adjacent water areas on Culebra.

1.7 LAND USE

1.7.1 MRS 13 CAYO LUIS PENA IMPACT AREAS

MRS 13 covers all of Cayo Luis Pena. The cayo is managed by the USFWS (land portion) and DNER (shoreline areas that are within maritime terrestrial zone). Water areas are DNER jurisdiction, and USFWS and NMFS only have jurisdiction in the water as it relates to ESA resources. Residential areas do not exist on Cayo Luis Pena but have been developed on the main island immediately across the channel. The site has no barriers to access; however, access is prohibited without USFWS authorization. Site conditions could change in the future with potential impact on land use. Examples might include; excessive soil erosion on beaches or streams, or the increase in land development that could reduce distances from the site to inhabited areas, or otherwise increase accessibility.

1.7.2 MRS 09 SOLDADO POINT MORTAR AND BOMBING AREA

MRS 09 is managed by the DNER, and residential development is not allowed on the site. However, squatters have taken up residence on MRS 09, thus populating Soldado Point. Public area structures could be developed at some point in the future. There are no restrictions on using the beach areas or entering the surrounding waters for recreation activities. Site conditions could change in the future with potential impact on land use. Examples might include; excessive soil erosion on beaches or streams, or the increase in land development that could reduce distances from the site to inhabited areas, or otherwise increase accessibility. Seasonal surf action could cause changes to the bottom of the surrounding waters.

1.8 PREVIOUS UNDERWATER VISUAL SURVEY DATA

Phase 1: The EBS's [with EBS Report (completed on October 2013)] primary purpose and scope was to perform an in-depth study designed to gather the data necessary to determine the underwater (U/W) habitat within the Culebra Island MRSs 09 and 13 (water areas) for use in subsequent phases of a RI/FS Phase 2 and 3. The intent of this EBS was not to perform an in-depth biological study; rather, it was to document the actual area where the RI activities will take place. The EBS was the first of three (3) phases of the RI/FS being conducted within the underwater portions of MRSs 09 and 13. The results of the EBS were presented via the EBS Report during the Technical Project Planning (TPP) 5 meeting held on 10 September 2013. In addition to an EBS, the report includes any data related to MPPEH that was observed during EBS field activities. MPPEH data will be included in the overall RI evaluation and associated MEC hazard assessment (HA).

The following EBS field activities that were conducted:

- Phase 1A: Hydrographic Surveys (Deployment of Multi-beam Bathymetry and Side Scan Sonar systems); Field work completed in November 2012
- Phase 1B: Underwater Visual Surveys (U/W Video/still camera systems and snorkeling); Field work completed in January 2013

All activities involving work in areas potentially containing MEC hazards were conducted in full compliance with USAESCH, USACE, DA, DoD requirements regarding personnel, equipment, and procedures, and with OSHA Standard 29 CFR Part 1910. In addition, field personnel adhered to the established Standard Operation Procedures (SOP)s developed for endangered species avoidance/mitigation (Appendix K of this WP).

1.9 INITIAL SUMMARY OF RISK FROM MEC

1.9.1 MRS 13 CAYO LUIS PENA IMPACT AREAS

Cayo de Luis Pena, with 380 acres of water area and 864 total MRS acres, is about one quarter mile off the western coast of Culebra (see Figure 1-2). The northern tip of this island was used as a firing target during Marine exercises conducted between 1924 and 1941. Records show that 75mm projectiles were

fired at the cayo in 1924, and that 155mm, 37mm, 8-inch, and 6-inch rounds may have also been used. In the 1960s, an observation point was erected on the hilltop on Cayo de Luis Pena, including a run-in line, helipad, and living quarters. Cayo de Luis Pena is managed by the USFWS as part of the Culebra National Wildlife Refuge.

During Phase 1B suspect MPPEH items were identified by digital video on MRS 13.

1.9.2 MRS 09 SOLDADO POINT MORTAR AND BOMBING AREA

This area consists of 328 acres on the very southern tip of the southwestern peninsula of Culebra, of which 132 acres are water (see Figure 1-2). In 1914, a 5-inch battery was established on Soldado Point. Several training exercises, including mortar firing, aerial bombing and strafing were conducted on Soldado Point and the bay northwest of Soldado point during the 1930s and 40s. The Supplemental Archives Search Report (ASR) mentions that 30- and 1,000-pound bombs were dropped in this area (USACE 2005c). Munitions used in the bay included 30-pound fragmentation bombs, 100-pound demolition bombs, 81mm mortars, and small arms. This piece of property was accepted in a quitclaim deed from the Secretary of the Interior by the Governor of Puerto Rico in 1982. This property is managed by the DNER.

No evidence of MPPEH was observed during Phase 1B.

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2.0 TECHNICAL MANAGEMENT PLAN

2.1 OBJECTIVES

The purpose of the Technical Management Plan is to provide the approach and procedures that will be used to manage the tasks required to meet the project objectives. A detailed description of the field procedures for this project, including geophysical survey, intrusive investigation, and MC sediment sampling, are included in separate chapters and appendices of this WP. This chapter focuses on organization, personnel, communication and reporting, duties and responsibilities.

2.2 PROJECT ORGANIZATION

Close coordination and cooperation between the stakeholders, community, regulators, and technical support personnel will ensure successful project completion. Figure depicts the key project entities and the roles these organizations occupy in the project.

Table 2-1: Key Project Organizations

Organization	Responsibility Category
USAESCH	Project Management, Implementing District,
Corps of Engineers, South Atlantic Division, Jacksonville District (CESAJ)	Project Management, Geographical District
USA, and Subcontractors	Project Management, Contractor
US Environmental Protection Agency (EPA)	Regulator/Review and concurrence of WP and reports
NMFS	Stakeholder/Review of WP and reports
National Oceanic and Atmospheric Administration (NOAA)	Stakeholder/Review of WP and reports
USFWS	Stakeholder/Review of WP and reports
PR DNER	Stakeholder/Review of WP and reports
Puerto Rico Environmental Quality Board (PR EQB)	Stakeholder/Review of WP and reports

2.2.1 USAESCH

USAESCH, the implementing agency for execution of the project, provides technical expertise for MEC and MC activities, and serves as the Project Manager (PM) for conducting the RI/FS. USAESCH responsibilities include procurement and direction of the prime contractor and the coordination of document reviews and approvals. Huntsville is also responsible for quality assurance (QA) of the contractor's adherence to the Performance Work Statement (PWS) and controlling the budget and schedule.

2.2.2 CESAJ

CESAJ is the overall PM for the RI/FS project. CESAJ's responsibilities include the review of project plans and documents, obtaining rights of entry (ROE) to properties in the work area, working with the news media and the public, and coordinating with federal, state, and local stakeholders on issues pertaining to implementation of this project and protection of ecological and cultural resources.

2.2.3 USA

USA is the prime contractor to USAESCH for this project. USA will provide staff to perform all aspects of fieldwork and provide oversight of field sampling activities. USA will assign project personnel based on management and technical experience and abilities. USA will subcontract Aqua Survey Inc. (ASI) to conduct geophysical surveys, Parsons for MC support, and CMS for logistical and boat support. USA will

prepare and submit data reports in accordance with (IAW) relevant USACE guidance and applicable DIDs. The USA PM is Mr. Thomas Bourque. The USA Project Engineer is Mr. Brian Skubin.

2.2.4 PROJECT REGULATORS/STAKEHOLDERS

The stakeholders are the individuals and organizations directly impacted by the survey activities and the utilization of the resulting EBS Report data. Stakeholders include (but are not limited to):

- United States EPA (Regulator)
- PR DNER
- PR EQB
- USFWS
- NOAA.

Those listed above participate in the TPP process.

2.3 CONTRACTOR MANAGEMENT TEAM

2.3.1 USA PROJECT MANAGER

The PM (Mr. Thomas Bourque) is responsible for monitoring overall progress of the Task Order, reviewing monthly progress reports, and ensuring that resources are available. The PM maintains close communication with USAESCH to assess USAESCH satisfaction with USA performance on this Task Order.

2.3.2 USA CORPORATE DIRECTOR OF SAFETY AND QUALITY

The Corporate Director of Safety and Quality (CDSQ) (Mr. Robert Crownover) is responsible for reviewing and updating the Quality Control Plan and verifying compliance with the plan. Compliance with the Quality Control Plan is accomplished by; auditing project activities; instituting corrective actions; and developing and coordinating the Accident Prevention Plan (APP). The CDSQ is the contact for regulatory agencies on matters of health and safety. For this project, the Quality Manager also serves as the Safety Manager.

2.3.3 USA PROJECT ENGINEER

The Project Engineer (Mr. Brian Skubin) provides logistical support for all field activities, in addition to providing technical and report writing support to ensure the technical quality of deliverables to USAESCH.

2.3.4 USA GEOGRAPHICAL INFORMATION SYSTEMS (GIS) MANAGER

The GIS Manager (Mr. Jeff Lewis) is responsible for management and control of the project GIS. The GIS Manager will direct GIS operations occurring locally and remotely, and is responsible for control of data included in and used as part of the project GIS.

2.3.5 USA PROJECT GEOPHYSICIST

The Project Geophysicist (Mr. Al Crandall) is responsible for the overall technical direction for DGM surveys, to include the following:

- Provide overall technical direction for DGM surveys.
- Supervise data processing and interpretation.
- Coordinate with the Site Geophysicist to verify the accuracy and completeness of; project DGM documentation and target lists, instrument verification strip (IVS) testing results, QC results, and related DGM project documentation.

2.4 FIELD MANAGEMENT TEAM

The Field Management Team is responsible for the efficient and safe execution of the daily site activities during Phase 2 and 3. Appendix L, Dive Operations Plan, provides additional detail regarding the qualifications of the dive team and their responsibilities, and the various field team compositions which are dependent upon the work being accomplished. The following is the Field Management Team and their responsibilities:

2.4.1 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) supervises all field activities while on the work site. The SUXOS ensures conformance with the RI/FS WP and all its associated plans. For Phase 2 and 3, the SUXOS will also be SCUBA Dive Qualified. The SUXOS may also be assigned as the Diving Supervisor but must meet the requirements of a Diving Supervisor and will be approved by the USACE District Diving Coordinator (DDC). The SUXOS will report administratively and operationally to the PM.

2.4.2 DIVING SUPERVISOR

The PM will designate the Diving Supervisor in writing. During diving operations, the Diving Supervisor has the operational authority and responsibility to conduct the dive operations per the RI/FS WP, Dive Operations Plan, and USA Dive Safe Practices Manual. The Diving Supervisor is not required to be an Unexploded Ordnance (UXO) Technician. The Diving Supervisor will report administratively and operationally to the SUXOS, or to the PM if the Diving Supervisor holds the additional responsibilities as the SUXOS.

2.4.3 UXO SAFETY OFFICER (UXOSO)

The UXOSO has responsibility for enforcement of the overall safety aspects of the RI fieldwork. The UXOSO will provide daily safety briefs, and will conduct safety audits of all activities in the Diving Phase of the project. The UXOSO is responsible to the USA Corporate Director of Safety and Quality for all safety related issues. The UXOSO has stop work authority in any matter related to the safety of personnel and equipment involved with the project. Specific duties include:

- Daily Safety Brief
- Daily Safety Inspections
- Weekly Safety Audit
- Conducting initial site safety orientation training
- Periodic safety training on relevant safety subjects
- Complete appropriate Accident Investigation and Accident/Incident Reports, as required
- Acting in an advisory capacity with the PM on safety related issues
- Working directly with the Dive Supervisor and SUXOS to ensure safe completion of operational tasks.

2.4.4 UXO QUALITY CONTROL SPECIALIST (UXOQCS)

The UXOQCS is responsible for overseeing the site Quality Control (QC) Plan in all field operations. The UXOSO/UXOQCS will be trained in QC techniques methodology and be qualified as a UXO Technician III (UXOIII). The UXOSO/UXOQCS coordinates with the PM for daily operations, and maintains a direct line of communication to the PM and Field Team.

2.4.5 UXO QUALITY CONTROL SPECIALIST/SAFETY OFFICER (UXOQCS/SO)

USA will be using a UXOQCS/SO for this project. The duties as described under UXOSO and UXOQCS apply to the UXOQCS/SO.

2.4.6 ASI SITE GEOPHYSICIST

The Site Geophysicist is provided by ASI. Mr. Mark Padover is responsible for the following:

- Coordination and communication with USA's Site Manger and Project Geophysicist
- Overall site geophysical support, and DGM equipment maintenance and operation
- IVS -up and processing
- Production DGM management, collection, archiving, processing, analysis, and delivery to USA's Project Geophysicist
- Primary input to the DGM report.

2.5 PROJECT COMMUNICATION AND REPORTING

Communications for this project will generally flow along the lines established by the organization depicted previously in Table. All communications between USA and the USAESCH will primarily be directed through the respective USAESCH PM or Contracting Officer. Communication directly between USA and other government entities associated with this project will only occur with USAESCH concurrence.

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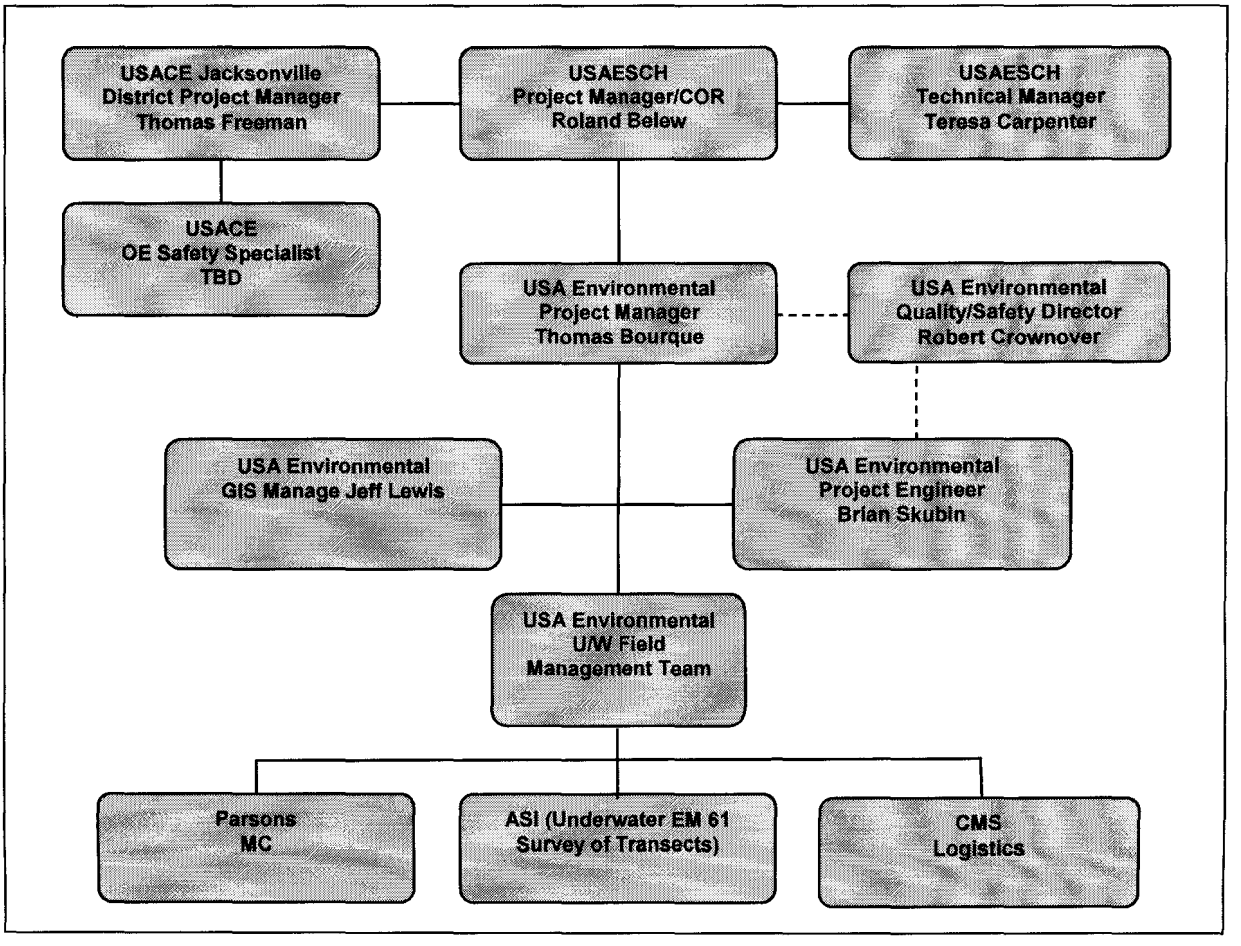

Figure 2-1: Project Management Organization

2.6 PROJECT DELIVERABLES

Project deliverables will meet the schedule requirements of the project and will be prepared in accordance with the applicable DID format. Deliverables will undergo internal review prior to submittal. A detailed description of project deliverables is provided in the current version of the PWS (Appendix A). Deliverable data will be submitted to USAESCH and CESAJ no later than the close of the business day indicated in the project schedule. Electronic data will be submitted in formats consistent with USAESCH software and systems, as defined in the PWS. Geophysical data deliverables will meet DID WERS-004.01 delivery schedule.

2.7 PROJECT SCHEDULE

The project schedule (Figure 2-2) presents the logical sequence of tasks, deliverable due dates, and anticipated number of days to complete each task. The schedule will be updated monthly and will be included in the Monthly Progress Status reports prepared in accordance with the applicable DID.

2.8 PERIODIC REPORTING

Project Status Reports will be prepared IAW WERS-016.02. This report will be submitted monthly when fieldwork is not being performed, and weekly when fieldwork is underway. When MC sampling is being conducted daily reports will be submitted per WERS-009.01 paragraph 1.3.2.

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Thu 10/24/13

Culebra RI/FS Project Schedule (4D6-22)

ID	% Complete	Task Name	Duration	Start	Finish
1	56%	**Culebra RI/FS (4D6-22)**	1572 days?	Mon 8/31/09	Mon 9/7/15
2	100%	**Task Order Award**	70 days	Mon 9/14/09	Fri 12/18/09
7	100%	**Technical Project Planning Meeting 1**	11 days	Mon 8/31/09	Mon 9/14/09
11	100%	**TPP Memorandum**	99 days	Tue 10/6/09	Fri 2/19/10
16	99%	**Draft and Draft Final Work Plan (WP)**	1560 days	Wed 9/16/09	Mon 9/7/15
23	50%	**Public Involvement Plan (PIP)**	647 days	Mon 10/12/09	Mon 4/2/12
28	100%	**Technical Project Planning Meeting 2**	9 days	Mon 9/13/10	Thu 9/23/10
32	100%	**Technical Project Planning Meeting 3**	34 days?	Mon 1/17/11	Thu 3/3/11
35	100%	**Final WP**	10 days	Fri 4/15/11	Thu 4/28/11
38	100%	**Receipt of Notice to Proceed (NTP)**	1 day	Fri 4/29/11	Fri 4/29/11
39	100%	**Receipt of NTP for Turtle Monitoring**	1 day	Mon 1/24/11	Mon 1/24/11
40	100%	**Turtle Monitoring**	150 days	Tue 1/25/11	Fri 8/19/11
41	100%	**RI/FS Field Activities**	110 days	Thu 5/5/11	Tue 10/4/11
72	100%	Environmental Sampling	10 days	Mon 9/26/11	Fri 10/7/11
73	100%	Electronic Laboratory Data Submittal	1 day	Wed 11/2/11	Wed 11/2/11
74	100%	Analytical Data Submittal for QA	1 day	Wed 10/26/11	Wed 10/26/11
75	35%	**RI/FS (Land Portions Only)**	645 days	Thu 3/15/12	Wed 9/3/14
76	51%	**RI/FS Report (Land Portions)**	539 days	Thu 3/15/12	Tue 4/8/14
77	100%	Draft RI/FS Report Development	23 days	Thu 3/15/12	Mon 4/16/12
78	100%	Draft RI/FS Report Submittal	1 day	Mon 4/30/12	Mon 4/30/12
79	100%	Government Review Period	15 days	Tue 5/1/12	Mon 5/21/12
80	100%	Revision Period	15 days	Mon 5/21/12	Fri 6/8/12
81	100%	CX Review Period	15 days	Mon 6/11/12	Fri 6/29/12
82	61%	**Groundwater Investigation**	135 days	Mon 6/24/13	Mon 12/30/13
83	94%	**MC SAP Revision for Groundwater**	72 days	Mon 7/1/13	Tue 10/8/13
84	100%	Draft MC SAP Revision Submittal	30 days	Mon 7/1/13	Fri 8/9/13
85	100%	Government Review Period	15 days	Mon 8/12/13	Fri 8/30/13
86	100%	Response to Comments and Revisions	5 days	Mon 9/2/13	Fri 9/6/13
87	100%	CX Review Period	15 days	Mon 9/9/13	Fri 9/27/13
88	50%	Response to Comments and Revisions	5 days	Mon 9/30/13	Fri 10/4/13
89	0%	Final MC SAP Revision Submittal	2 days	Mon 10/7/13	Tue 10/8/13
90	100%	Rights-of Entry	45 days	Mon 6/24/13	Fri 8/23/13
91	90%	Groundwater Survey	12 days	Mon 8/26/13	Tue 9/10/13
92	4%	**Groundwater Survey Letter Report**	35 days	Wed 9/11/13	Tue 10/29/13
93	10%	Draft Survey Letter Report	15 days	Wed 9/11/13	Tue 10/1/13
94	0%	Government Review Period	15 days	Wed 10/2/13	Tue 10/22/13
95	0%	Response to Comments and Revisions	5 days	Wed 10/23/13	Tue 10/29/13
96	0%	TPP Meeting	1 day	Fri 11/1/13	Fri 11/1/13
97	0%	ROE Mods	10 days	Mon 11/4/13	Fri 11/15/13
98	0%	Groundwater Sampling	15 days	Mon 11/18/13	Fri 12/6/13
99	0%	Electronic Laboratory Data Submittal	15 days	Mon 12/9/13	Fri 12/27/13
100	0%	Analytical Data Submittal for QA	1 day	Mon 12/30/13	Mon 12/30/13
101	0%	RI/FS Report Revision Period	23 days	Mon 12/16/13	Wed 1/15/14
102	0%	Government Review Period	15 days	Thu 1/16/14	Wed 2/5/14
103	0%	Response to Comments and Revisions	10 days	Thu 2/6/14	Wed 2/19/14
104	0%	CX Review Period	15 days	Thu 2/20/14	Wed 3/12/14
105	0%	Response to CX Review Comments	10 days	Thu 3/13/14	Wed 3/26/14
106	0%	Regulator Review Period	23 days	Thu 2/20/14	Mon 3/24/14
107	0%	Revision Period	10 days	Tue 3/25/14	Mon 4/7/14
108	0%	Final RI/FS Report	1 day	Tue 4/8/14	Tue 4/8/14
109	0%	**Proposed Plan**	96 days	Tue 3/25/14	Tue 8/5/14
110	0%	Draft Proposed Plan Development	10 days	Tue 3/25/14	Mon 4/7/14
111	0%	Draft Proposed Plan Submittal	1 day	Tue 4/8/14	Tue 4/8/14
112	0%	Government Review Period	15 days	Wed 4/9/14	Tue 4/29/14
113	0%	CX Review Period	15 days	Wed 4/30/14	Tue 5/20/14
114	0%	Response to CX Review Comments	5 days	Wed 5/21/14	Tue 5/27/14
115	0%	Regulator Review Period	23 days	Wed 5/28/14	Fri 6/27/14
116	0%	30-Day Public Comment Period	23 days	Mon 6/30/14	Wed 7/30/14
117	0%	Public Availability Meeting	1 day	Thu 7/31/14	Thu 7/31/14
118	0%	Revision Period	2 days	Fri 8/1/14	Mon 8/4/14
119	0%	Final Proposed Plan Submittal	1 day	Tue 8/5/14	Tue 8/5/14
120	0%	**Decision Document (DD)**	71 days	Wed 5/28/14	Wed 9/3/14
121	0%	Draft DD Development	5 days	Wed 5/28/14	Tue 6/3/14
122	0%	Draft DD Submittal	1 day	Wed 6/4/14	Wed 6/4/14
123	0%	Government Review Period	15 days	Thu 6/5/14	Wed 6/25/14
124	0%	CX Review Period	15 days	Thu 6/26/14	Wed 7/16/14
125	0%	Response to CX Review Comments	5 days	Thu 7/17/14	Wed 7/23/14
126	0%	Revision Period	4 days	Thu 7/24/14	Tue 7/29/14
127	0%	Regulator Review Period	23 days	Wed 7/30/14	Fri 8/29/14

Project: Culebra RI/FS (4D6-22)
Revision Date: Thu 10/24/13

Critical, Critical Split, Critical Progress, Task, Split, Task Progress, Baseline, Baseline Split, Baseline Milestone, Milestone, Summary Progress, Summary, Project Summary, External Tasks, External Milestone, Deadline

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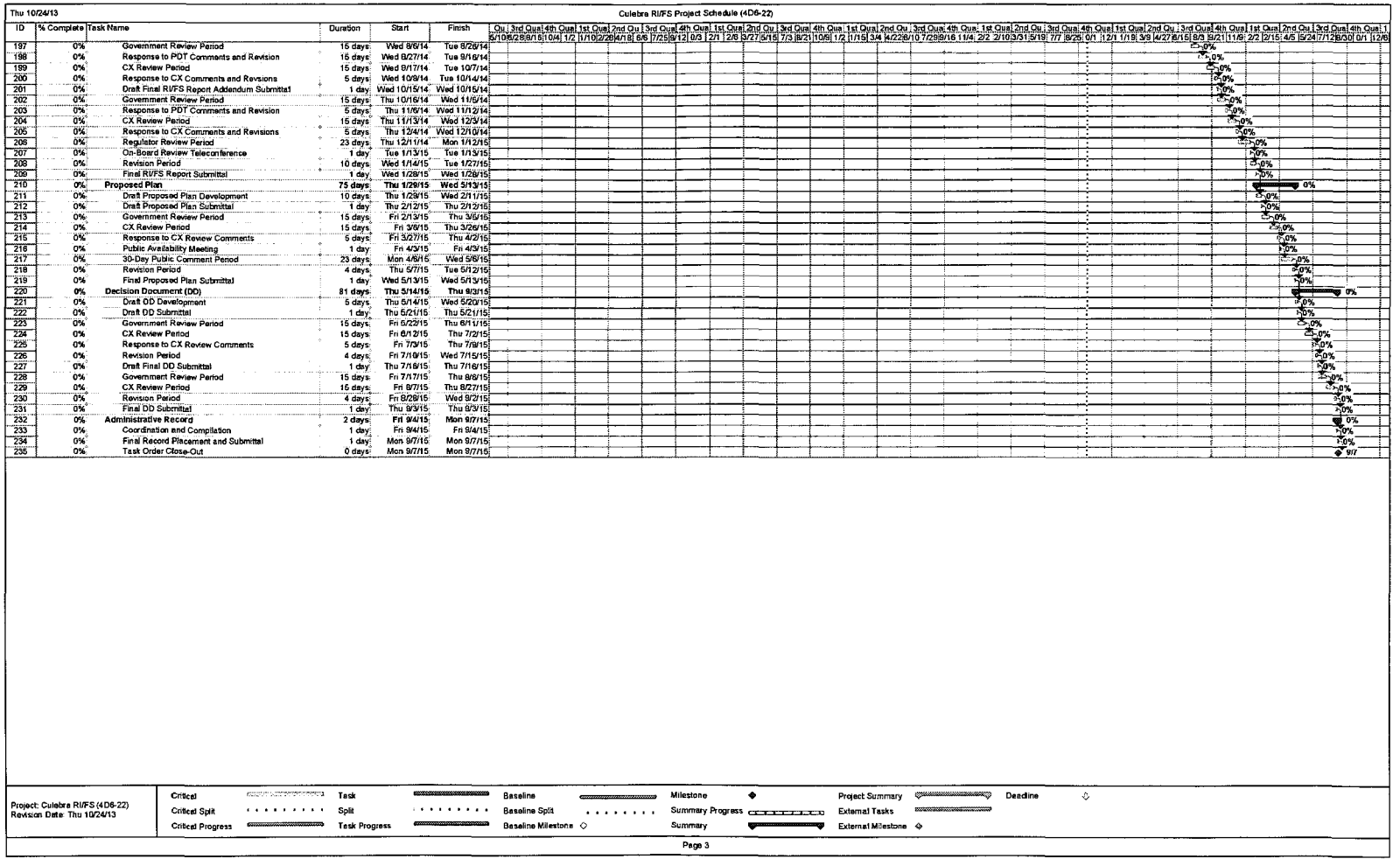
Thu 10/24/13 — Culebra RI/FS Project Schedule (4D6-22)

ID	% Complete	Task Name	Duration	Start	Finish
128	0%	Revision Period	2 days	Mon 6/1/14	Tue 6/2/14
129	0%	Final DD Submittal	1 day	Wed 6/3/14	Wed 6/3/14
130	57%	**Expanded U/W Investigation (MRS 13 and MRS 09)**	672 days	Tue 12/6/11	Wed 7/2/14
131	95%	**Phase I Work Plan Revision (Baseline Survey Report [BSR])**	234 days	Tue 12/6/11	Mon 10/29/12
132	35%	Technical Project Planning Meeting	11 days	Tue 12/6/11	Tue 12/20/11
135	100%	SOP Development	18 days	Wed 2/1/12	Fri 2/24/12
136	100%	Internal SOP Review Period	5 days	Mon 2/27/12	Fri 3/2/12
137	100%	Draft SOP Regulator Review Period	23 days	Mon 3/5/12	Wed 4/4/12
138	100%	Final SOPs	12 days	Thu 4/5/12	Fri 4/20/12
139	100%	Draft BSR Plan Revision Submittal	15 days	Fri 4/27/12	Thu 5/17/12
140	100%	Government Review Period	10 days	Fri 5/18/12	Thu 5/31/12
141	100%	Response to Comments and Revisions	6 days	Fri 6/1/12	Fri 6/8/12
142	100%	CX Review Period	15 days	Mon 6/11/12	Fri 6/29/12
143	100%	Response to Comments and Revisions	3 days	Mon 7/2/12	Wed 7/4/12
144	100%	Draft Final BSR Plan Revision Submittal	1 day	Thu 7/5/12	Thu 7/5/12
145	100%	Government Review Period	10 days	Fri 7/6/12	Thu 7/19/12
146	100%	CX Review Period	15 days	Fri 7/20/12	Thu 8/9/12
147	100%	Regulator Review Period	23 days	Fri 8/10/12	Tue 9/11/12
148	100%	Response to Comments and Revisions	5 days	Wed 9/12/12	Tue 9/18/12
149	100%	Final BSR Plan Revision Submittal	1 day	Wed 9/19/12	Wed 9/19/12
150	100%	Notice to Procede (Phases I Field Work)	0 days	Mon 10/29/12	Mon 10/29/12
151	100%	**Expanded RI/FS U/W Field Work- Phases Ia & Ib (E**	53 days	Wed 11/7/12	Fri 1/18/13
152	100%	Phase I - Sidescan Sonar/ Bathymetry Survey	8 days	Wed 11/7/12	Fri 11/16/12
153	100%	Data Post Process- Review-RI Transact (u/w geo	15 days	Mon 11/19/12	Fri 12/7/12
154	100%	Huntsville PDT Review	10 days	Mon 12/10/12	Fri 12/21/12
155	100%	Phase II - Underwater Visual -Snorkel Surveys	10 days	Mon 1/7/13	Fri 1/18/13
156	81%	**Baseline Survey Report (BSR)**	175 days	Mon 1/2/13	Fri 9/20/13
157	100%	EBS Data Analysis	23 days	Mon 1/21/13	Wed 2/20/13
158	100%	Draft Baseline Survey Report	35 days	Thu 2/21/13	Wed 4/10/13
159	100%	Government Review Period	23 days	Thu 4/11/13	Mon 5/13/13
160	100%	Response to Comments and Revision	23 days	Tue 5/14/13	Thu 6/13/13
161	100%	CX Review Period	15 days	Fri 7/12/13	Thu 8/1/13
162	100%	Response to Comments and Revision	5 days	Fri 8/2/13	Thu 8/8/13
163	100%	Draft Final Baseline Survey Report	2 days	Fri 8/9/13	Mon 8/12/13
164	0%	Regulator Review Period	23 days	Tue 8/13/13	Thu 9/12/13
165	0%	Response to Comments and Revision	5 days	Fri 9/13/13	Thu 9/19/13
166	0%	Final Baseline Survey Report	1 day	Fri 9/20/13	Fri 9/20/13
167	100%	TPP Meeting 5- EBS Report/ Phase II WP DOOs (U/W	1 day	Mon 9/23/13	Mon 9/23/13
168	11%	**Phase II/III Work Plan (U/W Geophysical Survey/In**	119 days	Mon 9/23/13	Thu 3/6/14
169	50%	Draft U/W ESP	11 days	Mon 9/23/13	Mon 10/7/13
170	0%	CX Review	23 days	Tue 10/8/13	Thu 11/7/13
171	0%	Final U/W ESP	4 days	Fri 11/8/13	Wed 11/13/13
172	50%	Draft Work Plan Addendum Submittal (DV plan ir	23 days	Mon 9/23/13	Wed 10/23/13
173	0%	Government Review Period	15 days	Thu 10/24/13	Wed 11/13/13
174	0%	CX Review Period	15 days	Thu 11/14/13	Wed 12/4/13
175	0%	Response to Comments and Revisions	5 days	Thu 12/5/13	Wed 12/11/13
176	0%	Draft Final Work Plan Addendum Submittal	1 day	Thu 12/12/13	Thu 12/12/13
177	0%	Government Review Period	15 days	Fri 12/13/13	Thu 1/2/14
178	0%	CX Review Period	15 days	Fri 1/3/14	Thu 1/23/14
179	0%	Regulator Review Period	25 days	Fri 1/24/14	Tue 2/25/14
180	0%	Response to Comments and Revisions	5 days	Wed 2/26/14	Tue 3/4/14
181	0%	Final Work Plan Addendum Submittal	1 day	Wed 3/5/14	Wed 3/5/14
182	0%	Notice to Procede (Phase II/ III Field Work)	1 day	Thu 3/6/14	Thu 3/6/14
183	0%	**U/W Field Work- Phase II- U/W Geophysical Surve**	25 days	Fri 3/7/14	Thu 4/10/14
184	0%	Mobilization (GEO team with a minimal dive team	6 days	Fri 3/7/14	Fri 3/14/14
185	0%	U/W EM Survey	19 days	Mon 3/17/14	Thu 4/10/14
186	0%	**U/W Field Work- Phase III- Intrusive Investigation**	58 days	Mon 4/14/14	Wed 7/2/14
187	0%	Mobilization (remainder of Intrusive team mobiliz	5 days	Mon 4/14/14	Fri 4/18/14
188	0%	U/W Intrusive Investigation/ MC Sampling	38 days	Mon 4/21/14	Mon 6/9/14
189	0%	MC Sampling	4 days	Tue 6/10/14	Fri 6/13/14
190	0%	Demobilization	2 days	Mon 6/16/14	Tue 6/17/14
191	0%	MC Laboratory Analysis	15 days	Tue 6/10/14	Mon 6/30/14
192	0%	Electronic Laboratory Data Submittal	1 day	Tue 7/1/14	Tue 7/1/14
193	0%	Analytical Data Submittal for QA	1 day	Wed 7/2/14	Wed 7/2/14
194	0%	**U/W RI/FS Reports**	150 days	Thu 7/3/14	Wed 1/28/15
195	0%	Draft RI/FS Report Development	23 days	Thu 7/3/14	Mon 8/4/14
196	0%	Draft RI/FS Report Submittal	1 day	Tue 8/5/14	Tue 8/5/14

Project: Culebra RI/FS (4D6-22)
Revision Date: Thu 10/24/13

Critical, Critical Split, Critical Progress, Task, Split, Task Progress, Baseline, Baseline Split, Baseline Milestone, Milestone, Summary Progress, Summary, Project Summary, External Tasks, External Milestone, DeadLine

Page 2



ID	% Complete	Task Name	Duration	Start	Finish
197	0%	Government Review Period	15 days	Wed 8/6/14	Tue 8/26/14
198	0%	Response to PDT Comments and Revision	15 days	Wed 8/27/14	Tue 9/16/14
199	0%	CX Review Period	15 days	Wed 9/17/14	Tue 10/7/14
200	0%	Response to CX Comments and Revisions	5 days	Wed 10/8/14	Tue 10/14/14
201	0%	Draft Final RI/FS Report Addendum Submittal	1 day	Wed 10/15/14	Wed 10/15/14
202	0%	Government Review Period	15 days	Thu 10/16/14	Wed 11/5/14
203	0%	Response to PDT Comments and Revision	5 days	Thu 11/6/14	Wed 11/12/14
204	0%	CX Review Period	15 days	Thu 11/13/14	Wed 12/3/14
205	0%	Response to CX Comments and Revisions	5 days	Thu 12/4/14	Wed 12/10/14
206	0%	Regulator Review Period	23 days	Thu 12/11/14	Mon 1/12/15
207	0%	On-Board Review Teleconference	1 day	Tue 1/13/15	Tue 1/13/15
208	0%	Revision Period	10 days	Wed 1/14/15	Tue 1/27/15
209	0%	Final RI/FS Report Submittal	1 day	Wed 1/28/15	Wed 1/28/15
210	0%	**Proposed Plan**	**75 days**	**Thu 1/29/15**	**Wed 5/13/15**
211	0%	Draft Proposed Plan Development	10 days	Thu 1/29/15	Wed 2/11/15
212	0%	Draft Proposed Plan Submittal	1 day	Thu 2/12/15	Thu 2/12/15
213	0%	Government Review Period	15 days	Fri 2/13/15	Thu 3/5/15
214	0%	CX Review Period	15 days	Fri 3/6/15	Thu 3/26/15
215	0%	Response to CX Review Comments	5 days	Fri 3/27/15	Thu 4/2/15
216	0%	Public Availability Meeting	1 day	Fri 4/3/15	Fri 4/3/15
217	0%	30-Day Public Comment Period	23 days	Mon 4/6/15	Wed 5/6/15
218	0%	Revision Period	4 days	Thu 5/7/15	Tue 5/12/15
219	0%	Final Proposed Plan Submittal	1 day	Wed 5/13/15	Wed 5/13/15
220	0%	**Decision Document (DD)**	**81 days**	**Thu 5/14/15**	**Thu 9/3/15**
221	0%	Draft DD Development	5 days	Thu 5/14/15	Wed 5/20/15
222	0%	Draft DD Submittal	1 day	Thu 5/21/15	Thu 5/21/15
223	0%	Government Review Period	15 days	Fri 5/22/15	Thu 6/11/15
224	0%	CX Review Period	15 days	Fri 6/12/15	Thu 7/2/15
225	0%	Response to CX Review Comments	5 days	Fri 7/3/15	Thu 7/9/15
226	0%	Revision Period	4 days	Fri 7/10/15	Wed 7/15/15
227	0%	Draft Final DD Submittal	1 day	Thu 7/16/15	Thu 7/16/15
228	0%	Government Review Period	15 days	Fri 7/17/15	Thu 8/6/15
229	0%	CX Review Period	15 days	Fri 8/7/15	Thu 8/27/15
230	0%	Revision Period	4 days	Fri 8/28/15	Wed 9/2/15
231	0%	Final DD Submittal	1 day	Thu 9/3/15	Thu 9/3/15
232	0%	**Administrative Record**	**2 days**	**Fri 9/4/15**	**Mon 9/7/15**
233	0%	Coordination and Compilation	1 day	Fri 9/4/15	Fri 9/4/15
234	0%	Final Record Placement and Submittal	1 day	Mon 9/7/15	Mon 9/7/15
235	0%	Task Order Close-Out	0 days	Mon 9/7/15	Mon 9/7/15

Figure 2-2: Project Schedule

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2.9 COSTING AND BILLING

The budget for the project was negotiated with the USAESCH pursuant to contract number W912DY-04-D-0006, Task Order No. 0022. USA will submit a monthly invoice to the USAESCH. The USA PM is responsible for submitting monthly reports to the USAESCH PM along with the invoice that documents the work performed during the corresponding billing period. Requests for payment will be based on completion of performance milestones as defined in the monthly Project Status Report.

2.10 PROJECT PUBLIC RELATIONS SUPPORT

Public relations support will include participation in public meetings to be held on Culebra. These meetings are in addition to the TPP meetings. A public meeting will be held specifically to present the Proposed Plan. USA will prepare and deliver briefings, graphics, maps, posters, presentations, and support of question and answer sessions. When required, USA will prepare invitation letters, fact sheets, and meeting notices. USA will obtain the meeting sites, perform public notifications and prepare any correspondence necessary to meeting the objectives of this task. To ensure the quality of public meetings, USA will coordinate with the USACE public relations officer or other appropriate USACE representative on all matters of public relations.

2.11 SUBCONTRACT MANAGEMENT

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

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

2.12 MANAGEMENT OF FIELD OPERATIONS

USA's PM will coordinate field operations with the Field Management Team. The USA Safety Manager and Quality Manager will remain off-site but will be available by telephone for consultation on issues of safety or quality. The USA GIS Manager, who is responsible for control of data included in and used as part of the project GIS, will also be available by telephone for consultation.

2.13 INITIAL CONCEPTUAL SITE MODEL (CSM)

A CSM is a description of a site and its environment that can be used to depict the nature of potential contamination, its location, and the possible human and environmental receptors' interactions with the potential contamination. The CSM summarizes which potential receptor exposure pathways for MEC and MC are (or may be) complete and which are (and are likely to remain) incomplete. Exposure pathways are considered incomplete unless *all four* of the following elements are present (USEPA 1989):

1. a source of contamination
2. an environmental transport or exposure medium
3. a point of exposure at which the contaminant can interact with a receptor
4. a receptor and a likely route of exposure at the exposure point

If any single factor was not present, the pathway would be incomplete. An incomplete exposure pathway indicates there are no current means by which a receptor (human or ecological) can encounter MEC or MC and, therefore, no hazards or risks from exposure to MEC or MC would be expected. This information is used to focus the investigation of the site by suggesting which complete or potentially complete exposure pathways need to be evaluated. The CSM is a "living document" based on existing knowledge and, therefore, can, and is, updated throughout the course of the project as more data become available.

2.13.1 MEC AND MC EXPOSURE ANALYSIS

Historical findings and preliminary visual investigations of the underwater areas of the MRS have identified MPPEH on the surface of the seafloor, and a MEC exposure pathway for human and ecological receptors is potentially complete. The presence of sub-surface MEC is currently unknown, but due to the dynamic nature of marine sediments, its presence is likely.

MC exposure pathways for humans would be through dermal contact with the surface sediments, and ingestion of fish or other biota from the sea that has ingested the MC. Marine water is not used for human consumption on the island. Exposure pathways to ecological receptors would be through ingestion of marine water and other sea life that has ingested MC, and dermal contact with the marine sediments.

The underwater portions of the MRS are frequented by fisherman, divers and snorkelers who may encounter MEC on the seafloor. Beach visitors may encounter MEC along the shoreline and in the shallow waters. Sensitive ecological receptors, including sea turtles, coral, and sea grasses, have been identified in the area and could be exposed to MEC during intentional or unintentional detonation. The MC associated with the MEC that is potentially present on the seafloor would likely be undetectable once the MEC is removed. Due to the undersea environment, the groundwater migration pathway is incomplete. MC exposure and pathway is potentially complete for ecological receptors in the immediate location of the MEC item, but currents and the dynamic nature of the seafloor would likely dilute the effects. To evaluate this exposure, a companion sample will be collected in the near vicinity of each underwater sediment sample to evaluate the extent of any exceedances.

The RI was designed to assess the presence/nature and extent of surface and subsurface MEC and identify if MC is present in and around MEC found within the underwater portion of the MRSs.

Human health and ecological risk due to potential exposure to MC will be evaluated using the methodology outlined in by the USEPA Risk Assessment Guidance (RAGS) and USACE guidance EM 200-1-4, Volumes I and II. A baseline risk assessment will be performed. This risk assessment will be conducted using a phased approach which includes a screening level risk assessment. Should the screening level risk assessment, based on the comparison of environmental sampling analytical data to the appropriate screening levels, indicate that there is no risk, further evaluation using a quantitative evaluation of human health risk will not be conducted. The CSMs will be updated with the results. Should the SLRA indicate a potential for unacceptable risks, a quantitative risk assessment will be conducted.

The Human Health Risk Assessment and SLERA results will be provided in the RI Report and will factor into potential removal/remediation measures during the FS phase. The MEC and MC CSMs are presented in Figures 2-3 thru 2-6.

These preliminary CSMs are the initial CSMs for the RI/FS, and were developed in accordance with Engineer Manual (EM) 1110-1-1200. These CSMs are presented as a summary table indicating known or suspected MEC/MC contamination sources, potential/suspected locations and distribution of contamination, related source or exposure media, current and future receptors, and potentially complete exposure pathways.

Conceptual Site Exposure Model Diagram

Site/MRS Name: Culebra Island, PR – MRS 09 – Underwater

Completed By: Margaret Zaice, USAE ***Date Completed:*** October 18, 2013

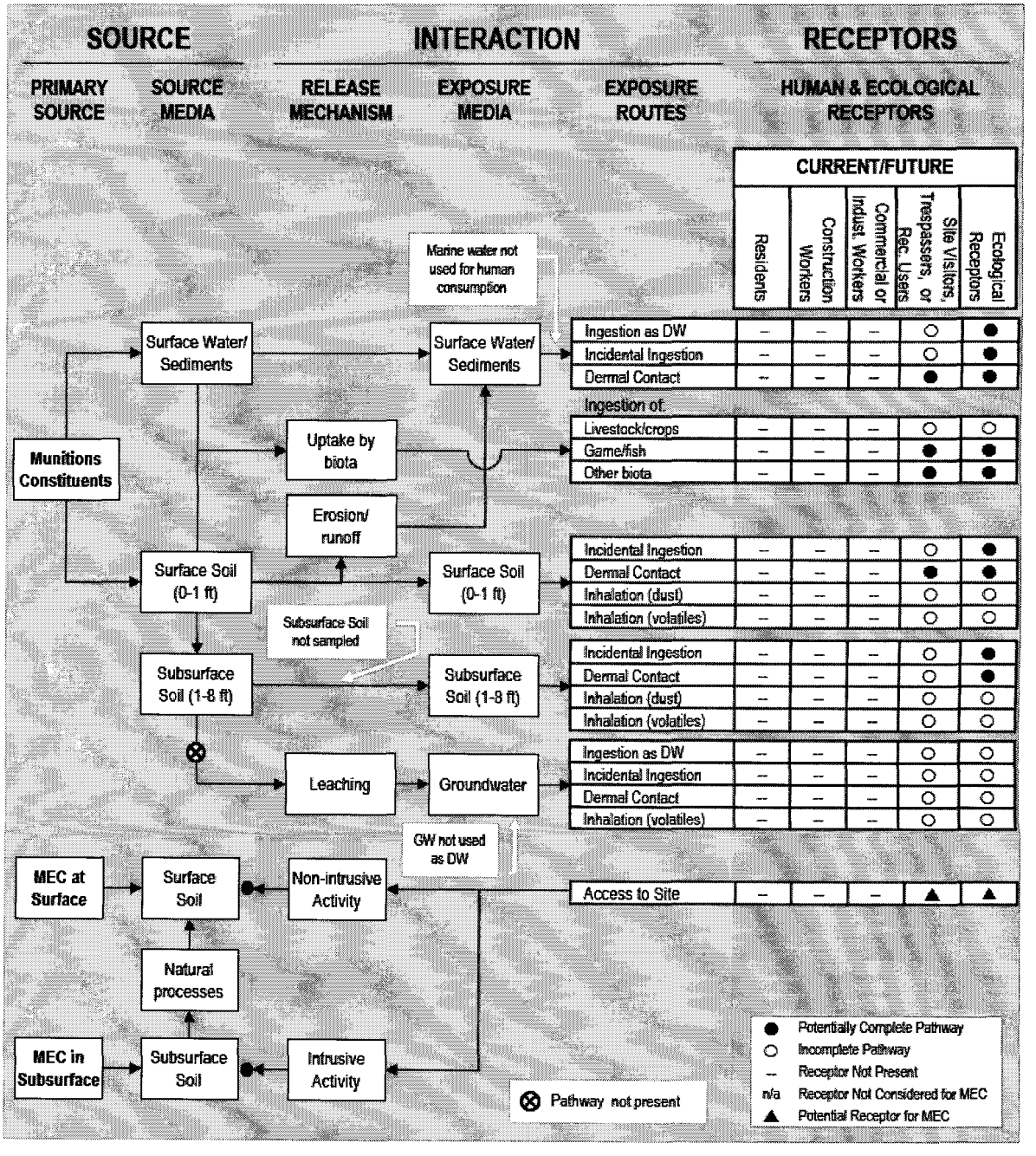

Figure 2-3: MRS 09 MEC/MC CSM

Conceptual Site Exposure Model Diagram

Site/MRS Name: Culebra Island, PR – MRS 13 - Underwater

Completed By: Margaret Zaice, USAE ***Date Completed:*** Octobert 18, 2013

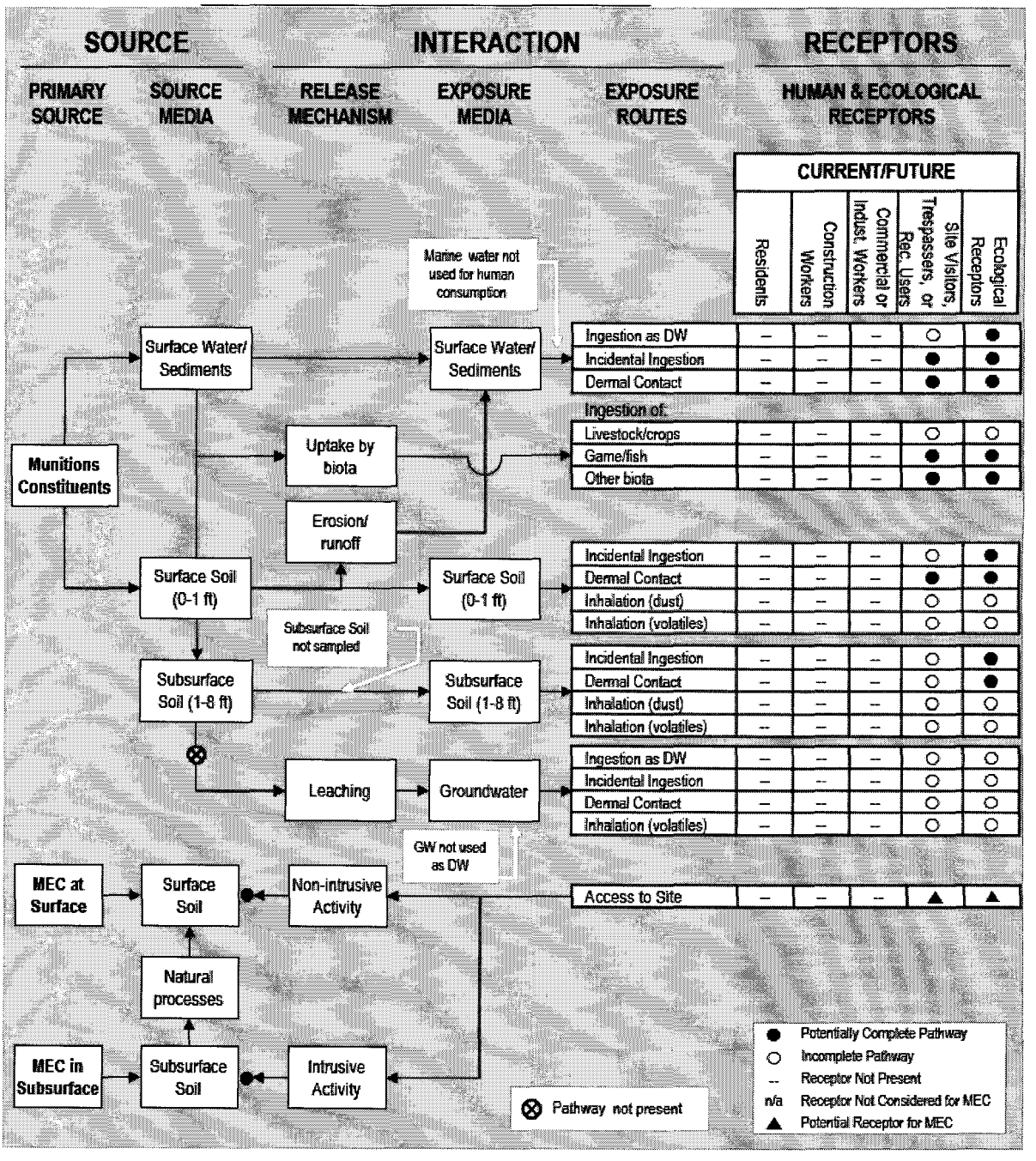

Figure 2-4: MRS 13 MEC/MC CSM

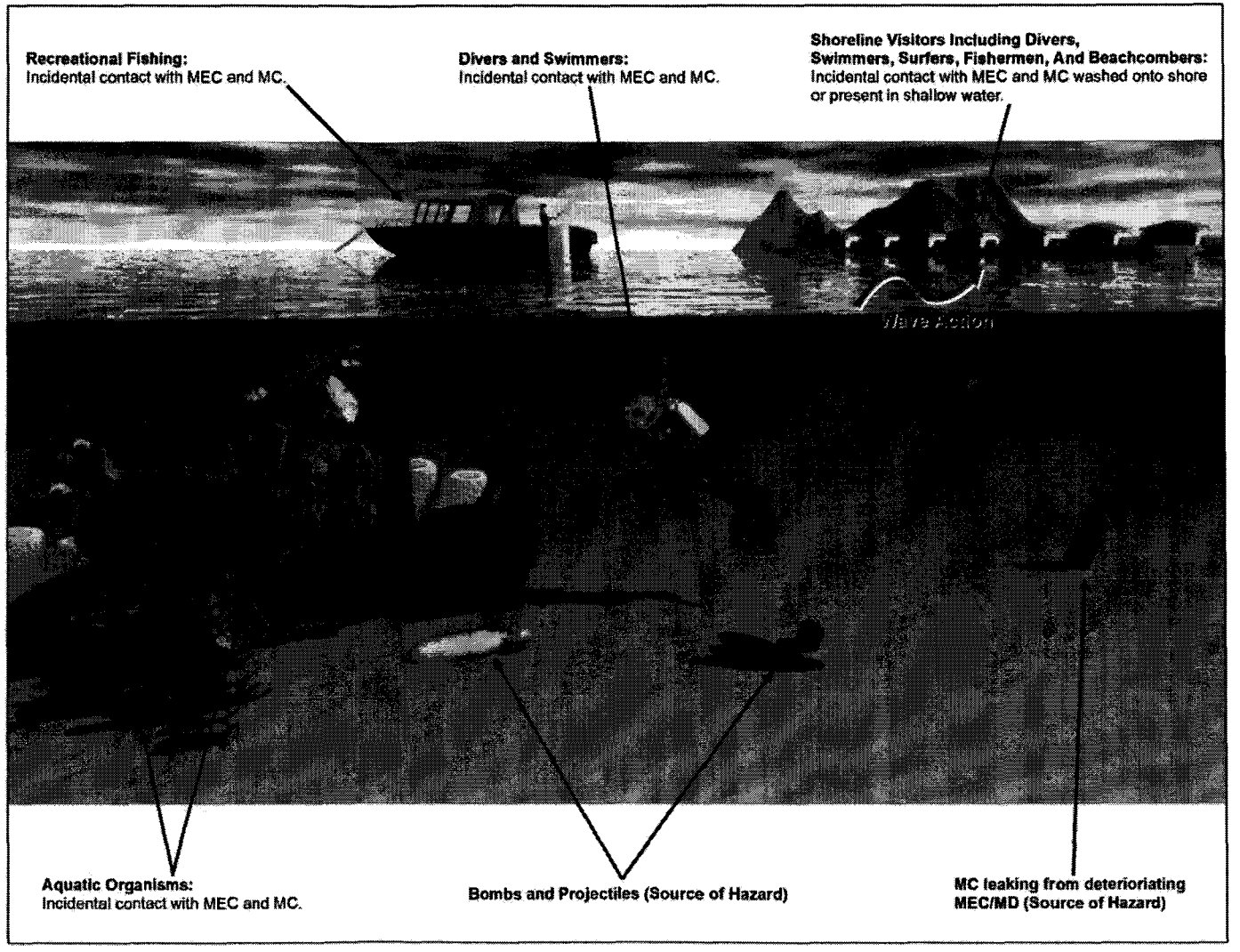

Figure 2-5: MRS 09 MEC/MC CSM

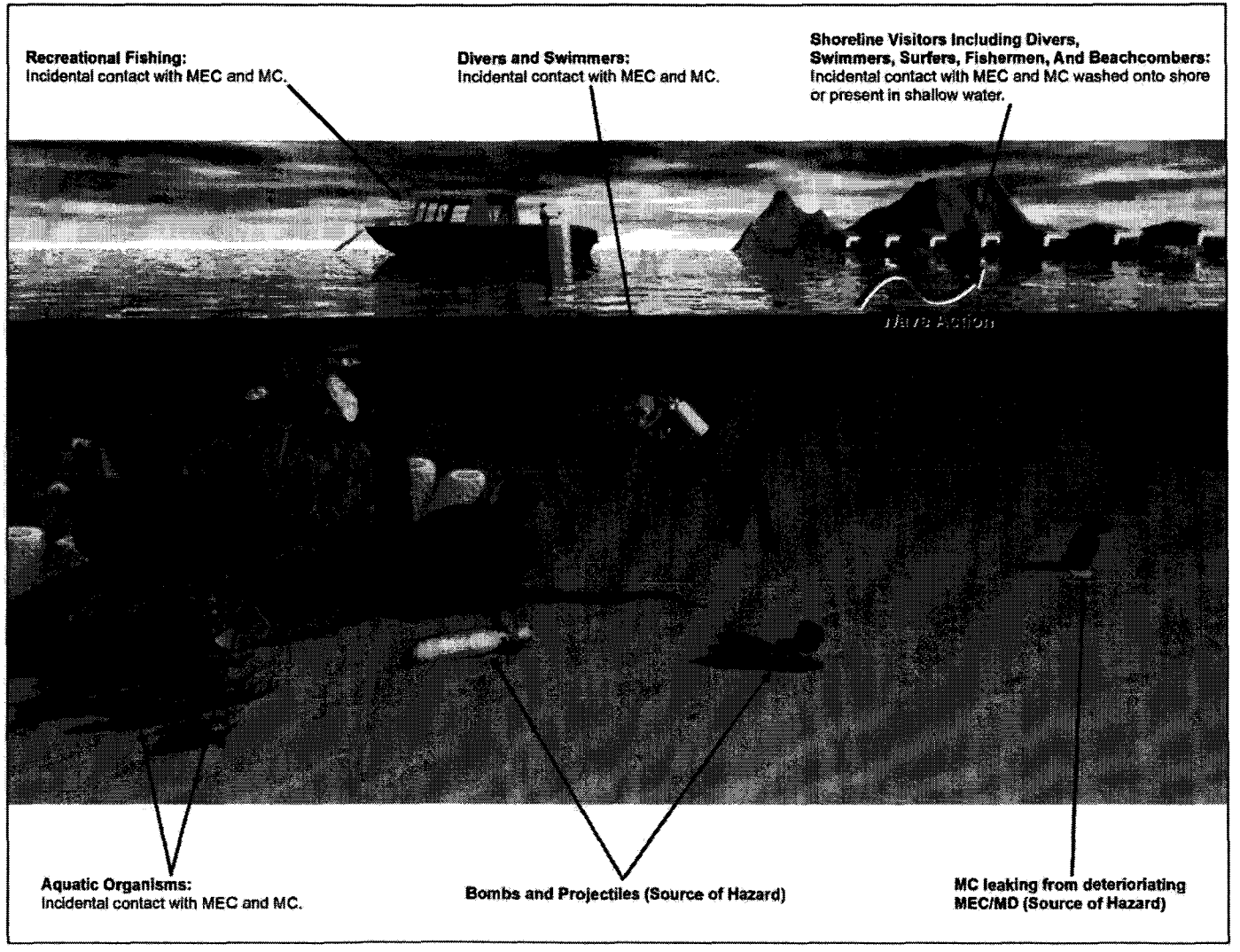

Figure 2-6: MRS 13 MEC/MC CSM

3.0 FIELD INVESTIGATION PLAN

3.1 OVERALL APPROACH TO MUNITIONS RESPONSE ACTIVITIES

This Field Investigation Plan outlines the site characterization goals, Data Quality Objectives (DQO), MEC exposure analysis and the data to be incorporated into the RI/FS report for Culebra MRS 13 and MRS 09. MC exposure analysis can be found in Appendix E, Munitions Constituents Sampling and Analysis Plan (SAP).

3.1.1 SITE CHARACTERIZATION GOALS

The characterization goal for this RI is to characterize the nature and extent of the MEC and MC hazards.

The preliminary project goal is to determine if the surrounding coastal waters within each MRS site is safe for continued use by property owners and the public. Based on this preliminary project goal, site characterization goals include:

- Document available information pertaining to the nature and extent of MEC within each MRS;
- Identify areas where further investigation is warranted;
- Conduct a field investigation of each MRS to characterize the nature and extent of MEC and MC within the MRS; and

Perform qualitative assessment of MEC and MC risk at each MRS (The data collected during this investigation will be sufficient to conduct a hazard assessment for MEC).

The goals identified for MEC will be achieved by:

- Conducting DGM transect surveys;
- Using Analog reconnaissance transects for transects that are not conducive to the underwater EM 61 platforms.
- Developing Anomaly density maps.
- Inspecting transect segment using analog or DGM intrusive investigations in high anomaly density areas. Selected geophysical anomalies will be excavated to identify the presence of MEC/Munitions Debris (MD).
- Additional bounding transects will be analog-surveyed and excavated to refine the extent of each MEC contaminated area, if a high-density area proves to be a MEC contaminated area.

The goal for MC is to establish the presence or absence, and the nature and extend of MC contamination above risk action levels. As part of the underwater investigation, marine sediment samples will be collected from the coastal waters and marine inlets to evaluate the presence of MC resulting from DoD activities. The location and number of the samples collected will be determined by MEC/MD findings during intrusive operations.

- A marine sediment sample will be collected by a UXO SCUBA diver each time a new munitions type is found (i.e., 4.2-inch mortar, 5-inch projectile, BDU-33 practice bomb, etc.). For additional underwater findings of an already sampled munitions type, samples will be collected at a rate of 10%.
- Samples will be collected beneath the munitions if the item has been determined to be acceptable to move, otherwise, the sample will be collected adjacent to the munitions. It is anticipated that any MC exceedances encountered will be highly localized. Therefore, each sample collected will have a companion step-out sample collected at a distance of 4 feet from the initial sample.
- Sediment samples will be collected from a depth interval of 0 to 6 inches in areas where sufficient media is present. The amount of sufficient media is anticipated to be in areas with one inch or more of sediment.

Samples will only be collected in unconsolidated sediments. If only coral, rocks, or bedrock are present, no samples will be collected. All efforts will be made not to harm or harass species located directly adjacent to sample locations.

A secondary goal of the site characterization effort conducted during the RI is to produce sufficient data to facilitate future development and evaluation of necessary remedial alternatives. The field investigation is designed to support this effort by including sufficient DGM and analog surveys, and MC sampling. The data will support the response alternative cost estimates to be developed if an FS is determined to be necessary. The RI/FS will be considered complete upon USACE acceptance of a Decision Document which meets the requirements of ER 200-3-1 and EM-CX Interim Guidance Document 06-04.

3.1.2 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are qualitative and quantitative statements that clarify project objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that are used as the basis for establishing the quality and quantity of data needed to support decisions. These project specific statements describe the intended data use; the data need requirements; and the means to achieve acceptable data quality for the intended use. DQOs established for the EBS activities meet the U.S. EPA *QA/G-4HW* Guidance's 7 step DQO criteria. Table 3-1 presents the Project DQOs for the EBS activities.

Table 3-1: Project Data Quality Objectives

DQO STEPS	MRS LOCATIONS
	Underwater Areas of MRS 09 and MRS 13
1. State Problem(s)	Based on historical data, previous investigations, suspected MPPEH items identified during the EBS visual survey, reports of UXO sightings in the water by civilians, and documented UXO findings on land, MRS 09 and MRS 13 are confirmed to have been used for DoD training operations using munitions with an explosive potential. A. Receptors Human receptors include residents and tourists who use the underwater portions of MRS 09 and MRS 13 for diving, snorkeling, swimming and fishing. The underwater portions of MRS 09 and MRS 13 are known to contain threatened and endangered ecological receptors and critical habitats. B. MEC It is highly possible MEC is present in the underwater (benthic) portion of MRS 09 and MRS 13, and may present an explosive hazard to human and ecological receptors and critical habitats. C. MC It is possible that MC from munitions remaining on-site and deteriorating in the marine waters, may have contaminated marine sediments present within the MRSs.

DQO STEPS	MRS LOCATIONS
2. Identify the Decisions	The decisions that need to be made to guide this investigation are in three general areas. A. Sensitive ecological receptors and critical habitats • Determine the species and habitats present in the study area. • Determine the presence of and identify Listed Endangered or Threatened Species and critical habitat present in the near vicinity or on MEC/MPPEH. • Determine what removal or disposal procedures, and equipment to be used, will best protect the ecological resources and still remove or dispose of the hazard. • Determine the acceptable level of hazard to expose UXO SCUBA divers to in the process of protecting environmental resources. B. Potential Target Areas Establish presence/absence of potential target areas within MRS underwater investigative areas; if present, characterize nature and extent of contamination present. • Intrusive investigations will determine whether MEC is present of not. . • Determine which procedures and equipment will be most appropriate to accurately detect MEC in the different marine environments present (shallow water, deep water). • Determine how investigative transects will be placed to characterize the presence of MEC with a 95% confidence of determining elevated anomaly density areas while protecting ecological resources and adequately considering the safety of UXO SCUBA divers. • Determine the level of acceptable hazard for divers. • Establish which anomalies identified in the geophysical/analog investigation will be intrusively investigated. • Transects designed with VSP will determine areas of high density that may indicate a target area • When MEC are found, determine the disposal method appropriate to the item found which will protect ecological resources and minimize hazard for divers. • Determine what methods and standards will be used to delineate the estimated extent of contamination identified. C. MC Establish presence/absence of MC contamination of marine sediment within MRS underwater investigative areas; if present, characterize nature and extent of MC contamination of marine sediment within MRS underwater investigative areas. • Determine what receptors are present • Determine the number of samples and locations where samples will be collected. • Determine what analytes will be evaluated • Determine what background values and screening values will be used to identify COPCs for risk assessment. • Determine if levels of detected MC present an unacceptable a risk to human or ecological receptors in a baseline risk assessment. • Determine how the extent of any contamination from MC determined to present an unacceptable risk to human or ecological receptors will be delineated.

DQO STEPS	MRS LOCATIONS
3. Identify Information Inputs	A. To establish presence/absence (nature and extent if present) MEC contamination: • Baseline Survey Report data (Relative position of identified endangered species/ critical habitat, suspected MEC items identified), • Current/ future land use, potential receptors and accessibility (CSMs), • Historical records review (ASR, previous investigations), • Terrestrial RI data, • Presence of surface MEC items discovered within underwater investigations of the MRS (Bathymetry, Side Scan Sonar (SSS), visual data from geophysical investigation), • Presence of subsurface MEC items from information gathered in the intrusive investigation based on data from the geophysical investigation. • Validation of the geophysical equipment and positioning equipment area functioning correctly for daily instrument testing. • Information from additional transects as necessary to refine characterization of high density areas, if established. B. To establish presence/absence (nature and extent if present) of MC contamination: • The nature of contamination will be determined from analytical data from discrete samples collected from marine sediments on the seafloor surface at transect locations where MEC items are found. – The list of MC analytes will be developed from the types of munitions suspected or identified as used at the MRSs. – The background levels will be established from samples collected in areas within the MRS separated from locations of MEC/MD. • The screening values: – Human Health: USEPA Regional Screening Level (RSL), residential soil, May 2013. Carcinogens divided by a factor of 10; – Ecological: USEPA Region 4 Ecological Screening Values (ESVs), November 30, 2001, supplemented with Los Alamos National Laboratory, EcoRisk Database (Release 3.1), October 2012 and USEPA Region 5 ESVs, August 22, 2003 when no value was available. • The extent of contamination identified will be determined from confirmation sampling conducted in a phased approach, according to the procedure described below in 4.B. C. Production data from the RI will be used to support cost estimates for the Feasibility Study Report and future remediation efforts.
4. Define the Boundaries of the Study	The overall horizontal extent of the RI study boundary consists of the underwater (benthic) areas of MRS 09 and MRS 13. The underwater boundaries were established as the area most likely to be used by the anticipated human receptors (residents and tourists swimming, snorkeling, diving, and fishing in the area) and the areas that DoD usage is suspected to have taken place. A. MEC • Horizontal Extent – The horizontal extent of the study is the MRS, with stepouts as needed based on RI findings.

DQO STEPS	MRS LOCATIONS
	– Areas identified with MEC presence will be bounded by step-out transects that are half the investigated transect spacing. The transects will be placed on both sides of the transect that produced MEC. The only exception is when the stepout transect would endanger coral, due to the stepout transect being placed onshore or too shallow water. Stepout transects will be investigated as analog and dig with analog instruments. • Vertical Extent – The vertical extent of the MEC is from the surface of the seafloor to the maximum depth of detection of the geophysical instrument in use, or to coral reef, consolidated hard bottom or bedrock, whichever is reached first. It is possible MEC may be above the seafloor but embedded in coral growth (The EM platform or UXO SCUBA diver held analog metal detection instrument deployed and deemed appropriate for each situation is identified in the technical approach of the WP. The type of instrument and platform are based on amount of submerged vegetation, presence of coral, bottom relief and depth of water.). • Intrusive Investigation – Intrusive investigation will be performed by hand, using hand tools, and will only occur in unconsolidated sediments. Procedures will vary depending on if seagrasses are present or not. The UXO SCUBA Divers will follow the appropriate SOPs when performing intrusive investigations. – The population of MEC-like anomalies to be intrusively investigated will be those anomalies identified along the planned transects. The numbers of anomalies investigated will vary according to the anomaly density detected in the area. The definition of high, medium and low density will be established using VSP statistical tools with data from the geophysical investigation. Anomalies removed will be based on type of anomaly and MEC hazard present, taking into consideration sensitive ecological receptors, critical habitats and hazards to UXO SCUBA divers. – If a MEC item is found embedded in or with listed or proposed to be listed as threatened or endangered coral colonies attached, the item will not be disturbed, and the hazard present will be discussed with the PDT, to determine a path forward. B. MC • MC will be investigated at transect locations where MEC items are found. The number of samples and their location will be based on MEC findings. – An investigative sample will be collected within each MRS at each MEC finding of a new munition type. At locations of repeated findings of the same munition type, samples will be collected at a rate of 10%. – The vertical boundary for the MC investigation will include marine sediments from a depth interval of 0-6 inches below the seafloor. However, if a MEC item is found deeper than 6 inches, the sample will be collected beneath the item (if safe to move) or adjacent to the item at the same depth. – If a MEC item is found in coral or in consolidated sediments, no sample will be collected. • Extent of MC contamination will be investigated in the following phased approach. – Analytical data from one sample will be collected 4 ft from the location where a MEC investigation sample is collected, to establish if potential contamination is localized to the munitions finding. This sample will be collected immediately prior to collection of the MEC sample, to avoid cross contamination. – Additional step-out samples to be determined by project team based on level of unacceptable risk present.

DQO STEPS	MRS LOCATIONS
	– QA and QC samples will be collected as defined in the FSP, Appendix E. C. Temporal Boundaries • In-water detonations will be avoided during coral spawning events (August) and Turtle Hatching events (identified by the team biologist as they occur).
5. Develop a Decision Rule	A. Characterization of Underwater Habitat: If endangered and/or threatened species and/or critical habitat within planned investigation areas are encountered, the field team will follow procedures for their protection in accordance with the Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat during Underwater Investigations which can be found in Appendix K. B. Characterization of MEC contamination: Geophysical investigation methods will be used to evaluate potential MEC presence. The Geophysical investigation determines that metallic anomalies are present, but doesn't identify the anomaly as MEC. An intrusive investigation will be conducted to determine which metallic anomalies are MEC. Types of equipment used will be chosen based on the type of environment in which the transect is located. Information related to types of equipment is located in Chapter 3, Section 3.2, Underwater Geophysical Investigation and Section 3.3.3.1, Intrusive Investigation of this WP. • Dig Selections: – If an anomaly detected during the geophysical investigation meets anomaly selection criteria (i.e, is above a background threshold determined by the IVS and based on professional judgment) and is placed on the dig list, and used to generate an Anomaly Density map. If the anomaly is in a high density area (e.g. ≥ 30 targets/acre or ≥ 20 targets above background), then the anomaly will be investigated intrusively. USA funded assumptions: 10 high density areas with a total of 100 EM anomalies in MRS 09 (includes EM or Analog anomalies within step out transects) and 158 EM anomalies in MRS 13 (includes EM or Analog anomalies within step out transects). – A random selection of low density area transect EM targets (up to 10 targets in MRS 09 and up to 16 targets in MRS 13) will be investigated to confirm that these areas are not MEC contaminated. If no high density areas are identified, then more low density area targets may be investigated, up to a maximum of 100 targets in MRS 09 and 158 targets in MRS 13. • MEC Hazard present – If no MEC-related items are found in an area based on intrusive investigation, then the area will be considered un-impacted by MEC. If anomalies are identified as MEC or MD indicative of high explosives, then the area will be considered contaminated by MEC. The extent of the hazard will be bound with stepout transects placed at a distance of half the original transect spacing from the outer boundary of the contaminated area. – If the area is contaminated with MEC, then the MEC hazard present will be evaluated in an assessment supported with data from a MEC HA, historical data, and professional judgment. • MEC Removal – If an item is determined to be MEC and is deemed unacceptable to move onshore for demolition, the item will be marked by a clump and video/photos will be taken of the item and the surrounding area, and the location will be captured by GPS (the DGM anomaly location may also be used in place of marking with a separate GPS). If the MEC item has Listed Threatened or Endangered species attached or

DQO STEPS	MRS LOCATIONS
	affixed to the reef adjacent to the MEC item, and it is determined that removing or detonating the MEC item will harm or injure the Listed Species, the item will be left in place for further determination by the government. – If a MEC item is deemed acceptable to move, then procedures identified in Chapter 3, Field Investigation Plan of this WP will be followed. C. Characterization of MC contamination: • If an MC analyte is undetected or is detected at concentrations less than background levels, then the area will be considered uncontaminated by that MC analyte and it will not be investigated further. • In areas where MC analytes are detected at concentrations greater than background levels, as established in the SAP (Appendix E), the analyte will be considered a Contaminant of Potential Concern (COPC) and retained for consideration in a baseline risk assessment. – If the baseline risk assessment determines the contamination is localized to the location of the munition, based on information from the companion sample collected at the same time, there will be no further investigation. – If the baseline risk assessment determines an unacceptable risk to human health or ecological receptors, and the contamination is also present at the companion step-out sample, then the TPP team will evaluate the magnitude of the unacceptable risk and further step-out sampling may be planned.
6. Specify Limits on Decision Errors	Measurable decision errors are limited to the field and analytical QC processes for survey coverage. A. MEC Investigation • All geophysical activities will achieve applicable Measurement Quality Objectives (MQOs) as stated in Chapter 3, Field Investigation Plan and confirmed/modified by the Instrument Verification Strip (IVS), unless MQO failures can be adequately explained or justified. B. MC Investigation • All sampling and analysis will achieve the MQOs outlined in the SAP, unless MQO failures can be adequately explained and/or justified.
7. Develop the Detailed Plan for Obtaining Data	A. Characterization of species and habitat The plan for evaluation of species and habitat within the underwater study area was developed in the WP for the EBS. B. MEC The investigation transects were designed in Visual Sampling Plan (VSP) software for detection of a MEC contaminated area by determining elevated anomaly density areas with a 95% confidence level above a background density. The VSP designed transects are realigned to consider bathymetric contours delineated in the 2013 EBS Report, sensitive ecological receptors and critical habitat. The transect design separation varies based on the specific area, from 225 ft to 250 ft. Transect width for the geophysical investigation is 3 ft. Data collection procedures and associated QC measurements are included in the Field Investigation Plan in Chapter 3. C. MC The detailed sampling plan for field procedures and laboratory analysis is outlined in Appendix E, the SAP.

Footnotes:
[1]*For the purposes of this DQO, "accessible" means:*

- *For Vessels: That access to the water portions of the MRS is not hindered by water depth, shallow rock or coral formations, or unsafe sea state conditions (consistently rough seas).*
- For Snorkeling or SCUBA Personnel: *That access to the water portions of the MRS is not hindered by unsafe sea state conditions (consistently rough seas).*

3.1.3 DATA INCORPORATION INTO THE RI/FS REPORT

The EBS Report, the Phase 2 and 3 field data, along with pertinent information provided by the local community, and the significant findings within each MRS will be incorporated into the RI/FS Report. Maps will be provided which show the transect designs, locations of the areas surveyed, intrusive investigations, and the locations, type, and nomenclature (if possible to determine) for MPPEH/MEC discovered. Personal Digital Assistant (PDA) GPS/Data Collection equipment will be used to record location data. A waypoint, brief description, and digital photograph will be electronically recorded for any MEC related items.

Locations and descriptions of craters or target remnants will also be recorded. A digital video, along with a detailed physical description of MEC and the natural resources in which they reside (for items left in place and not disposed of due to anticipated impact to listed threatened or endangered species), will be taken.

3.2 PHASE 2: UNDERWATER GEOPHYSICAL SURVEY

Phase 2 field activities will consist of performing geophysical surveys along the re-aligned RI transects established during Phase 1 (See Appendix B: Site Maps, Figures B-1 through B-9). The objective of these activities will be to collect EM anomaly data.

Table 3-2 presents the work elements and the supporting documents where the procedures for the work elements are discussed in detail.

Table 3-2: Project Activities and Supporting Documents

Definable Feature of Work	Supporting Document(s)
Mobilization	Appendix K: SOP
Site Specific Training/ IVS Certification	Section 3, Appendix L: Dive Operations Plan, Appendix K: SOP, Appendix D: APP
Snorkeling Operations	Appendix L: Dive Operations Plan
DGM Survey	Section 3, Section 6, Appendix K: SOP, Appendix L: Dive Operations Plan
Small boat operations	Section 6, Appendix K: SOP, Appendix D: APP

Transect spacing is designed to detect a 500-ft radius, circular target area, with a background anomaly density of 10 DGM targets/acre, and a MEC contaminated area anomaly density of 30 DGM targets/acre (20 above background). The transect width was set at 1m, the width of an EM61 coil. The 250-ft transect spacing provides a 100% probability of traversing the MEC contaminated area (see Appendix G: VSP Report for MRS 13). Due to the small amount of acreage being investigated VSP was not used in transect design for MRS 09. Instead, transect spacing was established at 225 ft, to ensure a 500-ft radius, circular target area, with a background anomaly density of 10 DGM targets/acre, and a target area anomaly density of 30 DGM targets/acre (20 above background).

For transects containing coral/rock and consolidated hard bottom, and/or Listed Threatened or Endangered Species, the survey methodology to be used will be tailored to cause minimal impact to the underwater environment. The underwater EM geophysical coil will be deployed using three types of system platforms, including 1) an EM61 sled, 2) an EM61 floating platform, and 3) an EM61 ROV platform

(see Figure 3-1 and Figure 3-2). As there is not a single EM system that will meet the objectives of the DQOs, multiple platforms will be used to survey the designated areas.

Figure 3-1: EM 61 Sled and EM 61 Floating Platforms

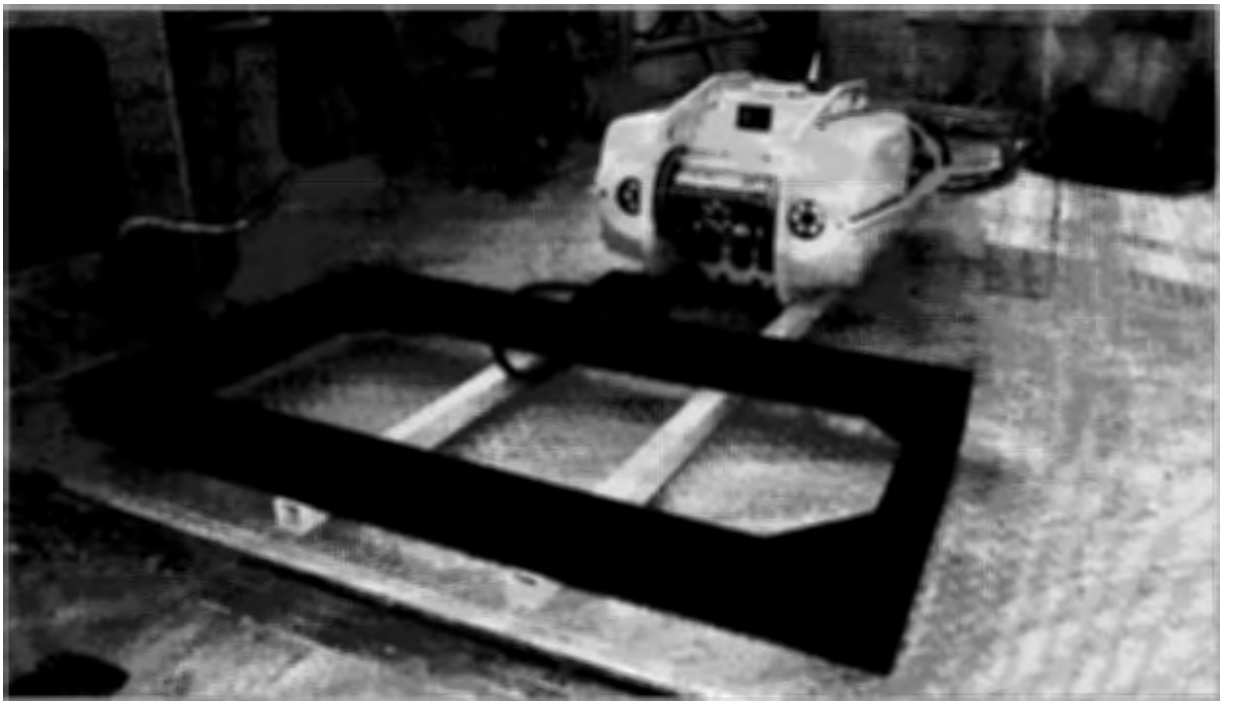

Figure 3-2: EM 61 attached to ROV

The system used in any given area will depend primarily on depth of water and habitat type present. Based on the analysis of all of the EBS data, USA has assigned EM platforms to each of the RI transects/segments based on benthic habitat. Appendix B: Site Maps, Figures B-10 – B-13, illustrate the EM platform deployment for MRS 09 and MRS 13, with each color-coded to indicate the proposed EM platform that will be used. Descriptions of each EM platform are provided in the following sub-paragraphs, and methods/procedures for deployment are contained in Appendix K: Standard Operating Procedure (DSOP 11).

The selection of an applicable survey platform was based on the depth of water (bathymetry data) and type of bottom (corals, seagrass, etc.) from Phase 1 activities, and the anticipated sea state and the

means in which the platform would be moved along segments of the transect. The start and stop points were also clearly identified by GPS coordinates, to ensure the EM platforms are switched out at the correct points within the transect.

The EM sled is designed to keep the Tx/Rx coil as close to the seafloor as possible to maximize the detection depth of buried MEC/UXO. The system can be towed across the seafloor on wheels, depending on bottom conditions. The sled can have a forward facing camera mounted on it with a real-time feed to the survey vessel. The EM sled is positioned with the RTK DGPS antenna mounted on a mast, if used in shallow water, or using an ultra-short baseline (USBL) acoustic positioning system in deeper water. The sled is used in unconsolidated sediments where no corals or obstructions are present.

The EM ROV platform is used to propel the Tx/Rx EM coil along the transect in deeper water where corals or obstructions are present. The ROV is equipped with a pressure sensor, altimeter, pitch sensor, roll sensor, and video cameras so real time monitoring of the coil is possible. The ROV is maintained under positive control by the ROV operator at all times, lending the ability to maneuver the ROV/EM coil around challenging bottom types (coral heads/ boulders). The EM coil is mounted in front of the ROV so it will be in the camera view at all times. Accurate positioning for the ROV and coil will be supplied by a USBL system set up between the survey vessel and the ROV system. The altitude will be monitored real-time by the ROV operator, and the survey will be conducted with the coil within 1 meter of the bottom as conditions allow. As corals often grow taller than 1 meter, the ROV will either divert around or go over the corals as needed and return to the preplanned transect/altitude as soon as it can safely do so.

As the accuracy of USBL positioning degrades significantly in shallow water, the float system will be used for data collection where applicable. The float system consists of a floating raft which supports a rigid mast. A Tx/Rx EM coil is rigidly attached to the bottom of the mast. This allows for the EM coil to be deployed beneath the water surface at a fixed depth which can be adjusted depending on the depth of the planned transect. The EM floating platform provides a means to float the EM coil in shallow waters over coral reefs or areas with obstructions along the bathymetric contour line. The EM float can be towed by a boat or pushed along by snorkelers. RTK-DGPS provides real time positioning by using the antenna mounted on the floating platform which is centered over the EM coil at the bottom of the rigid mast. The coil will be set at a depth so that it will be within 1 meter of the bottom along the pre-planned transect.

DGM surveys conducted from the survey vessel will be limited to areas with 4-ft or greater depth. All shallow water depths of 2-4-ft will be collected by a snorkeling team as part of the shallow water survey activities outlined in Section 3 of this WP. The EM Floating Platform will be used when coral/rock and consolidated hard bottom is present and in waters with depths between 2 and 20 ft. Snorkelers will swim the EM Floating platform when the depth of the water is too shallow for the boat to navigate. The EM ROV Platform will be used in waters deeper than 20 ft. For DGM transect surveys in unconsolidated sediments, the EM Sled/Cart Platform will be used.

DGM surveys will be conducted aboard a vessel with the approximate dimensions of a 30-ft fiberglass or aluminum small boat with a 10 ft wide beam and drafts 2.5 ft. The vessel operator will be a United States Coast Guard (USCG) licensed 100-ton Captain. All safety equipment will be certified by the USCG. The survey vessel will have a forward cabin where equipment can be stored and utilized in case of rain or bad weather. An on-board or portable generator will supply required power. The survey vessel will utilize a GPS Chart Plotter with depth finder. In addition, a 17-ft to 26-ft work boat (minimum of one) will serve as a support vessel to aid with GPS survey equipment (signal repeater), and to provide exclusion zone control while conducting surveys. All boats will utilize existing mooring buoys or will utilize the anchoring procedures outlined in this WP and Appendix K (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat.

Table 3-3: Performance Metrics of Marine DGM Survey

Metric/Test	Applicability	Performance Standard	Frequency	Failure Consequence
Static repeatability (instrument functionality)	All	Response (mean static spike minus mean static background) within 10 percent of value from initial static test with the test item	Twice daily (beginning and end of the day)	Day's dataset fails.
Dynamic Repeatability	IVS	IVS seed item dynamic response within 75% of initial measurement or average of initial 3 IVS runs, position offset less than 2 meters.	Once daily (beginning of the day)	Day's dataset fails
Along-line measurement spacing	All	98% <= 50 cm along line	By dataset	Dataset submittal fails.
Speed	All	95% less than 5 miles per hour	By dataset	Dataset submittal fails unless new maximum speed successfully demonstrated at IVS.
Target selection	All	All dig list targets are selected according to project design	By transect or dataset	Submittal fails.
Geodetic equipment functionality	All	Position offset of known/temporary control point within 10 cm.	Once Daily (beginning of the day)	Redo affected work or reprocess affected data.
Geodetic accuracy	Points used for RTK base stations	Project network tied to HARN, CORS, OPUS or other recognized network. Project control points that are used more than once must be repeatable to within 10 cm.	Repeat occupation of each point used monthly.	Reset points not located at original locations or resurvey point.
DGM Transect Deviation	All accessible DGM Transects	All planned and accessible DGM transects are followed within +/- 10 m	By Transect or dataset	Transect segments exceeding the 10m offset will be resurveyed.

3.2.1.1 IVS

Under the direction of the Site Geophysicist, USA will establish two IVSs to perform underwater EM transects. Phase 2 will have two different types of IVSs. The first IVS will be established from the water's surface in approximately 15 feet of water, and seed items will lie on the surface of the seafloor. This IVS will allow for the evaluation/verification of the EM ROV and Floating platforms without the need for SCUBA Divers to place the IVS seed items below the seafloor. The second IVS will be placed in approximately 25 feet of water by divers at a later date when there are only EM Sled transects left to be completed. The placement of the second IVS will be part of the training dives witnessed by the DDC, and will consist of IVS seed items below the seafloor.

Prior to the construction of either IVS, a pre-survey of the proposed locations will be conducted to ensure there are no anomalies already present that would interfere with the constructed IVS. Should anomalies be found, the survey will be expanded. If the expanded survey still finds existing anomalies, an alternate location will be chosen and pre-surveyed until a suitable location is found.

Both IVS's will be constructed using two small and two medium Industry Standard Objects (ISO) oriented horizontally (least favorable orientation) and will be placed approximately 15 feet apart. The shallow IVS will be seeded with items laid on the sediment, attached to non-metallic weights in order minimize the chance of movement once placed on the seafloor. The as-installed locations will be surveyed in with the real-time kinematic differential global positioning system (RTK DGPS) system. The RTK DGPS antenna will be mounted on top of a long pole and the pole will be placed on the item from the surface, and the location of the item will be recorded once the pole is vertical. A part of the IVS, with no seed items, will be used to establish dynamic background noise levels for each EM61 channel. The EM platform will be processed through the IVS using multiple passes in order to ensure all items are reliably detected. The second IVS will be constructed as follows. The location of the first and last items will be initially marked with weighted buoys dropped from the surface. The divers will then go down and attach a measured line between them. The line will be drawn taut and the ISOs will then be buried per the IVS design. Each ISO will have a piece of flagging tape attached to it of sufficient length that it will be exposed above the sediment surface once they have been reburied with sediment. This will facilitate their recovery following the survey. Following construction of the IVS, the blocks, buoys, and lines will be recovered. The as-built locations will be determined using the results of the first survey of the IVS. The initial IVS survey will be conducted with transects in both directions and with 100 percent coverage. This IVS will be used to verify the performance of the EM sled.

Table 3-4: Planned IVS Layout

Seed Number	Type	Distance along line in Feet	Shallow IVS Burial Depth	Deep IVS Burial Depth
1	Small ISO	0	0	7.6 cm
2	Small ISO	15	0	17.8 cm
3	Medium ISO	30	0	15.2 cm
4	Medium ISO	45	0	35.6 cm

3.2.1.2 Pre-Survey Preparation

Prior to commencing DGM operations, the survey team will review applicable ESA requirements (Appendix K (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat) related to conducting DGM activities. The survey team will then assemble the EM61 associated equipment and platforms, RTK-DGPS. At dockside, the team will verify that each component is installed on the vessel correctly, is working individually, and that the survey software is receiving data from the EM61.

The RTK-DGPS base station will be established on an established control point [certified by a PR Professional Licensed Surveyor (PLS)] located near the project site prior to the vessel leaving the dock. The required position QC check will be performed prior to conducting survey activities (see Table 3-3).

Prior to conducting DGM survey activities, the team will move the vessel to the IVS for equipment operation verification (see Table 3-3). The team will also do a complete operational test of all field equipment and generate an initial IVS report documenting system performance of each EM platform, and finalizing DGM metrics, including an initial DGM Transect anomaly selection channel and threshold value.

3.2.1.2.1 DGM Survey Operation

Using the pre-approved EM platform for each transect, or transect segment, the survey team will ensure that the line to be surveyed is the active line on the data logger. The vessel operator will begin the approach to the line with sufficient space to ensure a straight entry for the sensor platform. The survey

team will begin logging data at the start of each survey line. Checks will be periodically made to ensure the data is logging and that sensor and position data are valid. Once at the end of the survey line, logging will be stopped. The previous survey line should increment or decrement to the next survey line to be run.

3.2.1.3 Vessel Operation Practices

The vessel operator will carry and consult appropriate NOAA nautical charts, NOAA benthic habitat maps and aerial photographs to locate potential coral reefs, colonized hard bottom and seagrass areas. Combining information from aerial photographs with hydrographic data will help to ensure that nautical charts are accurate. The vessel operator and survey team will maintain a vigilant watch for coral reefs, colonized hard bottom and seagrass areas to avoid running aground or striking protected species. Real-time data (e.g. GPS with nautical chart and depth finder on boat) will be continuously observed to verify water depths and vessel location. From the water's surface, some coral areas may appear golden-brown. These areas should be avoided to keep from running aground. The vessel operator will stay at a minimum of 4 feet from the bottom of the vessel to the top of coral areas, to avoid accidental grounding, propeller wash, and propeller scarring. Vessels will be maintained away from areas with corals and seagrasses. Operations will be conducted in such manner that bottom scour or prop dredging will be avoided at all times. The vessel operator and survey team will consult Appendix L, which provides further details on endangered species and critical habitat mitigation measures related to vessel and equipment operation.

3.2.1.3.1 Processing DGM Data:

Following the survey, the DGM data will be processed and analyzed. Standard Oasis software will be used to generate X, Y, Z files, survey and target databases, color shaded relief maps, and GeoTIFF files for each map. Analysis of daily IVS data will include a running report (spreadsheet) of seed item response values, comparison to published response values, seed item location accuracy, and background noise values. Transect data will be analyzed using an anomaly selection EM61 channel and threshold value established at the initial IVS testing. USA expects an initial anomaly selection threshold 3 to 5 times the background noise values established at the IVS. The transect DGM target database(s) will be exported to Excel files, and will be used to develop anomaly density maps, either in ESRI or VSP. Transect DGM anomalies associated with high density areas will be selected for intrusive investigation.

3.2.2 SCUBA/SNORKEL INSTRUMENT AIDED VISUAL SURVEY

Upon completion of DGM field activities, USA will field a SCUBA or Snorkel Survey Team to conduct an underwater analog instrument aided visual survey within the water areas of each MRS, in areas that DGM surveys were not conducted due to sea conditions or accessibility. Positional data will be collected using a Trimble GEOXT. The SCUBA/Snorkel Instrument Aided Visual Survey will follow Appendix L: The Dive Operations Plan and adhere to the guidance contained in Appendix K (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat).

Items that reflect characteristics of MEC discovered on the surface will be investigated at the time of discovery. If the habitat type is unconsolidated sediments, and snorkeling is the method used the intrusive investigation on an anomaly can be completed as long as the snorkeler is not submerged. However, in most cases, the snorkeler will mark the location with GPS point and the anomaly will be processed during Phase 3 with SCUBA divers. If SCUBA is the survey method used the anomaly can be excavated and the intrusive investigation can be completed at the time of the discovery. There will be no excavation of anomalies in corals or consolidated hard bottoms. The SCUBA diver or snorkeler will record video footage of the the area prior to excavation and then again after excavation and document item found and the surrounding underwater environment.

3.3 PHASE 3: UNDERWATER INTRUSIVE INVESTIGATIONS

3.3.1 UNDERWATER INTRUSIVE INVESTIGATION DESIGN AND RATIONALE

This section describes the project design and rationale for the intrusive investigative portion of the RI at MRS 09 and MRS 13. The MEC/MPPEH removal that is incidental to the RI is designed to remove the munitions used at the site which were discovered during Phase 2 and 3.

Table 3-5 presents the work elements and the supporting documents where the procedures for the work elements are discussed in detail.

Table 3-5: Project Activities and Supporting Documents

Definable Feature of Work	Supporting Document(s)
Site Specific Training	Appendix L: Dive Operations Plan, Appendix K: SOP, Appendix D: APP
SCUBA and Snorkeling Operations	Appendix L: Dive Operations Plan
Underwater Demolition	Section 6, Appendix K: SOP, Appendix L: Dive Operations Plan, Appendix J: Explosives Site Plan (ESP)
Surface Demolition	Section 6, Appendix K: SOP, Appendix J: ESP
Raise Tow and Beach of MEC/MPPEH	Section 3
MPPEH Management	Section 3 & 5, Appendix K: SOP
MDAS Management	Section 3 & 5, Appendix K: SOP

3.3.1.1.1 Site Specific Training

The USA Field Management Team will familiarize field personnel, including subcontractors, with the site and will evaluate launching points, IVS site, MEC/MPPEH beaching locations and boat routes, USA magazine location, supporting and storage sites, survey control points, vessel layout and safety equipment and procedures for firefighting on the vessel.

The UXOSO will give a project specific brief on hazards that may be encountered, discuss emergency procedures and provide directions to the nearest emergency care facility. The UXO Dive Supervisor will discuss safe boating techniques and describe the Diving Operations Plan. Briefings will be conducted covering the project Work Plan and its appendices. Additional focus will be provided for Appendix K USACE Standard Operating Procedures for Endangered Species Conservation, Safety Equipment (O2 systems, spine board, etc), man-overboard procedures, injured or unconscious diver/snorkeler procedures, emergency contact phone numbers, review of the APP and AHAs. All project personnel will be required to read and sign the project WP, APP, AHA, and SOPs.

The primary methods for communications will be covered during the site specific training. Primary method for communications will be VHF with alternate communications is cell phones. All project team members will be provided a handout with call signs and the team's cell phone number along with all the emergency phone numbers found in the Emergency Management Plan of the Dive Operations Plan.

Diving requalification dives are conducted during this phase of work, the dive team will demonstrate their efficiency with all underwater equipment that is anticipated to be used during the project. These dives are to be conducted outside of the MRSs and in a safe environment. The team also develops their recovery procedures for an unconscious and injured diver/snorkeler. Once a workable process has been identified it is to be documented by the UXOSO and then exercised once per week for the remainder of the field work.

3.3.1.2 Analog Geophysical Instrument Verification Strip Certification

A land based IVS will be will be established on MRS 09 Beach or suitable site in an area free from metal debris. The UXO SCUBA divers will process through the land IVS with their analog metal detectors while witnessed by the UXOQCS/SO as a daily QC check when the teams will be performing reacquisition. The IVS layout will be as prescribed below.

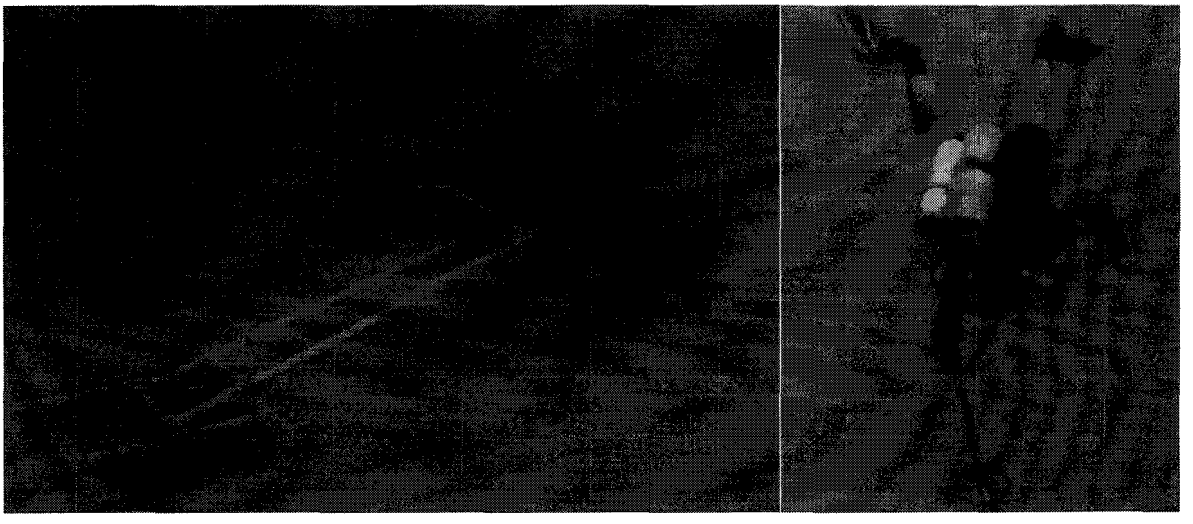

Figure 3-3: SCUBA UXO Divers using the Man Portable Underwater EM 61 (left) and the Minilab Excalibur all metals detector (right)

An Analog Geophysical IVS Certification process will be implemented to demonstrate that the instrument and operator and the data collection strategies selected for the site perform as intended. The Analog Geophysical Certification includes an IVS without a blind seeding program.

The analog geophysical method selected for the RI is based on previous underwater RI experience as well as the site history and data collection environment. The underwater White's all-metals detector, or a suitable replacement, has been selected for use at the site. The handheld Trimble GeoXT (or equivalent) DGPS will be used for recording the location of detected surface and subsurface transect anomaly locations. The DGPS will be checked daily at a known location.

The EM and analog hand-held detectors will be tested at an analog IVS to confirm that MEC can be detected by the audible tone of the instruments. When the Geonics EM-61 system is used during reacquisition, a standard static repeatability test will be conducted at the beginning and end of each day it is used. The IVS will be located in a convenient portion of the site with few background anomalies, and will include a combination of small and medium ISOs. ISOs will be buried at depths equal to 3 (3x) and 7 (7x) times their diameter, measured from the ground surface to the object center. All items will be buried in the worst-case orientation for detection: horizontal across-track and their locations measured with the DGPS to document the "as built" IVS. The IVS will have a start and end stake, with traveling line, two small ISOs every 10 ft buried 3x diameter (7.6 cm) and 7x diameter (17.8 cm) along-track, and two medium ISOs every 10 ft buried 3x diameter (15.2 cm) and 7x diameter (35.6 cm) along-track. During the site specific training phase each operator will use a White's all-metals detector, or a suitable replacement, to detect the buried items. If the operator/sensor is able to detect all seed items in the test strip, and the DGPS check is within project metrics (e.g., within 2m), the equipment will be considered to be in working order.

The UXO SCUBA divers, when using an underwater man portable EM61 or analog metal detector during reacquisition phases of the field operation, will perform an equipment operation check by passing the metal detector over an ISO in the water column at the start of each dive in lieu of processing though the

underwater IVS each day. Should a QC failure be identified the team may be required to pass back through the IVS.

3.3.1.3 Intrusive Investigations

Approximately 18.76 miles of transects will undergo DGM survey during Phase 2. Anomaly density maps will be createdusing the Transect DGM anomalies meeting the selection threshold which will beestablished during the initial IVS testing.

During intrusive investigations, Table 3-6 and the Appendix J ESP will be used to ensure proper safe distances are enforced.

Table 3-6: Minimum Separation Distance (MSD)

Area	MEC	MSD (ft)[1,4]					
		For Unintentional Detonations			For Intentional Detonations		
		Team Separation Distance (K40)	Hazardous Fragment Distance (HFD)	To Sides and Rear Using MOFB	Without Engineering Controls	Using Sandbag Mitigation	Using Water Mitigation Carboys/ Pool
MRS 09							
Aircraft Bombing Target	100lb AN-M30A1 HE	149	394	N/A	1,821	N/A	N/A
MRS 13							
Underwater	5" HVAR MK 1	82	349	N/A	2328	N/A	N/A

Notes:

1. See Appendix J: ESP for calculation sheets and documentation of MSD.
2. See Appendix J: ESPf or Maps of the MSD for each MRS.
3. Historical records and reports provided by the USACE provide the information for the MEC items located in each MRS, and the area within each MRS that specific MEC items are expected to be located.
4. If an item is discovered that exceeds the MSD in the approved ESP, USACE will be notified immediately and an update to the ESP will be made.

Selected DGM transect targets within high density areas will be investigated by the UXO SCUBA divers. The intrusive investigation will determine if the high density area is MEC related. If the high density area is determined to contain MEC transect segments for additional intrusive investigation will be added at half the distance between the planned DGM transects and on either side of the high density area. Additional transects radiating out from the high density area may also be required to further determine the extent of the high density area. The additional transect segments and radial transects will be executed by analog and dig.

To mark a MEC item to be investigated, or an anomaly selected to be excavated, use the following steps as a guide:

- Marking the position of a known MEC item that is on the surface of the seafloor.
  - Trimble Pro-XRT DGPS antenna is to be mounted over the gunnel of either the port or starboard side of the vessel.

  - As the vessel approaches the known GPS coordinate, it should maintain its heading while maintaining a speed which is fast enough to maintain the bearing but slow enough to limit the error when the clump is lowered into the water.
  - The navigator who is watching the monitor will tell the helmsman to correct headings as needed during the approach. The gunnel, which has the Pro-XRT DGPS antenna mounted, should pass directly over the MEC item and the navigator should instruct the UXOT assigned to lower the clump and buoy. This should be done as quickly as possible. It the area is known to be sand or grass the clump may consist of a mushroom anchor and 8 inch buoy (approx. size). If the area is known to have corals that are not on the List of Threatened or Endangered Species, then soft diver weights with a peanut buoy attached should be used. If the Phase 1 survey results (see Appendix B, Figures B-16 and B-17) indicated Listed Species of Coral is present in the area to be marked, an untended snorkeler with a waterproof GPS such as the Garmin GPS map 76cx or similar will snorkel over the EM MEC item and will lower the soft diver weight to the bottom, as close to the mark as possible while avoiding corals and MEC.
  - When the UXO SCUBA divers enter the water, a larger clump with buoy may be taken down to replace the peanut buoy if used, providing a more substantial mark. The divers will place the clump as close to the MEC as possible without impacting the MEC or corals.

- Marking the position of an anomaly selected to be excavated use the following steps as a guide:
  - Trimble Pro-XRT DGPS antenna should be mounted over the gunnel of either the port or starboard side of the vessel.
  - As the vessel approaches the knows GPS coordinate it should maintain its heading while maintaining a speed which is fast enough to maintain the bearing but slow enough to limit the error when the clump is lowered into the water.
  - The navigator who is watching the monitor will tell the helmsman to correct headings as needed during the approach. The gunnel which has the Pro-XRT DGPS antenna mounted should pass directly over the anomaly and the navigator should instruct the UXOT assigned to drop the clump and buoy. This will be done as quickly as possible. It the area is known to be sand or grass the clump may consist of a mushroom anchor and 8 inch buoy (approx. size). If the area is known to have corals that are not on the List of Threatened or Endangered Species then soft diver weights with a peanut buoy attached will be used. If the Phase 1 survey results (see Appendix B, Figures B-16 and B-17) indicated Listed Species of Coral is present in the area to be marked, an untended snorkeler with a waterproof GPS such as the Garmin GPS map 76cx or similar will snorkel over the EM MEC item and will lower the soft diver weight to the bottom, as close to the mark as possible while avoiding corals and MEC.
  - When the UXO SCUBA divers enter the water a larger clump with buoy may be taken down to replace the peanut buoy, if used, providing a more substantial mark. The divers will ensure they don't place the clump on corals.

The EM anomalies within the high density transect segments selected for investigation will be marked by lowering a clump with buoy as close as possible to the transect anomaly GPS coordinates (as described above). The dive boat will use Trimble Pro-XRT DGPS to mark the anomaly but an error of up to 10 ft can be expected due to sea state, winds, currents and the drift of the mark. If the EM anomaly is not located with the 10 ft radius of the clump it will be considered a no find. A no find rate greater than 15% will flag a root cause analysis. The reacquisition of an EM anomaly will be by either of the following methods depending on the seafloor type:

- Underwater man portable EM sensor (this will be used if there is no risk to corals). This method will be used if the EM anomaly was identified with the EM sled. Reacquisition of an EM anomaly will follow the process of marking the location as described above, UXO SCUBA divers deploying with the man portable EM sensor searching closest to the clump (the clump may have to be temporarily moved so as not to interfere with the EM sensor), and then gradually moving outward

until the largest EM anomaly within a 10 foot radius is located. The UXO SCUBA diver will excavate next to the contact until the item is uncovered and identified. If the EM anomaly is MEC, it will be photographed; the surroundings will be filmed, paying particular attention to corals. The DGM anomaly location will be used as the EM anomaly position.

- Underwater White or suitable substitute. The underwater man portable EM sensor is not suitable in bottoms consisting of coral and rock. The choice of performing the EM survey by using the EM ROV or Float was determined by bottom type (coral and rock) and depth of water. Analog is best suited for the reacquisition of EM anomalies in these types of bottoms. The UXO SCUBA diver can control the analog instrument ensuring that it does not touch corals. To mark the EM anomaly from the vessel, the steps provided for marking a GPS coordinate in coral and rock bottom types will be used. No excavation will take place in rock and coral. If the EM anomaly is on the surface of the coral and rock it will be investigated. If the EM anomaly is MEC it will be photographed, the surroundings will be filmed paying particular attention to corals, the DGM anomaly location will be used as the EM anomaly position. If the EM anomaly is determined to be subsurface (underneath coral or rock) it is to be recorded as such. The full 10 foot radius will be investigated with the Analog instrument.
- Post-intrusive DGM review. Post intrusive DGM review will be performed as an operational check. The Site Geophysicist (e.g. ASI's Geophysicist) will review the intrusive results reported for each selected anomaly. If, in their judgment, the reported object (size, weight, burial depth, quantity) agrees with the DGM signature, then a "pass" for the intrusive results will be recorded. If they believe that the reported object does not meet the DGM signature, the Geophysicist will flag the target for re-investigation by the intrusive team. The Site Geophysicist will review all reported No Finds. A No Find rate greater than 15% in an MRS will flag a root cause analysis and USAESCH notification.
- Intrusive investigation in seagrass areas will follow the procedures identified in Appendix K (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat –See paragraph 4.3.4).

The additional transect that is placed between the planned DGM transects will be marked by a clump and buoy on each end of the transect, and a line will be suspended in the water column to guide the divers on the transect route. All lines will be of polypropylene. Polypropylene is positively buoyant and will not sink and tangle around corals – divers will ensure that as the lines are deployed the lines remain free from coral. The transects will be investigated using underwater analog detectors deployed by the UXO SCUBA divers. Immediate intrusive investigation has been selected to ensure the MEC is verified and investigated. UXO SCUBA divers will use their analog metal detectors over unconsolidated bottom and a UXOQCS Diver will follow behind the divers performing a QC sweep of the transect as it is being conducted by the dive team. The transect segments will be investigated by using analog and dig techniques.

UXO SCUBA divers will conduct a visual search of the transect if it is over coral/rock or consolidated hard bottom. If a MEC/MPPEH item is located it will be identified, photographed and a buoy deployed to get a GPS position. If the item is to remain in place for further processing, an unmarked clump will be placed close to the MEC and GPS position will be recorded and the distance and direction from the MEC will be recorded, provided corals are not impacted by the placement of the clump. If corals interfere with the placement of the clump then a clump will not be used. The clump is to assist in reacquisition during follow-on work phases.

During the handling of MEC/MPPEH items underwater the minimum divers to perform the task will be used.

Locations of suspected MEC items will be reported to USACE. At no time will locations of items be shared outside of the USA project team.

3.3.1.4 Reacquire and Investigation of Suspected MPPEH items from Phase 1.

Suspected MPPEH items that were captured on video during Phase 1 will be reacquired by using the Trimble Pro-XRT DGPS to get the vessel as close to the recorded positions. Boat motion, current and wave action will limit the accuracy of the reacquisition. The Phase 1 camera GPS location or the Phase 2 DGM anomaly location will be recorded as the MPPEH/MEC position. UXO SCUBA divers will search immediately around the clump and continue their search outward until the suspect MPPEH has been located. If it is not located within 10 ft of the clump, the suspect MPPEH will be marked a second time using a new clump, leaving the original clump in place as a reference. Once the suspect MPPEH has been located, the UXO SCUBA divers will investigate and document the location, type and position of the MPPEH item. If it is determined to be MPPEH/MEC a risk analysis will be performed. If the item is MD, it will be removed. If the anomaly is deemed MPPEH or MEC and unacceptable to move, it will be marked by a clump, to assist in the reacquisition during the disposal phase of work.

3.3.1.5 Safety Briefs and Supervisor Checks

USA will routinely conduct four distinct team safety and operations briefs during execution of SCUBA and snorkeling operations, as described in the Dive Operations Plan (Appendix L):

- Pre-Dive brief
- Dive Supervisor's Checklist
- Daily Safety Brief
- Post-Dive Debrief

The Pre-Dive Brief will be completed prior to each SCUBA diving or snorkeling event, while a Daily Safety Brief will be completed prior to commencement of each work day. The USA Dive Supervisor will provide these briefs, highlighting both SCUBA diving/snorkeling and MEC related safety precautions.

The briefs will focus on the specific hazards anticipated at each work site during that day's operations and the safety measures that will be used to eliminate or mitigate those hazards. Review of applicable Activity Hazard Analysis (AHA) sheets, contained in Attachment 3 of the Dive Operations Plan (Appendix L of the WP), will also be conducted. The briefs will also refer to other operations within the area which proximity may have safety ramifications.

As work progresses and the team's location changes within a site, or from site-to-site, any corresponding changes in anticipated hazards or emergency procedures will be reviewed.

In addition, the UXOSO or the Diving Supervisor may hold a safety stand-down at any time a degradation of safety or a safety issue that warrants a review is noted.

3.3.1.6 Support/Safety Vessel

A support/safety vessel will maneuver in proximity to the UXO SCUBA divers/snorkelers, with the distance dependent on the conditions/state of the work site. Maneuvering of the vessel where UXO SCUBA divers/snorkelers will be working needs to be done in a way such that the vessel operates in adequate depths, doesn't anchor, etc., to protect natural resources while still supporting field operations. The vessel operator will carry and consult appropriate NOAA nautical charts, NOAA benthic habitat maps and aerial photographs to locate potential coral reefs, colonized hard bottom and seagrass areas as previously described.

The support/safety vessel will be available during all snorkeling operations in order to quickly respond to any emergencies.

3.3.1.7 Inspection Class ROV Operations (No diver support required)

An inspection class ROV, separate from the EM ROV platform, may be used for a collection of optional underwater tasks, depending upon the situation, site conditions, and on-site determinations made by USA

field managers. Situations where the ROV may be used to supplement underwater operations include, but are not limited to, the following:

- Visual investigations
- Visual surveys
- QC and safety observations
- Post MEC/MPPEH explosive disposal verifications.

As applicable, a peanut buoy (small buoy with soft diver's weight) will be laid at the anomaly GPS coordinate or general location to be investigated. The ROV Investigation Team will then dive the ROV on the anomaly/location, providing video of the targeted anomaly and the surrounding marine habitat. The ROV has a tethered range of 550 ft, and possesses a forward looking sonar and video. Data is captured via a computer located on the surface. The ROV also possesses real time GPS navigation with corrected position fixes through the GPS antennas located on the unit's tether (See Figure 3-4).

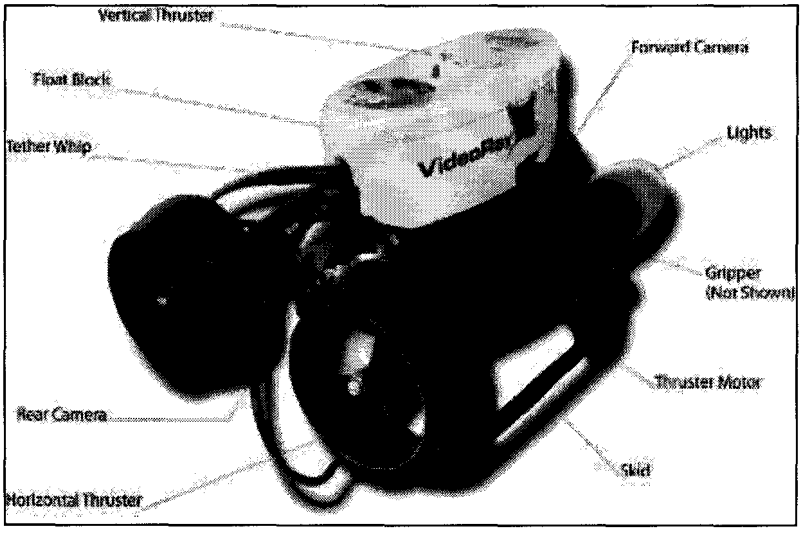

Figure 3-4: Video Ray

3.3.1.8 MEC Identification/Removal

Any suspected or known MEC encountered during excavation will be marked by a clump and its position annotated on the Trimble GeoXT, or equivalent, and other appropriate site maps. The UXO SCUBA Technician III will evaluate the item found and immediately report the condition of the item to the SUXOS. No UXO will be moved without being identified as acceptable to move and an evaluation of its condition. Approval resides with the SUXOS and UXOSO.

If the MEC item is deemed unacceptable to move, meaning that UXO Technicians will not move the MEC item by hand or by any other means while personnel are inside the exclusion zone identified within Appendix J: ESP, it may be moved by remote means (lifting balloon, deep water lift system etc) provided the exclusion zones (see Appendix J: ESP) are maintained during movement.

If an excavated item is considered MEC, it will be uncovered sufficiently to obtain a positive identification of the item and to determine whether or not it is fuzed. Unfuzed MEC may be removed and taken to shore for disposal on one of the beaching locations. A separate determination on disposal will be made by the SUXOS with the concurrence of the USACE OE Safety Specialist (OESS).

Fuzed UXO will not be removed unless it has been determined to be acceptable to move by the SUXOS and UXOSO. The SUXOS will make a determination in each case on how best to dispose of the UXO. If the UXO cannot be safely disposed of under the existing conditions, the USACE OESS will be notified. In no case will the SUXOS authorize or undertake destruction of UXO when there is sufficient reason to believe that the disposal action will result in personnel casualties, property damage or damage to listed threatened and endangered species.

Security (24 hr guard) on MEC items that are left underwater is not required. Should a MEC item be moved to MRS 09 beaching locations security will be required until the MEC item is disposed of and the hazard eliminated. MEC will not be stored.

3.3.1.9 Raise Tow and Beach Operations

MEC/MPPEH that is determined to not be acceptable to move by the SUXOS and UXOSO may be moved to an alternate site for disposal by remote means. Lifting balloon, deep water lift system or other suitable alternatives will be used for lifting the MEC item. During raise tow and beach operations Table 3-5: Boat and Personnel Withdrawal Distances (Above Water) will be followed, ensuring all vessels remain outside of the hazard arc. Safe swimmer distance arcs (see Appendix J: ESP) will also be enforced for the transit route. The following applies:

- All notifications will be made per Appendix J.
- Support vessels will be used to enforce withdrawal distances.
- Beaching sites will be secured and Police Officers posted in safe areas along public routes to enforce closure. MSD around the beaching site will be enforced (see Table 3-4).
- The MEC item to undergo raise, tow and beach operations must be free of corals that are on the Listed Threatened or Endangered list. "Listed" corals also, which might be harmed or damaged by the lifting procedures, should not be in the immediate vicinity of the MEC item.
- Floating lines such as polypropylene will be used for all aspects of the operation. This will ensure lines do not sink and damage corals.
- The MEC item will have a buoy with a line that exceeds the depth of the water by 25%. The buoy will not be attached to the bridle or lifting balloon but must be attached directly to the MEC item.
- The lifting balloon, or suitable alternative, will be attached securely to the MEC item by SCUBA UXO divers, by using a bridle attached by cargo straps or line.
- The MEC item must be structurally sound to qualify for raise, tow and beach procedures.
- The bridle should be long enough to allow for the MEC item to be suspended approximately 10 ft into the water column. If the MEC item is located in water less than 10ft it may be necessary to revise the calculations in Appendix J for the revised depth (depth is not to be less than 5 ft) for the Boat and Personnel Withdrawal Distance. USACE OESS will confirm calculations.
- A remote pull may be required to break the munitions free from the bottom, to gain access to secure the bridle. The ESP will be used to provide a safe pull distance for the boat from the MEC item.
- A beaching team will have the beaching line flaked out, with the bitter end running to a buoy well away from the beach, to which the tow boat will attach its tow line passing the tow to the beaching crew. At no time will the tow boat enter inside the hazard arcs during the tow or beaching operation.
- The beaching team will established a channel with channel buoys to guide the vessel to the munition reference buoy. The munition reference buoy will be placed at the mouth of the established channel with the beaching tow line attached (this line is then picked up by the boat crew, the boat tow line and beaching tow line are connected allowing the beaching team to take over the tow and beaching of the munition). The channel will be inspected by either snorkelers or divers to ensure the route is free of Proposed or Threatened species in depths in which it is anticipated that the munition while under tow may contact the sea floor.

3.3.1.10 MEC/MPPEH Explosive Disposal Operations

MEC Disposal Operations will follow the ESP which can be found in Appendix J of this WP.

During disposal of MEC and related material, safety is the primary concern. The most obvious requirements are to protect personnel, the public, and the environment from fire, blast, noise, fragmentation, underwater shock wave and toxic releases. Planned detonation of explosives requires more stringent safety distance requirements than those for ordnance in storage, and such detonation will be conducted in accordance with the requirements outlined in DoD 6055-9-M, EM385-1-97, p.1.2.C.3, EM1110-1-17 App D, and the latest approved version of the ESP (USA, 2013).

USA intends to use electrical disposal procedures for underwater detonations. Depending on local explosives availability, USA may use (with the concurrence of the OESS) a Shock Tube Firing System (Non-EL) in accordance with USA SOP in Appendix K for land based detonations. All personnel directly or indirectly engaged in UXO operations will be thoroughly trained and capable of recognizing hazardous explosive exposures. All personnel will be required to read, become familiar with, and adhere to the requirements contained in this chapter to ensure all general safety regulations and safe work practices are observed at all times.

All USA personnel engaged in UXO demolition activities will utilize these procedures. However, situations may warrant additional safety measures, such as fire trucks, medical personnel, and protective clothing. The SUXOS has the overall responsibility for compliance with the minimum requirements listed below and has the authority to upgrade the requirements as the situation dictates.

All MEC and MPPEH related material containing explosives or hazardous material will be disposed of by detonation using standard demolition procedures as outlined in Technical Manual (TM) 60A-1-1-31 and USA's SOPs in Appendix K of this WP. USA will use electric or Non-EL firing procedures for positive control of demolition operations. If these methods of disposal are determined to be impractical, USA will notify the on-site USACE OESS, who will request local military Explosive Ordnance Detonation (EOD) support. The following paragraphs describe the procedures USA will use to detonate MEC and MPPEH related items.

Throughout MEC disposal operations the SOPs for Endangered Species Conservation and their Habitat on DERP-FUDS Project No. I02PR006802. Culebra, Puerto Rico (Appendix K) will be followed to minimize the impact on the environment. USA will implement a daily survey for turtle nesting by a biologist for all beaching sites, and turtle nesting areas that are in the vicinity of MRS 09 and 13.

USA will dispose of MEC and MPPEH related materials after:

- Notification of the agencies listed in Appendix C of this document: Points of Contact and Appendix J: ESP has been made. This includes Notification to Airmen (NOTAM), Notice to Mariners (NOTM), and notification of the local police.
- Enforced evacuation of the hazard arcs prior to the MEC items being brought ashore. If MEC items are being disposed of in the water, small boats will be used to enforce evacuation of hazard arcs.
- SUXOS coordinates with the USACE OESS and keeps the OESS apprised of all progress.
- All nonessential personnel are out of the minimum separation distance (MSD) of the ordnance being detonated. The applicable separation distance will be followed (See Appendix J, ESP).

MEC that is acceptable to move may be consolidated within an area to reduce the number of shots and lessen environmental damage. Land based demolition shots may require engineering controls to meet the MSD requirements stated in Table 7-1 of the Explosives Site Plan.

3.3.1.11 Coordination and Supervision

On-site disposal will be under the direct control of the SUXOS. The SUXOS will be responsible for training all personnel regarding the nature of the materials handled, the hazards involved, and the precautions

necessary, and will be present during all on-site disposal operations. The SUXOS will maintain custody of the blasting machine or Non-EL initiator. The SUXOS will ensure that the appropriate local authorities are notified prior to daily on-site demolitions [see paragraph 7.2 of the ESP (Appendix J)]

The SUXOS and UXOSO will be on-site at all times during disposal operations. The UXOSO will monitor compliance with the safety measures contained in the WP and associated documents and, in case of noncompliance, is vested with the authority to stop or suspend operations. Individuals will report the completion of tasks to the SUXOS.

3.3.1.11.1 Acceptable to Move

The UXO SCUBA dive team will transfer recovered MEC/MPPEH determined acceptable to move, meaning the MEC/MPPEH may be moved by UXO Technicians by hand, to the shore for processing. (The SUXOS and UXOSO will make the determination if a MEC/MPPEH item is acceptable to move). Only items that are determined acceptable to move will be brought up to the surface by the UXO SCUBA divers for transport. MEC items, along with MPPEH items that cannot be determined to be MDAS, will be detonated on the shore of MRS 09 (see Figure 3-5 and Figure 3-6). MPPEH items that can be inspected and designated as MDAS will be shipped to an approved metals recycling facility off–island.

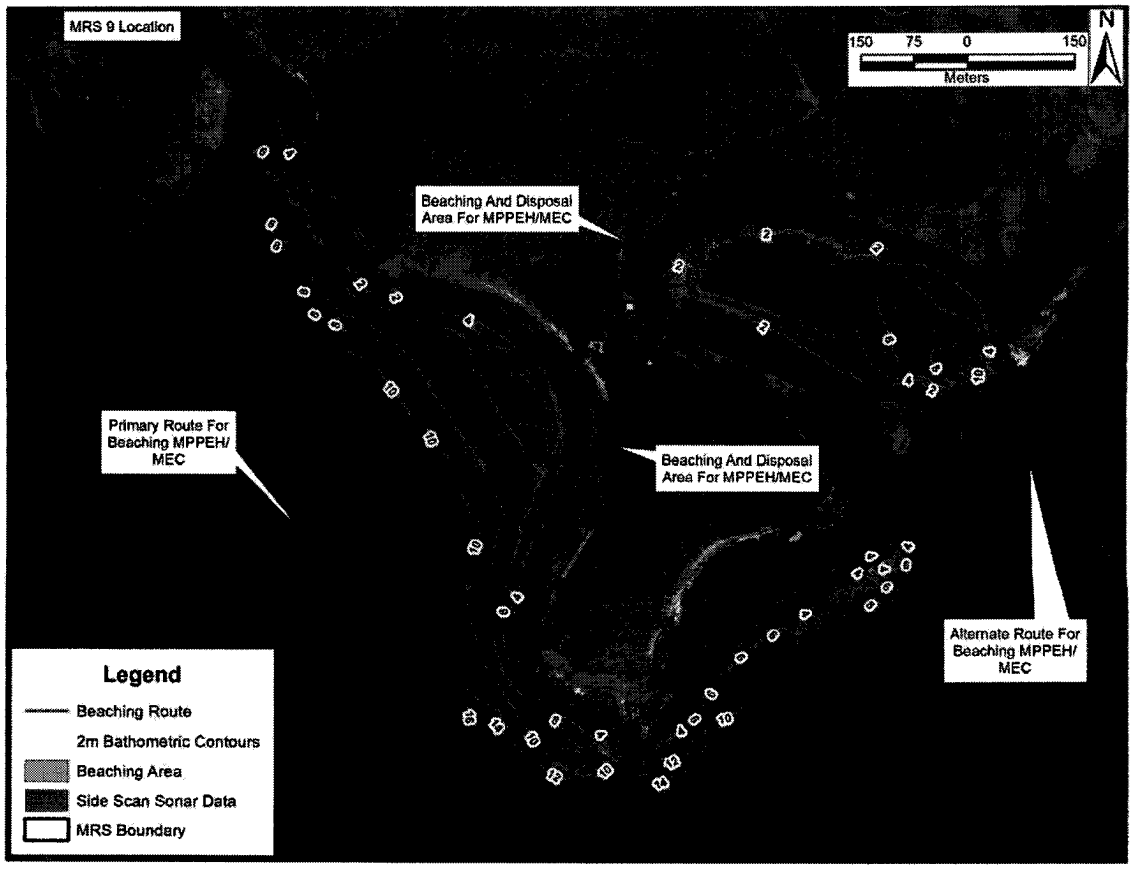

Figure 3-5: MEC/MPPEH Towing Route and Beaching Sites for Disposal by Detonation

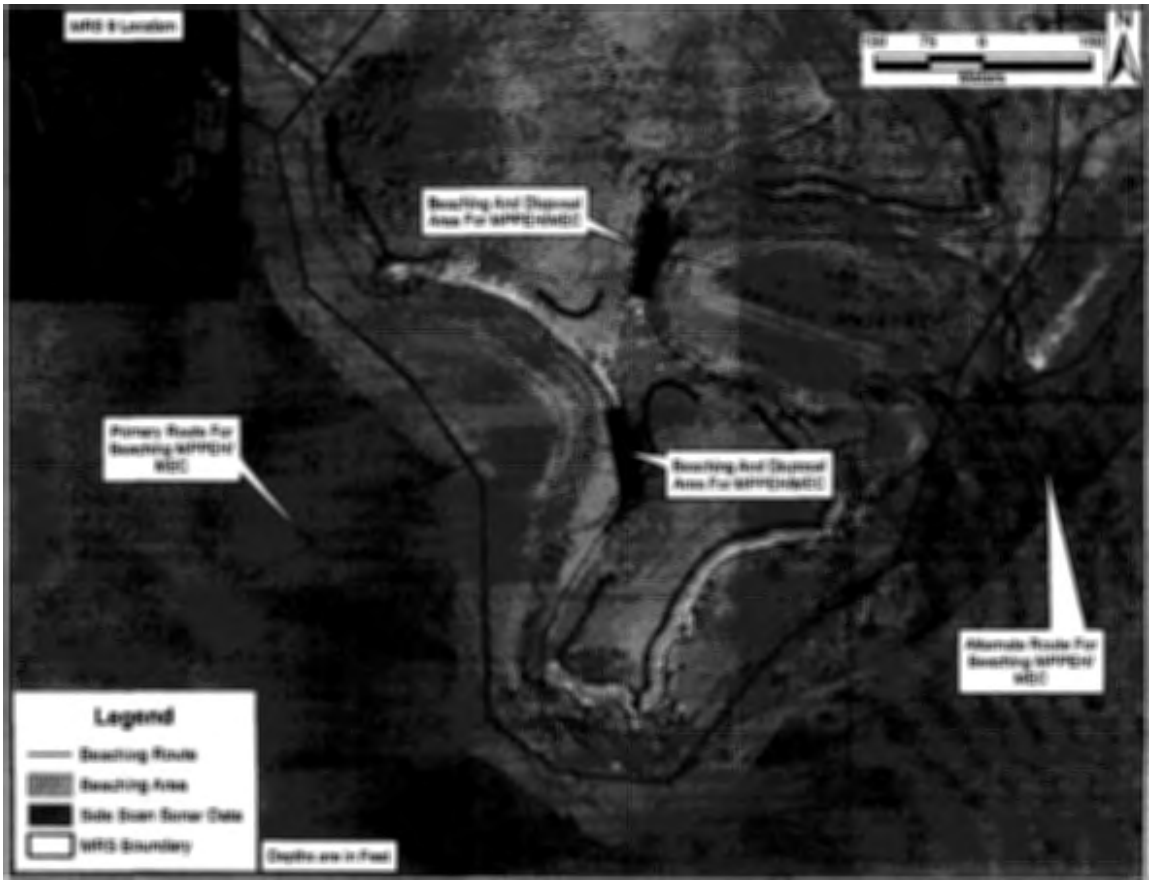

Figure 3-6: MEC/MPPEH Towing Route and Beaching Sites for Disposal by Detonation (Nautical Chart)

3.3.1.11.2 Item Not Acceptable to Move

Underwater MEC/MPPEH items that are not acceptable to move will be left in place and will be marked by a clump (to provide a visual reference) and the coordinates will be recorded using GPS, or by using the DGM anomaly location or Phase 1 GPS coordinates, whichever is deemed the most accurate. Coordinates denoting the position of MEC/MPPEH item will remain under the positive control of the USACE until further decisions are made regarding disposition. MEC/MPPEH items that have been selected for disposal by detonation will be either detonated in place or will be remotely moved to the disposal location via remote means (see paragraph 3.3.1.8). The location for disposal is determined as a result of the Risk Analysis being completed.

3.3.1.11.3 Risk Analysis

A risk analysis will be developed for each MEC/MPPEH. The risk analysis will take into account human health and safety, Natural Resources as described within the Appendix K: SOP ("USACE SOP for Endangered Species Conservation"). The analysis will also provide recommendations and options for the removal and disposal of the munitions. In relation to any encountered MEC/MPPEH item, no actions will be completed to remove, explosively dispose of, or leave in place (if leave in place, the risk analysis will recommend with or without cement encapsulation, and will provide justification) without USACE notification and concurrence. MEC will only be moved or disposed of during the last phase of the project.

3.3.1.11.4 Underwater Explosive Disposal Operations

Should underwater explosive disposal operations be required to address MEC/MPPEH, the requirements are set forth within the ESP. Underwater detonations will require timely notification and coordination with stakeholders and with concurrence by the USACE. Coordination will be conducted in advance through the TPP process, and by the development of SOPs found in this Work Plan. Notifications, per the RI/FS Work Plan and the SOPs, will be completed and decisions to proceed with underwater detonations will be communicated. The procedures identified in the Appendix K: "USACE SOP for Endangered Species Conservation" will be adhered to prior to and immediately following underwater detonations.

Standard underwater demolition procedures will be used, and are reflected in Attachment 2 of the Dive Plan: DSOP 2 Underwater Demolition and OPS-03 Demolition Disposal Operations on Land. A single, tended diver (using a witness float) will be used to place the explosive charge if it is determined to be safe to do so; otherwise, two divers will be used (witness floats will be attached to divers). Upon completion of demolition actions, all munitions debris will be inspected and removed from the marine environment for further processing. If explosives are still present, the munitions debris will be collected and either a cleanup shot will be done in an underwater sand area or on land at MRS 09.

The following MPPEH Disposal Flow Diagram (see Figure 3-7) will be used by the USA field teams to identify the disposal approach for each MPPEH item.

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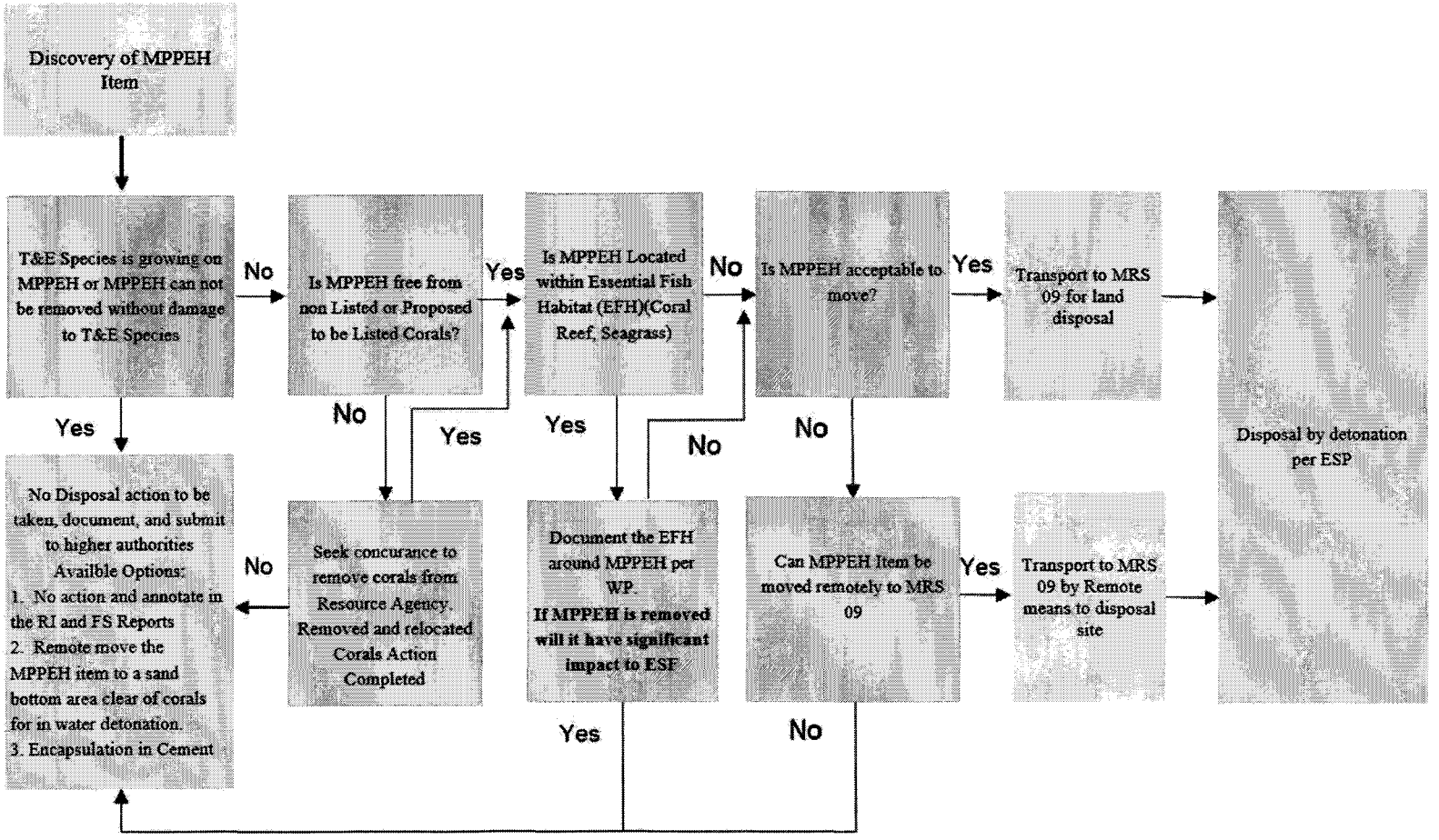

Figure 3-7: MPPEH Disposal Flow Diagram

3.3.1.12 Temporary Storage of MDAS

MDAS may be temporarily stored in a 55-gal locked drum and placed inside the fenced-in USA magazine compound located at Flamenco Peninsula (See Figure 3-8).

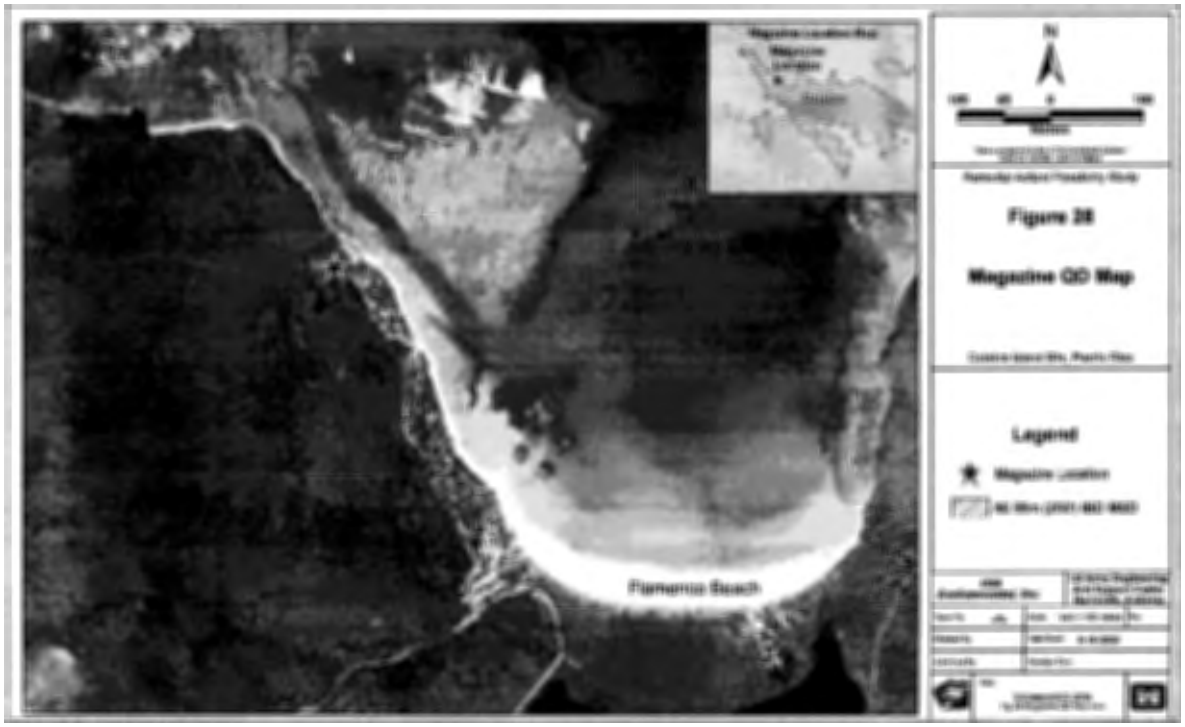

Figure 3-8: USA Magazine Location

3.3.1.13 MEC Encapsulation in Cement

If during the Risk Analysis (see paragraph 3.3.1.10.3) MEC items are selected for cement encapsulation the below steps will be followed. These steps will be rehearsed outside of the MRS in a suitable underwater location approved by the team biologist. The results will be documented by the SUXOS. The SUXOS will inform the USACE OESS and USA PM of the results of the rehearsal.

- SUXOS and team Biologist will identify where the form will be placed to contain the cement. Consideration should be given to bottom conditions, such as the presence of rock which will allow for adhesion of the cement to the bottom and sand deposits that can be removed exposing rock etc.,
- The presence of Listed Threatened or Endangered corals should have been taken into consideration during the risk analysis. If any are in the immediate area, they will be marked in accordance with Appendix K (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat – See paragraph 4.3.8.1) to provide a constant visual reference of their location and the need to protect them from damage. Encapsulation should not be considered if the concrete will be covering corals.
- It is recommended that 155mm projectiles and smaller are selected for encapsulation due to the amount of cement that would be required to encapsulate much larger munitions. Provide 12" around all exposed surfaces for cement encapsulation.

- Only portland cement (concrete or other cement types are not suitable for underwater use) is to be used for MEC encapsulation. Portland cement is a hydraulic cement and will harden underwater. *Note: Portland cement is not a brand name but a term describing a type of cement.* Type II Portland cement is preferred but if Type II cannot be found in Puerto Rico Type I may be used.
- Once the form has been constructed, it is then taken to the MEC site and divers will anchor it to the bottom with stakes or clumps (sandbags are not to be used).
- Portland cement is then mixed into a bucket and allowed to start reacting. Aggregate or other mixers are not to be added, however, if a more plasticized consistency is needed, plaster of paris may be added. The bucket with cement is then lowered with a SCUBA Diver escorting it to the bottom. The diver will hand deposit the portland cement into the form in small quantities to minimize impact to the MEC. This process continues until the munition is completely covered.
- Burlap, or a suitable covering material, is placed over the top of the form and anchored in place, ensuring the cement remains in place while the chemical reaction occurs causing the cement to harden.
- The cement will harden over 24 hrs to the point that it can be inspected and an assessment can be made whether the process was successful. It will take approx. 28 days to fully harden and years to fully cure.

3.3.1.14 Environmental Sampling

As part of the underwater investigation of the Culebra Island RI activities, marine sediment samples will be collected from the coastal waters and marine inlets to evaluate the presence of MC resulting from DoD activities. The location and number of the samples collected will be determined by MEC/MD findings during intrusive operations.

- A marine sediment sample will be collected by a UXO SCUBA diver each time a new munition type is found (i.e., 4.2-inch mortar, 5-inch projectile, BDU-33 practice bomb, etc.). For additional underwater findings of an already sampled munition type, samples will be collected at a rate of 10%.
- Samples will be collected beneath the munitions if the item has been determined to be acceptable to move, otherwise, the sample will be collected adjacent to the munitions. It is anticipated that any MC exceedances encountered will be highly localized. Therefore, each sample collected will have a companion step-out sample collected at a distance of 4 ft from the initial sample.
- Sediment samples will be collected from a depth interval of 0 to 6 inches in areas where sufficient media is present. The amount of sufficient media is anticipated to be in areas with one inch or more of sediment.
- Samples will only be collected in unconsolidated sediments. If only coral, rocks, or bedrock are present, no samples will be collected. All efforts will be made not to harm or harass species located directly adjacent to sample locations.
- QA/QC samples consisting of Field Duplicates, QA Splits, MS/MSD, Equipment Blanks and Temperature Blanks will be collected at a frequency stipulated in Table E-1 in the FSP, Appendix E.1. When using the hand auger (with disposable sleeve), one equipment blank will be collected per MRS.

Two sampling procedures are planned and will be chosen based on the strength of current/wave action at the sample collection area. If the current/wave action at the sample location is non-existent to mild (i.e. in inlets and at depths below the influence of wave action), and results in minimal dissipation of particles, samples will be collected with a disposable plastic hand trowel and placed in a zip-loc bag for transport to the surface. If the current/wave action is strong enough to significantly dissipate particles upon collection, a hand auger with a plastic sleeve will be used to collect samples.

For further details please see Appendix E: SAP.

3.3.2 TIME CRITICAL REMOVAL ACTIONS

The procedures outlined in this WP apply to a RI/FS. Should circumstances justify the need for a Time Critical Removal Action (TCRA), USA will develop procedures in accordance with USACE guidance.

3.4 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

This chapter details procedures that USA will use to perform mapping and GIS integration during the Phase 2 and 3 field activities.

3.4.1 ACCURACY

USA will establish survey control on the site using Class I, Third Order control monuments. The horizontal control will be based on either the English or the metric system and will reference the NAD83 and the UTM Grid System. Any control points established or recovered will be constructed of iron or steel pins, concrete monuments, or other permanent construction method meeting the standards found in EM 1110-1-1002. This construction will ensure recoverability for any current or future work at the site. USA will use a PLS registered in Puerto Rico to install control points. The northing and easting (X and Y) coordinates for all control points will be presented in a certified letter, or drawing, at the completion of the project. The PLS will provide all required data, and include the project-specific coordinate system, datum, and units (e.g., UTM Coordinate System, Zone 17 North, NAD83, and units in meters).

3.4.2 GIS INCORPORATION

The GIS database will be maintained at the USA corporate office located in Oldsmar, Florida. The GIS Manager will manage the database, which is used to store preliminary and final, or published versions, of project GIS data. The GIS Manager will also coordinate positional data generated by ASI's DGM team. This database is the official project repository of GIS data, including unprocessed feature and attributable data sources that may be used outside the GIS. The Oldsmar-based database is the main location for processing data sources into draft and final GIS products, as well as for production work.

USA will produce ArcGIS Projects in accordance with the PWS, and will update the GIS as often as necessary to enable planning and coordination of daily, weekly, and monthly activities. Acreage clearance estimates will be prepared and revised based on the latest design drawings provided to USA. The ArcGIS project will be prepared in ArcGIS 9.x format and be compatible with ArcGIS 9.1.

Suspected underwater MEC items will have the original coordinates documented within the GIS. The layers will be completely independent, and produce a concise picture of all clearance activities completed during this contract. Supporting tabular data will be provided in Microsoft Excel and/or Microsoft Access format at the completion of the project.

Throughout the project, USA will build the GIS database upon existing data, will and integrate the field data into the system. To enhance accuracy of the field data, USA/ASI will collect the field data using a ruggedized handheld GPS and electronic data collection system, as required. Project data will be downloaded on-site on a daily basis and digitally transferred to USA's Corporate Headquarters on at least a weekly basis. Upon receipt of the field data, the GIS Manager will perform an accuracy inspection of the data and import this data into the project GIS.

All GIS data will be in ESRI Shapefile or Geodatabase format. Raster data, such as orthophotography, will be in Tagged Image File Format (TIFF) or MrSID-compliant format. Associated databases will be in Microsoft Excel format.

3.4.3 PLOTTING

All control points recovered or established will be plotted at the appropriate scale for the parcel being described. Parcels less than 10 acres will be plotted at 1:200. Parcels of 10-100 acres will be plotted at

1:600 (1" = 50'). Parcels larger than 100 acres will be plotted at 1:2400 (1" = 200'). A sheet index for the project will be prepared that includes enough of the planimetric data to indicate the sheet's geographical location in the project area. This index will be shown on each map with the current sheet crossed-hatched or heavily outlined. If required, a separate sheet file may be utilized for the index.

3.4.4 MAPPING

The location, identification, coordinates, and elevations of all control points recovered or established at the site will be plotted on a map. Control points will be identified on the map by its name and number and the final adjusted coordinates and elevations. The coordinates for points of interest will be shown to the closest 1.0 ft. Locations of individual recovered MEC items will be located to a horizontal accuracy of plus or minus 1 ft within the grid and will be plotted on a map. Maps will have a revision block, title block, index sheet layout, legend, grid lines, scale bar, and a true north arrow. In general, the direction of north will run from the bottom of the file to the top, with no skew. A legend showing the standard symbols used for mapping will be on the map as well as a map index showing the site in relation to all other sites within the project boundary.

3.4.5 DIGITAL DESIGN DATA

All GIS Data will be delivered in ESRI Shapefile format. A READ ME file will be included with delivered data, which will contain basic information about each Shapefile.

3.4.6 COMPUTER FILES AND DIGITAL DATA SHEETS

All final document files will be delivered to USAESCH in IBM and MS Office compatible formats. The drawing and plot data will be provided in the UTM Coordinate System, NAD83, with units in meters. GIS data will be submitted in ESRI Arc Map-compatible format. Raster data, such as USGS Topographic Quadrangles or Orthophotography will be provided in either TIFF or MrSID format. All ArcGIS project files (.mxd) will be supplied with the appropriate final report. In addition to GIS data and project files, maps will be delivered in PDF format for viewing without modification.

All final GIS data generated from this project will conform to the Spatial Data Standards for Facilities, Infrastructure and Environment.

3.5 PERSONNEL QUALIFICATIONS

As required by the specific task, all USA personnel and its subcontractors (as applicable) will complete the OSHA 40-hour training course for hazardous waste site workers and an 8-hour refresher course as appropriate. Management and supervisory personnel will also complete supervisory training and refresher training as required by CFR 1910.120 e (4) & (8). Additional site-specific training, in accordance with 29 CFR 1910.120, EM 385-1-1 (USACE Safety and Health Requirements Manual), and ER 385-1-92 (Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities) will be provided to all personnel upon their initial mobilization. A Medical Surveillance Program is in place with the latest examination within the last 12 months.CPR training will be required for USA personnel and subcontractors that are participating in field operations. .

3.5.1 UXO PERSONNEL QUALIFICATIONS

The USA Underwater Visual Survey Team will include a UXO Technician III who will be qualified personnel, approved by the USACE. UXO personnel must meet the requirements set forth in Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP) 18, Personnel/Work Standards. UXO personnel will be U.S. citizens and be graduates of the either the U.S. Naval EOD School, Eglin AFB, Florida; the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, Maryland; the U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, Maryland; the EOD Assistants Course, Redstone Arsenal, Alabama; the EOD Assistants Course, Eglin AFB, FL or a DOD-Certified equivalent course. Credit for the EOD experience while assigned to the National Guard or Reserve will be based on the actual documented time spent on active duty, not on the total time of service.

3.5.2 SNORKELING PERSONNEL QUALIFICATIONS

All UXO technicians, marine biologists, and other personnel functioning as survey snorkelers will be qualified as open water divers by a nationally recognized organization, to include the following:

- Professional Association of Diving Instructors (PADI)
- National Association of Underwater Instructors (NAUI)
- U.S. Navy Diving and Salvage Training Center
- U.S. Forest Service Snorkel Safety Program.

In addition, all UXO Technician/survey snorkelers will also meet the applicable requirements of DDESB TP-18 for the related position as previously described. All Snorkeling UXO Technicians will be qualified as UXO Technicians II/III

The USA Snorkel Supervisor will maintain personnel files on each snorkeler, to include copies of qualifications, training records, and certificates of qualifications that support the individual's placement and position. Prior to initial assignment or any change in duties/assignment, the Snorkel Supervisor will review the individual's qualifications, training records, and certificates to ensure the individual is qualified to perform required tasks.

3.5.3 UXO DIVING TECHNICIANS

UXO Diver Technicians will be qualified and designated, in writing. They will be current in diving qualifications, periodicity, and have current diving medical certification. All UXO Diving Supervisors, UXO Diver Technicians, Support Divers (such as Marine Biologist) and Tenders will be certified in SCUBA by one of the following agencies:

- A commercial diving School
- A military School
- A Federal School (e.g., USACE)
- An Association of Commercial Diving Educators (ACDE)-accredited school

Each dive team member will have the experience or training necessary to perform assigned tasks in a safe and healthful manner.

Each dive team member will have experience or training in the following:

- A graduate of U.S. Naval Explosive Ordnance Disposal (EOD) School, if engaged in munitions response diving operations;
- The use of tools, equipment and systems relevant to assigned tasks;
- Techniques of the assigned diving mode, diving operations and emergency procedures.
- Cardiopulmonary resuscitation and First Aid (American Red Cross or equivalent).

In addition, all UXO Diver Technicians will also meet the applicable requirements of DDESB TP-18 for the related position as previously described. All UXO Diver Technicians will be qualified as UXO Technicians II/III.

USA will not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

3.6 INVESTIGATIVE DERIVED WASTE PLAN

Previous investigations and records detailing historical use of the MRS sites have not identified Recovered Chemical Warfare Materiel (RCWM) or any other hazardous material contamination at the project site. As a result, the project team does not anticipate recovery, handling, or disposal of Investigative Derived Waste (IDW) during the course of the RI/FS investigations.

3.7 RISK CHARACTERIZATION AND ANALYSIS

3.7.1 CSM

A screening level risk assessment is conducted after analysis of each CSM profile information update based on results from the fieldwork. USA will revise/identify source-receptor interactions for each MRS and exposure pathway, including source, access, activity, and receptor (human and ecological) for MEC as well as source, an exposure medium, an exposure route, and receptor (human and ecological) for MC. Interaction for the MEC component of these CSMs requires access and activity. Current and future access to the source area is limited, but activities both current and future can bring receptors into contact with potential MEC.

The MC exposure media data and pathway analysis are revised based on the results of the field investigation.

The MC exposure media data and pathway analysis are revised based on the results of the field investigation. For MC source areas, analytical results are compared to project action levels and US EPA Regional Screening levels (RSLs) to determine the likelihood for potential risk to human and ecological receptors. The project action levels are detailed in Worksheet #15 of the MC SAP.

The CSM will be updated in the RI Report for each MRS.

3.7.2 MEC RISK

For the MEC risk characterization and assessment element, the MEC Hazard Analysis (MEC HA) will be used. The MEC HA evaluates the level of risk to the public in terms of the likelihood of exposure and the severity of exposure to MEC. The MEC HA process entails definition of risk factors, MEC risk assessment, and assessment of response alternatives. The MEC HA will be included with the RI report for each MRS.

3.7.3 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL (MRSPP)

In 2001, Congress directed that the DoD identify and then prioritize their MRSs. The protocol was published as a rule on 5 October 2005 (35 Code of Federal Regulations Part 179). The protocol was designed to: 1) maximize use of the latest MRS-specific data, and 2) be applied early in the munitions response process. The protocol assigns a relative priority to each location in the DoD's inventory of defense sites known or suspected of containing UXO, Discarded Military Munitions (DMM), or MC, and prescribes procedures for prioritizing the defense sites and general component responsibilities. The site priority ranking is based on the risk posed by potential hazards captured in data entered for three hazard evaluation modules of the Munitions Response Site Prioritization Protocol(MRSPP), explosive hazard evaluation (EHE) module, chemical warfare material (CWM) hazard evaluation (CHE) module, and the health hazard evaluation (HHE) module. Separate MRSPP tables (EHE Tables 1 through 10, CHE Tables 11 and 20, HHE Tables 21 through 28, MRS Priority Table 29, and MRS Background Information, Table A) will be completed for each MRS in the RI Report. USA will submit a 30 day public notice which offers to the public involvement with the government to update the MRSPP Tables prior to submitting the Draft Final RI Report.

3.7.4 ANALYSIS OF LAND USE CONTROLS

USA will conduct an Institutional Analysis in accordance with EP 1110-1-24 as part of the RI/FS. As Institutional Controls rely on existing powers and authorities of various government agencies to protect the public from MEC risks, government agencies having jurisdiction over properties containing MEC will be identified and their appropriateness, capability, and willingness to assert controls will be assessed.

For each institution selected for review, USA will collect the following information:

- Name of Agency
- Origin of Institution
- Basis of Authority
- Sunset Provisions
- Geographic Jurisdiction
- Public Safety Function
- Land Use Control Function
- Financial Capability
- Desire to participate in the Institutional Control Program
- Constraints to Institutional Effectiveness.

An Institutional Analysis Report will be prepared to document feasible local initiatives that will be used to support development of alternative plans of action. The report will identify and analyze the institutional framework that supports the development of institutional controls for the site. The report will address local initiative strategies available to control or limit access to different areas within the project site, or strategies to implement public safety awareness actions regarding the site. The Institutional Analysis will include discussions with state and local agencies, and with private parties having interests in the sites.

Following the Institutional Analysis and preparation of the Institutional Analysis Report, a draft Institutional Control Plan will be included in the draft RI Report detailing the Institutional Control Alternatives recommended based on their apparent ability to satisfy project objectives.

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4.0 QUALITY CONTROL PLAN (QCP)

4.1 INTRODUCTION

The USA QC process provides a permanent and workable system that allows each employee to understand the job performance expected within the assigned task. The USA QC and improvement process ensures that the training, actions, procedures, and tools support every employee according to requirements, and in such a manner that we protect the environment and minimize the impact of project activities. Checklists have been developed to ensure critical elements are addressed and that QC checks are documented for compliance with the WP, SOPs, policies and procedures. By promoting teamwork and by focusing attention on the solutions, the quality of work is increased and assured throughout the project.

This QCP provides the procedures and methods to be used for the field activities within the selected work areas. This plan addresses organization and responsibilities; DQOs, QC test methods, audit procedures and pass/fail criteria, digital geophysical operations, anomaly acquisition and reacquisition, field operations, equipment testing, maintenance and calibration, QC inspections, and reporting procedures. The QCP outlines procedures to ensure all personnel meet the qualification requirements and receive the site-specific training to perform the duties of the job for which they will be hired, and site-specific training requirements for visitors. The QCP also describes how lessons learned are captured, documented and submitted to the Government.

4.2 QUALITY MANAGEMENT STRUCTURE

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

4.2.1 USA CORPORATE DIRECTOR OF SAFETY AND QUALITY

The CDSQ (Mr. Robert Crownover) is responsible for reviewing and updating the QCP and verifying compliance with the plan. The Corporate Director of Safety and Quality verifies compliance with the Quality Control Plan by auditing project activities and instituting corrective actions; and develops and coordinates the APP. The CDSQ is the contact for regulatory agencies on matters of health and safety and has the following responsibilities:

- Preparation of USA QC policies and procedures
- Ensuring timely submission of contract deliverables
- Providing training and assistance to the site project UXOSO/UXOQCS
- Reviewing employee qualification records to ensure accuracy
- Conducting periodic field audits of sites, programs, and projects project activities to ensure QC compliance.

4.2.2 PROJECT MANAGER (PM)

The PM is responsible for overall performance during this project. The PM will develop and implement the site WP and also has the following responsibilities:

- Serves as primary point of contract with the USACE PM
- Monitors project performance, safety, quality, cost, and schedule
- Ensures timely submission of contract deliverables
- Reports directly to the Program Manager

4.2.3 USA PROJECT GEOPHYSICIST

The Project Geophysicist (Mr. Al Crandall) is responsible for the overall technical direction for DGM surveys to include the following:

- Provide overall technical direction for DGM surveys
- Supervise data processing and interpretation.
- Coordinate with the Site Geophysicist to verify the accuracy and completeness of project DGM documentation and target lists, instrument verification strip (IVS) testing results, QC results and related DGM project documentation
- Review all DGM data, confirm that DGM performance metrics are being maintained, and provide notification to USAESCH when data are available for their review.

4.2.4 USA SENIOR UXO SUPERVISOR (SUXOS)

The SUXOS is responsible for the day-to-day field operations at the project site. The SUXOS reports directly to the USA PM and has the following responsibilities:

- Implementation of WP and QC policies and procedures
- Reporting to the PM on effectiveness, adequacy, and status of the project
- Ensuring the timely submission of contract deliverables
- Coordinating with project personnel for site tasking and schedules
- Reviewing any failures and implementing corrective actions
- Implementing additional guidelines used to assist in the development of site and task specific policies and procedures.

4.2.5 UXO QUALITY CONTROL SPECIALIST (UXOQCS)

The UXOQCS is responsible for overseeing the site QCP in all field operations. The UXOQCS will be trained in QC techniques methodology and be qualified as a UXO Technician III. The UXOQCS coordinates with the PM for daily operations and maintains a direct line of communication to the PM and SUXOS. The UXOQCS reports directly to the CDSQ and has the following responsibilities:

- Reviewing, implementing, and enforcing the QCP
- Coordinating with the USACE QA representative to ensure DQOs are appropriate for the task being performed
- Coordinating with the CDSQ to ensure QC procedures are appropriate for demonstrating validity sufficient to meet QC objectives
- Performing periodic audits of USA's performance under the contract.
- Assisting the CDSQ in Root Cause Analysis
- Recommending to the PM actions to be taken in the event of a QC failure
- Maintaining a Lessons Learned log
- STOP WORK authority for issues regarding QC at the project site.
- Conducting QC inspections of documents, work in progress, work performed, and monitoring. The UXOQCS records and reports the results to the appropriate personnel.
- Ensuring classification of MEC-related items
- Recommending to the CDSQ actions to be taken in the event of a QC failure
- Advising the Field Team Leader and Survey Teams on all QC-related site matters
- Reporting non-compliance with QC criteria to project management personnel

4.2.6 UXO QUALITY CONTROL SPECIALIST/SAFETY OFFICER (UXOQCS/SO)

USA will be using a UXO QCS/SO for this project. The duties as described under UXOSO and UXOQCS apply to the UXOQCS/SO.

4.3 DATA QUALITY OBJECTIVES

The data obtained during Phase II and IIIfield operations will be used to prepare the RI report, which will document the findings of the data collections efforts and field inspection. This data, plus the data previously collected during Phase I, will be used to assess the nature and extent of the hazard presented by MEC at the sites in order support recommendations for proposed MEC remedies. The data will be used to develop a hazard analysis, by evaluating and vertically delineating the nature and extent of potential hazards to human health and the environment. This data will provide a basis for determining whether the sites (or portions of the sites) can be NDAI or needs to move forward to the Feasibility Study for analysis of further response actions. The project DQOs are presented in Table 3-1.

4.4 QUALITY CONTROL TEST METHODS AND AUDIT PROCEDURES

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

4.4.1 INSPECTIONS

USA will conduct inspections to verify whether quality-related activities comply with this QCP. A list of the audit procedures based on the Definable Feature of Work (DFW) is provided in Table 4-1 . Internal inspections will address activities performed by the project team. External inspections will address activities performed by project subcontractors, laboratories, and equipment and material suppliers.

The UXOQCS will implement the three-phase control process for each of the Definable DFWs in Table 4-1 to audit/inspect the subtasks for compliance with the approved WP, SOPs and DQOs. The three-phase control process includes the preparatory, initial and follow-up phase audits/inspections. The inspections are documented using the QC Surveillance Forms prepared for each DFW (located in Appendix F).

4.4.1.1 Preparatory Phase

A preparatory phase inspection is performed prior to the beginning of work on each DFW. The UXOQCS will review the DFW scope and applicable specifications (MQO's) and verify that the necessary resources, controls and conditions are in place and compliant with the WP before the work activities begin.

4.4.1.2 Initial Phase

The UXOQCS performs an initial phase inspection for each DFW once a representative sample of the work has been completed. The purpose of this inspection is to check the preliminary work for compliance with procedures and contract specifications, to verify through inspection and testing the acceptable level of workmanship. The UXOQCS will review the minutes of the preparatory phase to check for omissions and resolve any differences of interpretation by project personnel and the contract requirements.

4.4.1.3 Follow-up Phase

The UXOQCS performs a follow-up phase inspection periodically while work progresses for each DFW. The frequency of the follow-up phase is specified in Table 4-1 by DFW. The purpose of the inspection is to ensure continuous compliance and an acceptable level of workmanship. The UXOQCS will observe the same activities as under the initial inspection and ensure that discrepancies between site practices and approved specifications are identified and resolved. Corrective actions for unsatisfactory conditions or practices will be verified by the UXOQCS prior to continuing work on the affected DFW.

The inspection program is established to provide the following:

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

Personnel performing QC inspections are knowledgeable about, and have received training in, QC techniques and methodologies, this QCP and applicable regulations. They will also be technically knowledgeable of the processes being inspected. Inspections will be performed in accordance with written procedures or checklists. Personnel performing QC inspections will not have direct responsibilities in the areas they are assessing.

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

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

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

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Table 4-1: Definable Features of Work Audit Procedures

Note: QC audits/inspections for each DFW are documented using the QC Surveillance Forms located in Appendix F.

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Mobilization & Site Specific Training	WP Sec-2.2.3, Sec-3.3.1.1.1; Sec 4.8.1 Form Personnel Qualification Verification Form; MEC Training Documentation Form	Visual Observation and Document Review	PP/IP/FP	Once, and follow-up as required	All personnel required for the work activities have been identified, are available, and meet the requirements and qualifications for the positions, or waivers from the USAESCH have been obtained.	Document deficiency and report to SUXOS and PM for resolution, follow-up to verify compliance before personnel are assigned project tasks
	WP Sec-4.8.1	Visual Observation and Document Review	PP/IP/FP	Once, and follow-up as required	All personnel are properly trained and certified to operate equipment and machinery.	Document deficiency and report to SUXOS for resolution, follow-up to verify compliance before personnel operate equipment and machinery
	WP and APP	Document Review	PP/IP/FP	Once, and follow-up as required	All field personnel have reviewed the WP and APP.	Document deficiency and report to UXOQCS and SUXOS for resolution, follow-up to verify compliance before personnel commence assigned project tasks
	APP Form Safety Meeting Attendance Log	Document Review	PP/IP/FP	Once, and follow-up as required	All personnel have signed the Employee Sign-off Forms for the Site Safety and Health Plan SSHP), the Certificate of PPE training and all AHAs have been completed.	Document deficiency and report to UXOQCS and SUXOS for resolution, follow-up to verify compliance before personnel commence assigned project tasks
	APP	Document Review	PP/IP/FP	Once, and follow-up as Material is Introduced to Project	Material Safety Data Sheets are available on-site for all hazardous materials used or encountered onsite	Document deficiency and report to UXOQCS and SUXOS for resolution, follow-up to verify compliance before personnel are exposed to the hazardous material of concern

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
	WP Sec- 2.7 Project Schedule	Visual Observation and Document Review	PP/IP/FP	Once and Follow-up as Required	All equipment is received on island as needed to support the project schedule.	Document deficiency and report to SUXOS for resolution
	WP Sec- 2.2	Document Review	PP/IP/FP	Once	Coordination is performed with personnel on Culebra, FWS, DNER, PREQB, the U.S. Coast Guard, FAA and USAESCH.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
	Appendix F: Forms: Mobilization and Site Prep SOP	Document Review	PP/IP/FP	Once and Follow-up as Required	Coordination with support facilities has been conducted.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
	SSHP	Visual Observation and Document Review	PP/IP/FP	Daily	Work zones and exclusion zones are properly established.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
	SSHP	Visual Observation and Document Review	PP/IP/FP	Weekly	Break and rest areas established in accordance with reference.	Document deficiency and report to SUXOS for resolution prior to initiating project tasks
IVS Certification	WP Sec- 3.2.1.1	Visual observation	PP/IP/FP	Daily as required	Divers and equipment detect all buried ISO's at IVS or in designated water column	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
	WP Sec-3.2.1.1, App. L Appendix F: Forms Operator and Geophysical Instrument Checkout	Visual observation	PP/IP/FP	Daily as required	DGPS checked at a known location and indicates accurate position	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
Snorkeling Operations	WP Sec-3.2.2 App. L	Document review	PP/IP/FP	Daily as required	Snorkeler marked anomaly location, recorded with video footage if unburied, and documented surrounding underwater environment	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
DGM Survey	WP Sec-3.2.1.2 and Table 3-3 Appendix F: Forms DGM (Phase 2) Prep Initial and Follow-up	Visual Observation and Document Review	PP/IP/FP	Daily as Required	Pre-operations checks performed on detection equipment and ROV equipment Data may be re-collected depending on the results of the RCA	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
	WP Sec-3.2.1.3.1, and Table 3-3 Sec- 6, App. K	Document Review	IP/FP	Daily as required	Locations of suspected MEC recorded and reported to USACE Data may be re-collected depending on the results of the RCA	Deficiency will be reported to SUXOS. UXOQC will verify resolution procedure

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Intrusive Investigation	WP Sec-3.3.1.3. Appendix F: Forms Intrusive (Phase 3) Prep Initial and Follow-up	Visual Observation and Document Review	PP/IP/FP	Daily as Required	Pre-operations checks performed on detection equipment and Dive Equipment	Deficiency will be reported to SUXOS and personnel/equipment will undergo remedial training and certification
	WP Sec-3.3.1.5, Sec 6, App. K Form: MEC Accounta-bility Log	Document Review	IP/FP	Daily as required	Additional intrusive transects investigated; Locations of suspected MEC recorded; Threatened and Endangered Species Identified around MEC; The above items reported to USACE	Deficiency will be reported to SUXOS. UXOQC will verify resolution procedure
Small Boat Operations	WP Sec-3.3.1.6, Sec-6, App. K	Visual Observation	IP/FP	Daily as Required	Vessel operating in a manner to protect natural resources but remains functional in field operations	Deficiency will be reported to SUXOS and boat operator will perform remedial training and certification.
	WP Sec-3.3.1.6, DSPO 2, SOP App K	Visual Observation	IP/FP	Daily as Required	Vessel operator carrying and utilizing appropriate documentation to identify natural aquatic resources	Deficiency will be reported to SUXOS and boat operator will perform remedial training and certification.

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Underwater Demolition	WP Sec-3.3.1.10, Sec-3.3.1.11.4, OPS-03, ESP App J Form: Explosive Demolition Review Checklist; Explosive Usage Record Form	Visual Observation and Document Review	PP/IP/FP	Upon each occurrence	Coordination and notification requirements have been complete; Munitions debris inspected and removed for further processing	Deficiency will be documented and reported to SUXOS. UXOQC will verify resolution procedure
Surface Demolition	WP Sec-3.3.1.10, Sec-3.3.1.11 Table 3-5, and App. J Explosive Demolition Review Checklist; Explosive Usage Record Form; Explosive Vehicle On Site Inspection	Visual Observation and Document Review	PP/IP/FP	Upon each occurrence	Coordination and notification requirements have been complete; Munitions debris inspected and removed for further processing	Deficiency will be documented and reported to SUXOS. UXOQC will verify resolution procedure

Definable Feature of Work	Reference	Audit Procedures	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Raise, Tow, and Beach of MEC/MPPEH	WP Sec-3.3.1.9, App. J	Visual Observation	PP/IP/FP	Daily as required	Remote means employed for breaking-free of munitions from the bottom/moving of MEC determined not acceptable to move	Deficiency will be documented reported to SUXOS. UXOQC will verify resolution procedure
	WP Sec 3.3.1.10, WP Fig. 3-7 & 3-8	Visual Observation	PP/IP/FP	Daily as required	MEC free from Listed corals prior to performing lift	Deficiency will be documented reported to SUXOS. UXOQC will verify resolution procedure
MPPEH Management	WP Sec-3.3.1.10, WP Fig 3-7 & 3-8	Visual Observation and Document Review	IP/FP	Daily as required	MPPEH items properly recorded, contained, and stored	Deficiency will be documented reported to SUXOS. UXOQC will verify resolution procedure
MDAS Management	WP Sec- 2.7 Form MDAS Accumula-tion Form	Visual Observation and Document Review	IP/FP	Daily as required	MDAS items properly recorded, contained, and stored	Deficiency will be documented reported to SUXOS. UXOQC will verify resolution procedure
	WP Sec- 2.8 and PWS	Visual Observation and Document Review	PP/IP/FP	Weekly	Project Status Reports are reviewed for accuracy and thoroughness IAW the PWS	Deficiency will be documented reported to SUXOS. UXOQC will verify resolution procedure

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4.4.2 DEFICIENCY MANAGEMENT

All deficiencies or nonconforming conditions (as defined in the pass/fail criteria in Table 4-1) discovered during inspections or other QC functions will be noted on a Deficiency Notice (DN) form. The DN will identify, at a minimum, any corrective action required, the individuals reviewing and approving the actions, and the actions taken to prevent recurrence. A Deficiency Notice Log will be maintained to document and track corrective actions to closure, and will be included in the RI Report. The UXOQCS will be responsible for tracking deficiencies to closure and reporting their status on daily reports and log forms (see Appendix F for the DN and Deficiency Notice Log forms).

4.4.2.1 Root Cause Analysis

If a requirement failure occurs, a root cause analysis will be performed by the UXOQCS who will then present the findings to the PM and CDSQ with suggested or required corrective actions. Once approved by management, the team will implement the corrective actions. The Root Cause Analysis and corrective actions will be attached to the weekly QC report. All target reacquisition and intrusive quality control measures and metrics will be documented, with copies sent to the appropriate personnel for review and inclusion in other documents as deemed necessary.

Figure 4-1 illustrates the flow of the root cause and effect process that the UXOQCS will use to determine failure causes.

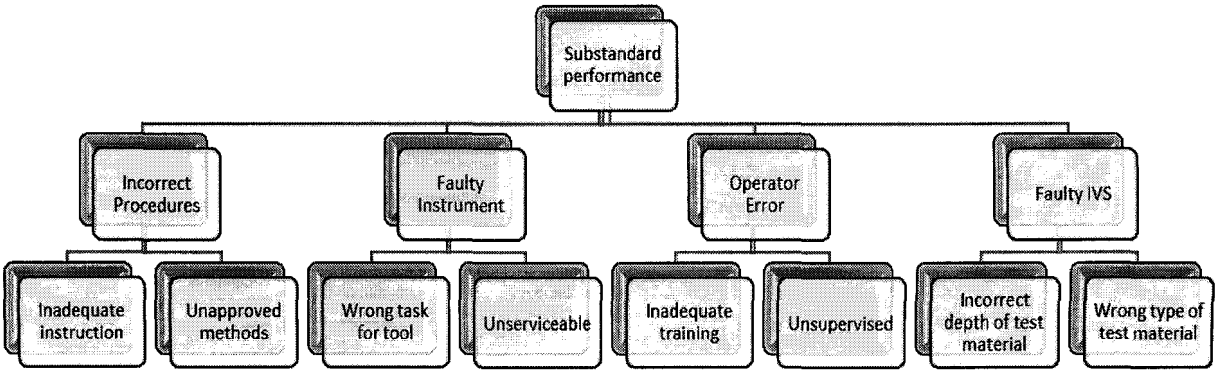

Figure 4-1: Cause and Effect Process

4.4.2.2 Corrective Actions

Following the root cause analysis and approval of corrective actions by management, project personnel will implement these actions to correct the problem. Potential remedies to be considered may include the following:

- Supplemental training of personnel
- Changes of equipment or modification to equipment currently in use
- Acquisition of supplemental equipment
- Implementation of new procedures or modification to existing procedures
- Changes in QC procedures.

The UXOQCS will document the application of the corrective actions on the DN. Through follow-up phase surveillance, the UXOQCS will verify that the corrective action implemented has rectified the deficient condition and is sufficient to prevent recurrence.

4.5 FIELD QUALITY CONTROL INSPECTIONS, AUDITS AND REPORTS

The UXOQCS is responsible for verifying that site personnel perform operational checks of instruments and equipment prior to using them on-site. The UXOQCS will periodically check the project logbooks listed below to ensure the log entries are complete and accurate. Inspections will be performed daily at random, with unscheduled checks of the site in general to ensure personnel accomplish all work as specified in the WP. The UXOQCS will utilize the process outlined in Figure 4-2 and Table 4-1 , to ensure all field tasks meet quality standards prior to submittal for the Quality Assurance process. The UXOQCS will submit a report to the SUXOS detailing the results of these checks.

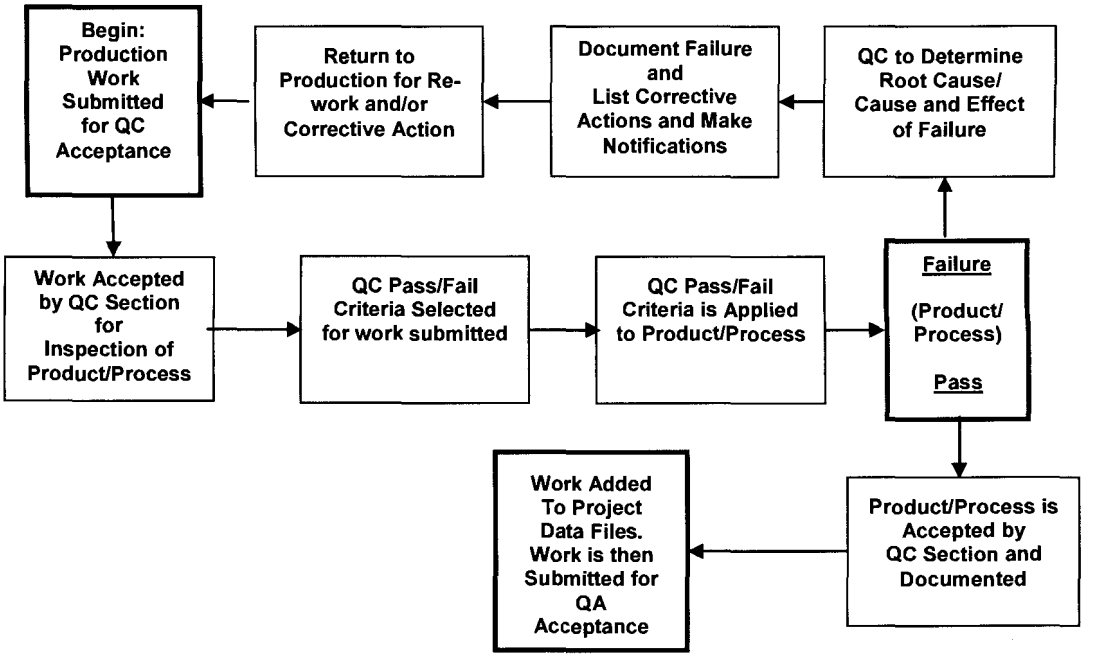

Figure 4-2: Quality Control Process

4.5.1 EQUIPMENT TESTING PROCEDURES AND FREQUENCY

Instruments and equipment, such as navigational, video, and data analysis and transfer systems, used to gather and generate site specific data, e.g. GPS, Geophysical data (results of geophysical tests will be recorded in the Access Database) to support the field activities, will be tested with sufficient frequency and in such a manner as to ensure that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Instruments or equipment failing to meet the standard will be repaired, recalibrated, or replaced. Replaced instruments or equipment must meet the same specifications for accuracy and precision as the item removed from service. Operator proficiency will also be evaluated regularly for proper instrument set-up, operation, survey technique, and data transfer. Items such as cellular telephones and radios will be tested for serviceability at the start of each workday. Results of these tests will be recorded in the Daily Log. Items failing these tests will be repaired or replaced prior to operations commencing.

4.5.2 CALIBRATION

The UXOQCS will coordinate with the ASI survey team to check and ensure that DGM equipment is calibrated or recalibrated in accordance with the applicable SOPs and manufacturer's recommendation, or owner's manual. Calibrations will be completed on a prescribed schedule and the calibration results recorded in the daily field logbook.

Recalibration will be performed as necessary, with the reason for the recalibration and the results recorded in the daily field logbook.

4.5.3 MAINTENANCE

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

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

- Vehicles
- Vessels (Boats)
- VideoRay Pro -3 ROV
- Data Acquisition Systems
- Personal Protective Equipment
- Communications Equipment
- RTK-DGPS Equipment, and Personal Digital Assistant
- Emergency Equipment.

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

Repair or replacement parts will meet the manufacturer requirements and be installed by personnel authorized to replace parts or make repairs. Records pertaining to the testing, repair, or replacement of instruments and equipment will be maintained on-site by the UXOQCS.

4.5.4 LOGS AND RECORDS

Activity Logs will be maintained daily, as applicable; all entries will be in ink. Logbooks will be bound and pages consecutively numbered. Logbooks and records may be supplemented by the use of preprinted forms (e.g., safety inspection forms, safety briefings, etc). These forms help to ensure uniformity of activities being conducted, inspected, and reviewed. Forms are located in Appendix F of the WP. The following logbooks and records will be maintained on-site and are subject to inspection by the UXOQCS.

4.5.5 UXO QUALITY CONTROL REPORT

The UXOQCS will prepare daily QC Reports and a weekly QC Report (See the report forms located in Appendix F, Daily Quality Control Report, and Weekly Quality Control Report forms). These documents will be kept on-site. The weekly QC report will be submitted to the PM for distribution to the appropriate personnel. This report will include the following information:

- The periodic assessments of work performed
- Significant QA/QC problems and corrective actions taken
- Conformance or non-compliance issues
- Work progress
- Lessons learned, and change recommendations
- Signature of the UXOQCS.

4.5.5.1 Daily Journal

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

- Date and recorder of information
- Start and end time of work activities
- Work stoppage
- Visitors and escorts
- Weather conditions
- Changes to the WP, SSHP, policies or procedures
- Injuries and /or illnesses
- Safety briefings
- MEC encountered
- Relevant events and training
- Signature of the SUXOS.

4.5.5.2 Field Logbooks

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

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

4.5.5.3 Safety Logbook

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

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

4.5.5.4 Quality Control Logbook

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

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

4.5.5.5 Training Records

Training records will be maintained on-site and monitored by the PM as necessary. These records contain any licenses, permits, certificates, or other qualifying data, to include:

- Date and nature of training
- Personnel attending and instructor(s)
- Visitor training and briefings
- Signature of instructor and SUXOS, UXOSO or UXOQCS.

4.5.5.6 Underwater MEC and Anomaly Records

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

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

4.5.5.7 Photographic Logbook

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

- Date and time taken
- Unique identifying number(s) relating to the Photographic Logbook
- Location photograph was taken
- Brief description of the subject matter.

4.5.6 DAILY REVIEW OF FIELD DATA

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

4.6 CONTRACT SUBMITTAL QUALITY CONTROL PROCESS

Documents required under this contract will be developed and maintained by a project team consisting of the USA PM, Project Engineer, Project Geophysicist, GIS Manager, and Corporate CDSQ. These team members will contribute their corporate knowledge and experience to the documents to ensure technical quality.

- The PM will take the lead in the development of contract documents, and will schedule a peer review and a QC review in sufficient time to meet project milestones for delivery of submittals.
- The Project Engineer will provide technical writing support to develop the documents, and will review completed documents to ensure accuracy and completeness.
- The PM will review and supply information and documents to ensure accuracy and completeness of procedures and reports.
- The Project Geophysicist will ensure a technically sound approach to fieldwork, and accuracy and completeness of reporting on geophysical data.
- The GIS Manager will develop digital database and maps, overlays of beaches and exclusion zones, and other spatial data. The GIS Manager will prepare all drawings or maps needed for submittals, and will perform QC of civil survey data.

After the project team has performed a review of documents, the CDSQ and UXOQCS will perform a QC review to ensure overall quality and completeness.

Comments on submitted documents will be directed by project personnel to the appropriate subject matter expert for resolution.

Changes to final WPs will be submitted to the PM immediately upon approval. The PM will be responsible for ensuring that the changes are posted to the hard copy on file and that all field personnel are made aware of the changes.

4.7 FIELD QUALITY CONTROL INSPECTIONS, AUDITS, AND REPORTS

Project QC inspections, audits, and reports are divided into Phase 2 (DGM) and Phase 3 (Intrusive Investigations). Personnel responsible for the inspections, reviews, corrections, and reports are identified in the following paragraphs.

The UXOQCS is responsible for the accomplishment of operational checks of instruments and equipment by site personnel. The appropriate log entries will be made. Inspections will be performed daily at random, with unscheduled checks of the site in general, to ensure personnel accomplish all work as specified in the WP. The UXOQCS will utilize the process outlined in Figure 4-2 and Table 4-1 to ensure all field tasks meet quality standards prior to submittal for the Quality Assurance process. The UXOQCS will submit a report to the Site Manager detailing the results of these checks.

4.7.1 CLASSIFICATION OF MEC-RELATED ITEMS

To ensure accurate classification of MEC-related items (with respect to their explosive hazard), as the information is used to make decisions about the response action, USA will inspect suspect MEC and classify these items in accordance with Table 4-2. The list is not all inclusive, but reflects the types of MEC related material that may be encountered at the project site. The numbers in the table refer to footnotes that are found below the Table. It is important to read the footnotes, as they provide additional information of importance to understanding.

Table 4-2: Classifications of MEC-Related Items

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

Footnotes:

[1] DMM: Munitions generally considered as DMM include: buried munitions; un-recovered kick-outs from open detonations; munitions left behind or discarded accidentally during munitions-related activities; munitions intentionally disposed of without authorization during munitions-related activities. Munitions removed from storage for the purpose of disposal that are awaiting disposal are not DMM.

[2] MC: MC is both (a) an explosive; and (b) present in sufficient concentrations to present explosive hazards.

[3] This is MC that is either (a) not an explosive (e.g., lead, beryllium, and cadmium); or (b) an explosive not present in sufficient concentrations to present explosive hazards.

[4] Although military munitions in a burial pit will normally be DMM, some may be UXO. For explosives safety reasons, munitions in a burial pit should be approached as UXO until assessed by technically qualified personnel (e.g., EOD personnel, UXO-qualified personnel) have determined that they are not UXO or that they do not present explosive hazards similar to UXO.

[5] Explosive soil is typically found in sumps and settling lagoons for explosives-laden wastewater, and in and around drainage ditches and pipes that carry the wastewater to such sumps and lagoons.

[6] A target is a type of range-related debris. Although a target is not MEC, it may contain UXO, DMM, or MC. Prior to its release from DoD control, its explosives safety status must be documented.

[7] A target's explosives safety status must be documented and any demilitarization required to remove its military characteristics must be performed prior to its release from DoD control.

[8] UXO, DMM, or MC may be found on operational ranges and on former ranges (previously referred to as closed, transferring or transferred ranges). An inspection of the material will determine into which category this material falls. For example, if a projectile breaks apart on impact, one could find (a) a sheared-off fuze, which would be UXO or (b) explosive filler, which would be MC that broke away from the projectile's open body. If, during an open detonation of an unserviceable munitions that is

conducted on an operational range, the donor charge detonates but the munitions being destroyed breaks up but does not detonate, the remnants of the munitions would be DMM or, if explosive residue (e.g., clumps of TNT), MC.

(9) Fragments, while munitions debris, may be evidence of High Explosive (HE) usage at the site. For such fragments, USA will indicate evidence of HE in its classification. After determination of its explosives safety status, scrap metal from used munitions on a range that is documented as safe would, after any demilitarization required to remove its military characteristics, be available for release from DoD control. In additions to these DoD requirements, other regulatory criteria may apply.

4.8 QUALIFICATIONS AND TRAINING

4.8.1 EMPLOYEE QUALIFICATIONS

The PM will maintain personnel files on each employee at the project site. These files include copies of necessary licenses, permits, training records, certificates of qualifications, and resumes that support the employee's placement and position. Prior to an employee's initial assignment, or before any change in duties or assignment, the PM will review the employee's files to ensure necessary qualifications are met. All site records and documentation are subject to inspection and review by the UXOQCS/SO.

- Site UXO personnel must meet the minimal qualifications as outlined in DDESB TP-18, dated 20 December 2004.

Dive personnel must also meet the requirements set forth in the PWS, USACE requirements, and applicable sections of 29 CFR 1910.120, Subpart T.

4.8.2 EMPLOYEE TRAINING AND SITE SPECIFIC REQUIREMENTS

USA ensures that only qualified and properly trained personnel are assigned to positions on project sites. Prior to mobilization of personnel, USA ensures that training required by USA, OSHA 29 CFR 1910.120, and the EM 385-1-1 has been completed for all personnel assigned to the project as shown in Table 4-3 below.

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Table 4-3: Training

Training Course	Personnel Attending
40-Hour HAZWOPER Training	All personnel who have not previously received this training or who do not qualify for certification through documented experience or training equivalent to that in paragraphs (e)(1) through (e)(4) of 29 CFR 1910.120.
8-Hour Supervisor Course	All USA management and supervisory personnel. This includes the SUXOS, UXOSO, UXOQCS, and UXO Technicians III.
8-Hour Refresher Course	All site personnel, except those who have completed their initial 40-Hour HAZWOPER training within the past year.
First Aid and Cardiopulmonary Resuscitation (CPR) Training	CPR training will be required for USA personnel and subcontractors that are participating in field operations
30-Hour OSHA Construction Safety Course	Training Requirement for UXOSO IAW with EM 385-1-1, Section 01.A.17

In addition, prior to the start of operations all personnel will receive the following as a minimum:

- Familiarization with the WP and its policies and procedures
- APP/SSHP/AHA/SOP orientation
- Emergency Response Plan training
- PPE training
- Environmental considerations peculiar to the operations on the project site
- Instruction and training on equipment usage and safe work practices
- Daily safety training outlining the day's activities.

Visitors to the site will be provided with a site orientation and safety briefing prior to entering the exclusion area (while on-site, visitors will be escorted at all times by a UXO technician).

Training is conducted by the SUXOS, UXOQCS, or other designated personnel and records of attendance are maintained on-site. Certificates of Training are issued when applicable.

4.9 LESSONS LEARNED PROGRAM

As required by ER 1110-1-12, USA will develop a Lessons Learned Program (LLP) to provide for the exchange of information regarding problems that may occur during the response RI activities on this project site.

4.9.1 LESSONS LEARNED OBJECTIVE (LLP)

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

- Prevent the recurrence of repetitive design/execution deficiency
- Clarify interpretation of regulations or standards
- Reduce the potential for mistakes in high risk/probability areas of concern
- Pass on information specific to an installation or project
- Promote a good work practice that should be ingrained for repeat application
- Promote efficient and cost-effective business practice.

4.9.2 TEAM RESPONSIBILITIES

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

4.9.3 PROJECT MANAGEMENT RESPONSIBILITY

The PM will review and approve all lessons learned for submittal to the Corps PM for potential discussion with the project development team during After Action Reviews.

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5.0 EXPLOSIVES MANAGEMENT PLAN

5.1 GENERAL

This plan outlines the procedures USA will use to complete the Culebra RI/FS MRS 09 and MRS 13 fieldwork. The procedures are in accordance with the following regulations:

- DOD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives
- DOD 6055.9-M, DoD Ammunition and Explosives Safety Standards
- Applicable Sections of the Department of Transportation (DOT), 49 CFR Parts 100-199
- Army Regulation (AR) 385-64, Ammunition and Explosives Safety
- AR 190-11, Physical Security of Arms, Ammunition and Explosives
- Engineer Manual (EM) 1110-1-4009 Engineer Manual, Ordnance and Explosives
- EP 1110-1-18 Engineer Pamphlet, Ordnance and Explosives Response
- Explosive Law for Commonwealth of Puerto Rico
- USACE EM 385-1-97, Explosives Safety and Health Requirements Manual
- USACE EM 385-1-1, Safety and Health Requirements Manual
- Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) Publication 5400.7, Federal Explosives Laws and Regulations.

5.2 ACQUISITION

USA will use commercial explosives obtained through a local explosives supplier for disposal and venting of MEC. USA has an ATF permit (see Appendix M) to purchase, store, and use explosives and will supply commercial demolition material for disposal and venting operations. USA personnel have a letter of clearance from the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE) for the use of explosives. As required by the Commonwealth of Puerto Rico, USA will have a Blaster's License issued for the RI/FS. USA will provide the explosives distributor a certified statement of the intended use of the explosive material. The ATF permit will be posted on-site and will be available for Federal, state, or local inspection.

5.2.1 DESCRIPTION AND ESTIMATED QUANTITIES

USA will store explosives on-site in the Type II magazine approved ESP dated November 2013. USA will store less than 100 pounds of bulk and initiating explosives on-site.

5.2.2 ACQUISITION SOURCE

USA will purchase explosives from licensed commercial suppliers such as Professional Rock Crushing Corp., Dorado, PR. The SUXOS will be authorized, in writing, to request and receive explosives from the commercial suppliers.

5.2.3 LISTING OF PROPOSED EXPLOSIVES

Table 5-1 lists the types and quantities of explosives that may be used.

Table 5-1: Typical Explosives and Quantities for RI/FS

Type of Explosive	Descriptions	Quantity
1 lb	Booster Black Cap	20 ea
Electric Caps	Rock Star Detonators	100 ea
Detonating Cord	80 Grain	1 roll 500 ft
Perforators	19.5 gram Shaped Charges	50 ea

5.3 INITIAL RECEIPT

Shipments of explosives will be by commercial carrier from the explosives supplier. The explosive supplier is responsible for all permits and documentation required by Federal, Commonwealth of Puerto Rico, and local regulations for movement of explosives to the air terminal. USA will coordinate with the Mayor's Office and the Puerto Rico State Police to receive and transport the explosives to the Type II magazine.

5.3.1 PROCEDURES FOR RECEIPT OF EXPLOSIVES

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the shipping manifest and recorded on the USA Explosives Usage Form and the Daily Operations Journal (see Appendix F USA Forms).

5.3.2 PROCEDURES FOR RECONCILING DISCREPANCIES IN QUANTITIES SHIPPED AND RECEIVED

The SUXOS will reconcile the delivery shipping documentation with the requested amounts ordered and received. The SUXOS will not sign for or accept shipments with shortages or overages until the discrepancies are corrected.

5.4 STORAGE

On-site storage of explosives is anticipated.

5.4.1 ESTABLISHMENT OF STORAGE FACILITIES

USA will store explosives in the existing ATF Type II magazine, previously sited on Culebra (Figure 5-1). USA will comply with ATF, Federal, and local storage and compatibility criteria and procedures, including the required USAESCH approved ESP.

USA will maintain the magazine in compliance with the magazine criteria and quantity distance (QD) requirements established in ATF Regulation ATF P 5400.7 and DoD 6055.9-M, DoD Ammunition and Explosives Safety Standards.

Figure 5-1: Site of Type II Magazine

5.4.2 PHYSICAL SECURITY OF STORAGE FACILITIES

The Type II magazine and the blasting cap box that is mounted on the side of the Type II magazine will be locked with high security padlocks (2) meeting ATFP 5400.7 Section 55.208 (a) and will be enclosed by a chain link fence, IAW 6055-9 M, and EM 1110-1-4009. The magazine and cap box will remain locked except when receipts and issues are being made. The two locks on both the magazine and cap box will require two different keys. One key will be kept by the SUXOS and the second key will be kept by the UXOQCS. The SUXOS will maintain the key to the fence enclosing the magazine. The magazine storage area will be inspected each work week by the SUXOS and UXOSO/UXOQCS to ensure the integrity of the enclosure.

5.5 TRANSPORTATION

Transportation of MEC and explosives will comply with all Federal, state, and local regulations. Permits are not required under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for on-site or on Federal installations for transportation of explosives or conventional military munitions. USA will request permission from the Mayor's Office to use the docks at DNER or the Ferry Dock in the City of Dewey, Culebra, PR. Coordination will be made with the Puerto Rican State Police to provide an escort during transport of any explosives to or from the magazine to each MRS on the island, or to the docks on the island. From the docks, explosives will be transported by water to MRS 13 or MRS 09. USA plans to transport newly purchased explosives to the island of Culebra using helicopters.

5.5.1 PROCEDURES FOR TRANSPORTATION FROM STORAGE TO DISPOSAL LOCATION

IAW with DOT regulations, USA will transport explosives in IME-22 containers for transportation to the disposal sites. USA will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate IME-22 container (49 CFR 173.63) and secured away from other items.
- Compatibility requirements will be observed.
- Only UXOTIIIs and above may be issued with and can transport explosive materials. The receiving party will sign the receipt documents for accountability.
- Operators transporting Hazard Division (49 CFR 173.50) 1.1 explosives will have a valid driver's license.
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25MPH.

Personnel will not ride in the cargo compartment with explosives or MEC.

5.5.2 EXPLOSIVE TRANSPORTATION VEHICLE REQUIREMENTS

Explosives will be transported in closed containers in the beds of vehicles whenever possible. The load will be well braced and, except when in closed vehicles, covered with a fire-resistant tarpaulin or placed in an appropriate shipping container.

- Initiating explosives, such as blasting caps, will remain separated at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate container and secured away from other items.
- Compatibility requirements will be observed.
- Only UXO Technicians III and above may be issued explosive materials and may transport them. The receiving party will sign the receipt documents for accountability;
- Operators transporting explosives will have a valid driver's license;
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions. Vehicles transporting explosives off-road will not exceed 25 MPH.
- Personnel will not ride in the cargo compartment with explosives or MEC.
- Vehicles transporting explosives or MEC will be inspected prior to load-out using the Motor Vehicle Inspection form DD FORM 626 (Appendix F), and will be properly placarded.
- Vehicle engine will not be running and the wheels will be chocked when personnel are loading/unloading explosives.
- Beds of vehicles will have a bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings.
- Vehicles transporting explosives will have a First Aid kit, two 10-BC rated fire extinguishers, and a means of communications.

5.5.3 TRANSPORTATION BY VESSEL

Movement of explosives from Culebra to MRS 09 and MRS 13 water boundaries will require the use of a contracted and licensed vessel. Transport of explosives by waterborne vessel requires adhering to the applicable sections contained in 49 CFR (DOT) and U.S. Coast Guard directives.

Specifics, such as safety requirements, placarding, stowage, security, personnel, and emergency procedures are detailed in the SOP Explosives Transportation –Open Water Vessels, contained in Appendix K.

5.6 RECEIPT PROCEDURES

The SUXOS will strictly control access to all explosives. All receipts, issues, and usage of explosives will be properly documented and verified through physical count by the UXOQCS.

5.6.1 RECORDS MANAGEMENT AND ACCOUNTABILITY

Upon receipt, the type, quantity, and lot number of each explosive item will be checked against the manifest and recorded on the Explosives Usage Form (Appendix F). The original receipt documents and an inventory will be maintained on file by the SUXOS. All original explosive records will be forwarded to USA Oldsmar for archive in accordance with ATF regulations and requirements. ATF requires USA to maintain explosive records for commercial purchases for a period of 5 years. Copies of all records will be maintained on-site by the SUXOS and be available for inspection by authorized agencies. Their respective lot number will track explosive items until the item is expended or transferred to Government control and accountability.

5.6.2 AUTHORIZED INDIVIDUALS

USA is required to provide commercial suppliers with documentation of individuals authorized to request and receive explosives. The individual authorized to receive and issue explosives is the USA SUXOS and in some cases, if the SUXOS is not available, the UXOQCS. On site, the SUXOS will designate, in writing, the individual who is authorized to transport and use explosives.

5.6.3 CERTIFICATION

The SUXOS and UXO Technician III team leader performing demolition will sign and date the explosives usage form certifying that the explosives were used for their intended purpose.

5.6.4 PROCEDURES FOR RECONCILING RECEIPT DOCUMENTS

The SUXOS and UXOQCS will be responsible for performing a review of the explosives usage record. If there is a discrepancy between the amount received and the amount of explosives consumed, then these individuals will review the receipt documentation to see if the records are correct. If the records review does not reconcile the discrepancy, then it will be reported to the Contracting Officer and USA-Oldsmar for investigation.

5.7 INVENTORY SCHEDULING

Explosives will be inventoried at least weekly by the SUXOS (or approved designee), the UXOQCS, and a Team Leader. Complete inventories will also be conducted after any issues/turn-ins of demolition material.

5.7.1 STORAGE FACILITY PHYSICAL INVENTORY PROCEDURES

The SUXOS will strictly control access to all explosives. All issues and turn-ins of explosives will be properly documented and verified through physical count by the SUXOS or his approved designee. On receipt, the type, quantity, and lot number of each explosive item is recorded on the Magazine Data Card (see Appendix F).

The SUXOS will review all requests for explosives from the individual operating sites and only sufficient explosives for the day's operations will be requested and issued. Issues of explosives will be recorded on Explosives Usage Records, deducted from the Magazine Data Cards, and annotated in the daily journal. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The end user of explosives will certify on the Explosives Usage Record that the explosives were used for their intended purpose. Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the UXOTIII when drawing or turning-in the explosives and will be verified by the UXOQCS.

- At the end of each disposal operation the UXOQCS and the Demolition Team UXOTIII will reconcile the entries on each Explosives Usage Record, and will turn these records over to the

SUXOS. The record of ordnance items destroyed with the explosives consumed will be kept in the SUXOS daily log.

- Entries made on the Explosives Usage Records and Magazine Data Cards will be verified through physical count by the Demolition Team UXOTIII when drawing or turning in the explosives, and the UXOQCS will verify the record.

5.7.2 PROCEDURES FOR RECONCILING INVENTORY DISCREPANCIES

The SUXOS, UXOQCS, and a UXOTIII will be responsible for performing a weekly inventory of the explosives within the magazine. If there is a discrepancy between the inventory and the volume of explosives within the magazine, then they will review the Magazine Data Card and Explosives Usage Record to see if the inventory records are current. If the records review does not reconcile the discrepancy, then it will be reported to the USACE OESS, Contracting Officer, and USA PM for investigation.

5.7.3 INVENTORY SCHEDULING

SUXOS, UXOQCS, and a UXOTIII will perform weekly inventories of the explosives within the magazine.

5.7.4 REPORTING LOSS OR THEFT OF EXPLOSIVE MATERIALS

If it is confirmed that ordnance or explosives are missing, then the SUXOS will contact the Contracting Officer immediately by telephone and in writing within 24 hours. The USACE OESS and USA-Oldsmar will be notified following the notification of the Contracting Officer. USA-Oldsmar will notify ATF and immediately begin an investigation.

5.7.5 PROCEDURES FOR RETURN TO STORAGE OF EXPLOSIVES NOT EXPENDED

Explosives that were issued for use but were not expended will be returned daily to the magazines at the completion of disposal operations. The Demolition Team UXOTIII will return the unused explosives to the storage magazine and record the items on the Magazine Data Card and Explosives Use Record.

5.8 DISPOSAL OF REMAINING EXPLOSIVES

ATF requires an accounting of all explosives purchased and used; therefore, at project completion all unused explosives still in the sealed containers will either be disposed of by detonation, or by transferring custody and accountability to an incoming contractor, a Government agency, or returned to the distributor.

5.9 ECONOMIC ANALYSIS

Because of ATF requirements and prohibition for returning used open packaging, these explosives will be consumed at the site. An economic analysis of the explosives disposal alternatives will not be required.

5.10 FORMS

USA will use internal USA forms Magazine Data Card and Explosives Usage Record for explosives receipt, issue, inventory, and DD Form 626 for vehicle inspections. These forms are in Appendix F.

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6.0 ENVIRONMENTAL PROTECTION PLAN

6.1 GENERAL

This Environmental Protection Plan (EPP) has been specifically developed to address environmental protection issues associated with performing the RI/FS underwater field activities within this WP. Specifically, this plan is intended to provide adequate procedures to safeguard the environmental condition of land and water in and around each MRS, beaches and access routes, and to mitigate and/or minimize the environmental impact from USA's operations.

Appendix K contains the revised SOPs for Endangered Species Conservation and their Critical Habitat during underwater investigations at DERP-FUDS property No. I02PR0068, Culebra Island, Puerto Rico (CESAJ, 2012). These SOPs provide specific procedures for DERP-FUDS operations in Culebra and surrounding cayos and is being referenced by section into this EPP. **Adherence to these SOPs will be strictly enforced.**

6.1.1 DEFINITIONS

For the purposes of this plan, the definitions of "Environmental Protection" and "Environmental Impact" are as follows:

- **Environmental Protection**: Preservation of the environment in its natural state to the greatest extent possible.
- **Environmental Impact:** Disturbance, damage, and/or contamination of the soil, air, and/or water.

6.1.2 ENVIRONMENTAL GOALS

The following are the environmental goals of the project:

- Perform operations in a manner that minimizes the disturbance of corals, seagrasses, sediment, and other underwater vegetation
- Perform operations in a manner to avoid impact to Listed Threatened or Endangered Species.
- Leave the investigation footprint areas in as near a natural condition as operationally possible.

Implement the procedures designed to protect the environment agreed to during coordination with project stakeholders and regulators.

To accomplish these goals, USA will implement procedures to control air and/or noise pollution; manage site-wastes; and control water pollution throughout this project. These procedures will focus on preventing contaminants from leaving the source, from entering potential contaminant transport pathways, and from reaching receptors.

6.1.3 ENVIRONMENTAL COORDINATION

USA's SUXOS will coordinate all land resources management, waste management, pollution control, and abatement activities with the on-site USACE OESS, and USFWS/NOAA NMFS/PR DNER personnel.

Project Stakeholders:

The project stakeholders are those individuals and organizations directly impacted by the survey activities. Stakeholders include (but are not limited to):

- PR DNER
- PR EQB
- United States EPA
- Culebra National Wildlife Refuge
- USFWS
- NOAA
- NMFS.

The stakeholders listed above participated in the TPP process for Culebra FUDS projects.

6.2 ENVIRONMENTAL RESOURCES AND EFFECTS

6.2.1 MRS 09 BEACHING SITE SURVEY

Prior to beginning site activities, USA's SUXOS and UXOQCS/SO, along with representatives of the USFWS Ecological Service and NMFS and the USACE OESS, will conduct a joint environmental survey, and will develop a layout plan of the operating area for MRS 09 Beaching sites, to document conditions of areas in and adjacent to the work site and access routes. The following items will also be identified on the layout plan: endangered and protected species or habitats, and cultural or historical resource areas.

6.3 ENVIRONMENTAL BASELINE SURVEY RESULTS

The main island of Puerto Rico and its associated islands support 75 federally listed threatened and endangered species consisting of 26 animals and 49 plants. Among this diverse group of fauna and flora are multiple species that are known to exist, potentially exist, or temporarily use areas within the Culebra Island archipelago. Of the 75 federally listed species, nine are known or are suspected to occupy Culebra Island and/or the associated cayos. In addition to the federally listed species, two state-listed species are known to occupy Culebra Islands. The federally and state-listed species include both terrestrial and marine life. The federally listed species of most concern for the wildlife refuge are the green sea turtle, hawksbill sea turtle, leatherback sea turtle, and loggerhead sea turtle. Due to declining populations, the elkhorn and staghorn corals in the surrounding waters are federally listed as threatened and endangered species. In addition to the species listed under the ESA, the Center for Biological Diversity petitioned NMFS on 20 October 2007 to list 83 species of corals as threatened or endangered under the ESA, and to designate critical habitat for these corals. NMFS received and reviewed the petition and determined that the requested listing actions may be warranted for 82 of the 83 coral species. The completed status review and management report (NOAA Technical Memorandum NMFS-PIFSC-27) was issued in September of 2011. All of the Atlantic coral species have the potential to be found in waters around Culebra.

According to the NWR System, portions of Culebra Island and 22 of the associated cayos are considered NWR area. The three largest cayos are Culebrita, Cayo Norte (privately owned), and Luis Pena. These resemble Culebra in that they all have sandy beaches, rugged coastline, and gentle to steep hills. Vegetation ranges from moderate to extremely dense. The smaller cayos are primarily solid rock with sparse or no vegetation. A few of the smaller cayos have small beaches; however, most are rugged rock all around.

According to the PR DNER, the conservation priority areas for Culebra and associated cayos are as follows:

- Designated Critical Habitat

- All of the lagoons on Culebra
- Monte Resaca
- All beaches around Culebra
- The designated critical habitat area for the Virgin Islands Boa
- Flamenco Peninsula
- Puerto del Manglar
- Los Canos
- Punta Soldado
- Bahia (also called "Ensenada") Cementerio
- All cayos and cayos around Culebra
- The Culebra NWR
- The Canal Luis Pena Natural Reserve.

6.3.1 OBSERVED BENTHIC HABITAT TYPES

6.3.1.1 Description of Observed Benthic Habitats in MRS 09 and 13

The following section provides a description of the results from the benthic habitat analysis performed by USA. USA utilized the data collected for hydrographic and video surveys during Phase 1, along with the NOAA benthic GIS, to characterize the benthic habitat classifications. According to the NOAA GIS effort (Kendall, M.S., et al. 2001), there are twenty-six (26) distinct benthic habitats located within near shore waters of Puerto Rico and the U.S. Virgin Islands. During the course of completing the EBS analysis, it was observed that the benthic habitats located within the water portions of MRS 09 and MRS 13 consist primarily of unconsolidated sediments (sand), submerged vegetation (sea grass/microalgae), and coral reef/hardbottom (colonized and uncolonized pavement) habitats. For the purposes of evaluating the implementability of subsequent RI fieldwork actions (conducting Geophysical surveys and intrusive investigations), USA considered two main benthic habitats; unconsolidated sediments and coral/hardbottom classifications. The following paragraphs summaries the observations for these two classifications. Appendix B: Site Maps Figures B-14 and B-15 illustrate the two benthic classifications projected on GIS within both MRS 09 and MRS 13.

6.3.1.2 Unconsolidated Sediments

The unconsolidated sediments habitat classification consists primarily of mud or sand with varying coverage (density) of submerged vegetation (seagrass and macro algae). Submerged vegetation populated the unconsolidated sediment habitats over much of the survey area. For MRS 09 both mud and sand cover were observed with sand being the majority of this classification. In MRS 13, sand was observed to be the primary cover, given the amount of wave energy present in most areas. A moderate amount of unconsolidated sediments within MRS 09 and MRS 13 were observed to be adjacent to hard bottom areas where sand cover over hard bottom is present. Some areas contained individual corals or rocks that were distinctive, but made up a very small percentage of the total cover. Species indentified in this habitat type included, but are not limited to: *Thalassiatestudinum* (turtle grass), *Syringodiumfiliforme* (manatee grass), *Dictyota sp.* (Y-branched algae), *Halimeda sp.*(leaf algae), *Penicillusdumetosus* (bristle ball brush algae), *Caulerpa sp.* (feather algae), *Udotea sp.* (Mermaid's fans), and *Galaxaura sp.*(tubular thicket algae). These areas can be seen in SSS mosaic as being flat with no relief or sand ridges.

6.3.1.3 Colonized or Uncolonized Hard Bottom and Coral Reef

The second observed class consisted of colonized or uncolonized hard bottom and coral reef. This class also included scattered coral or rock in unconsolidated sediment. In both MRS 09 and MRS 13 the majority of hard bottom structure was considered to be the pavement cover in the form of flat, low-relief, solid carbonate rock with coverage of macroalgae, hard coral, zoanthids, and other sessile invertebrates

that are dense enough to have begun to obscure the underlying surface. The various species identified included, but are not limited to: *Briareumabestinum* (corky sea fingers), *sea rods* (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina* (common sea fan), *Acropora palmate* (elkhorn coral), *Acroporacervicornis* (staghorn coral), *Poritesporites* (finger coral), *Dendrogyracylindricus* (pillar coral), *Madracis sp.* (finger coral), *Montastraea sp.* (star corals), *Dichocoeniastokesi* (elliptical star coral), *Siderastrea sp.*(starlet coral), and *Diploria sp.*(brain corals). These areas can be seen in the SSS mosaic as appearing rough in texture and having closely packed light and dark spots caused by the high reflectivity and vertical relief of the structures.

6.3.2 PRESENCE OF ESSENTIAL FISH HABITATS

6.3.2.1 List and Description

Essential fish habitat (EFH) is identified for species managed in Fishery Management Plans under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is the habitat necessary for managed fish to complete their life cycle, thus contributing to a fishery that can be harvested sustainably. EFH applies to each life stage of approximately 1,000 managed species.

The waters around Culebra have the potential to be EFHs for corals, queen conch, two species of lobster, and 43 different species of fish at either certain stages of, or throughout, their entire life cycle.

Critical habitat (CH) is designated for the survival and recovery of species listed as threatened or endangered under the ESA. Critical habitat includes those areas occupied by the species, in which are found physical and biological features that are essential to the conservation of an ESA listed species, and which may require special management considerations or protection. As of 2 September 1998, all waters surrounding Culebra from the high water mark out 3 nautical miles, as well as the surrounding cayos, were designated as CH for the green sea turtle. Green sea turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The turtles are attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting. These conditions are present at both MRS 09 and MRS 13.

Two species of coral are currently listed as threatened under the ESA; staghorn coral and elkhorn coral. As both MRS 13 and MRS 09 contain live specimens of these species, areas of these MRSs should be considered CH for these species as well as for the green sea turtle, for the planning of future activities.

6.3.3 PRESENCE OF THREATENED AND ENDANGERED SPECIES

6.3.3.1 Threatened Species

- *Acroporacervicornis* (staghorn coral) is currently listed as a threatened species and is being considered for change to endangered species status. It is found in shallow waters from 1 up to 160 ft depending on water conditions (though rarely seen below 60 ft). Colonies form antler-like racks of cylindrical branches that often grow in great tangles. The surface is covered in small, protruding, tubular corallites. Live staghorn coral is brown to yellow-brown. Once abundant throughout the region, it suffered mass mortality since the early 1990s in many areas due to white band disease. Though it was not observed in waters greater than 20 ft during the video transect survey, it has the potential to be in deeper water, therefore, all areas of reef within both MRSs were considered to have staghorn present.
- *Acroporapalmata* (elkhorn coral) is currently listed as a threatened species and is being considered for change to endangered species status. It is found in shallow waters from 1 up to 55 ft depending on water conditions (though rarely seen below 35 ft). Colonies form flattened branches resembling the horns of moose or elk. The surface is covered in small, protruding, tubular corallites. Live elkhorn coral is brown to yellow-brown. Once abundant throughout the region, it suffered mass mortality since the early 1990s in many areas due to white band disease. Though it was not observed in waters greater than 20 ft during the video transect survey, it has

the potential to be in deeper water, therefore, all areas of reef within both MRSs are considered to have elkhorn present.

- Cheloniamydas (Green sea turtle)
- CarettaCaretta (Loggerhead sea turtle)

6.3.3.2 Endangered Species (Descriptions in the EBS WP):

- *Balaenopteramusculus* (Blue whale)
- *Balaenopteraphysalus* (Fin whale)
- *Megapteranovaeangliae* (Humpback Whale)
- *Balaenoptera borealis* (Sei Whale)
- *Physetermacrocephalus* (Sperm Whale)
- *Eretmochelys imbricate* (Hawksbill Sea Turtle)
- *Dermochelyscoriacea* (Leatherback sea turtle).

6.3.3.3 Proposed Threatened Species

NOAA has proposed adding seven more Caribbean coral species to the threatened and endangered species list. These additional potentially endangered species include *Dendrogyracylindrus* (pillar coral), *Montastraeaannularis* (boulder star coral), *Montastraeafaveolata* (mountainous star coral), *Montastraeafranksii* (mountainous star coral), *Mycetophylliaferox* (rough cactus coral) all of which are, or have the potential to be, located within the waters surrounding Culebra. The additional potentially threatened species include *Dichocoeniastokesi* (elliptical star coral) and *Agaricialamarki* (Lamarck's sheet coral) which also are, or have the potential to be, located within the waters surrounding Culebra. While not currently included on the endangered/threatened species list at the time of the writing of this report, the areas in which they are found were not impacted by survey activities. All future survey activities in areas of coral will be conducted using remote sensing equipment which does not contact the seafloor; therefore, these potentially listed species should not be impacted in the future.

6.3.4 COMMONWEALTH OF PUERTO RICO LISTED SPECIES POTENTIALLY PRESENT

6.3.4.1 List and Descriptions (Description in the EBS WP)

- *Trichechusmanatusmantus* (Antillean Manatee)
- *Caretta Caretta* (Loggerhead Sea Turtle)
- *Cheloniamydas*(Green Sea Turtle)
- *Dermochelyscoriacea* (Leatherback Sea Turtle)
- *Eretmochelys imbricate* (Hawksbill Sea Turtle)
- *Magapteranovaiangliae*(Humpback Whale)
- *Balaenopteraphysalus* (Finback Whale)
- *Balaenoptera borealis* (Sei Whale)
- *Physetermacrocephalus* (Sperm Whale)
- *Balaenopteramusculus*(Blue Whale)
- *Acropora palmate* (Elkhorn Coral)
- Acroporacervicornis (Staghorn Coral).

The list of species as designated by the Commonwealth of Puerto Rico includes all species listed under the Listed Threatened or Endangered Species Act as well as the Antillean manatee. Manatees are most

abundant along the south and east coasts of the main island, particularly in the area of Fajardo and Ceiba and in the Jobos Bay area between Guayama and Salinas. Manatees are rarely seen in Culebra and do not tend to stay for extended periods as there are no reliable sources of fresh water (Caribbean Stranding Network, unpubl. data).

6.3.4.2 Threatened or Endangered Species Observed

No species currently on the endangered species list (USA 2013 – Environment Baseline Survey Report Underwater Portions of MRS 09 and MRS 13 Culebra, PR, paragraph 3.4.3) were encountered during the Phase 1 survey activities. Threatened species observed include staghorn and elkhorn corals as well as green sea turtles (See Appendix B, Figures B-16 and B-17). Proposed species that were seen during video and snorkeling surveys included *Montastraeasp* (star corals), *Mycetophylliaferox* (rough cactus coral), and *Dendrogyracylindrus* (pillar coral). Table 6-1 indicates the Listed and Proposed Listed corals observed during Phase 1.

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Table 6-1: Biological Survey

Location ID	Description	Longitude	Latitude	Benthic Habitat Classification
MRS 13- 1	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraeasp.* **(star corals), tube sponges	18.29721415	-65.332436	Coral Reef and Colonized Hardbottom
MRS 13- 2	*Syringodiumfiliforme* (manatee grass), *Udotea sp.* (Mermaid's fans), *Halimeda sp.*(leaf algae), finger sponges.	18.2981211	-65.3352354	Submerged Vegetation-Macro algae - patchy
MRS 13- 3	*Thalassiatestudinum* (turtle grass)	18.29951801	-65.3347057	Submerged Vegetation-Seagrass - continuous
MRS 13- 4	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), tube sponges, barrel sponges	18.29367263	-65.3284048	Coral Reef and Colonized Hardbottom
MRS 13- 5	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals), *Poritesporites* (finger coral)	18.29611126	-65.3266864	Coral Reef and Colonized Hardbottom
MRS 13- 6	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals)	18.29744294	-65.3250887	Coral Reef and Colonized Hardbottom
MRS 13- 7	*Syringodiumfiliforme* (manatee grass), *Udotea sp.* (Mermaid's fans), *Halimeda sp.*(leaf algae), *Dictyota sp.* (Y-branched algae), finger sponges.	18.29916625	-65.3254717	Submerged Vegetation-Macro algae - patchy
MRS 13- 8	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals), *Poritesporites* (finger coral)	18.30170373	-65.3271679	Coral Reef and Colonized Hardbottom
MRS 13- 9	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina* (common sea fan), *Montastraea sp.*** (star corals)	18.30197092	-65.3256028	Coral Reef and Colonized Hardbottom
MRS 13- 10	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals)	18.30221059	-65.3264071	Coral Reef and Colonized Hardbottom
MRS 13- 11	*Syringodiumfiliforme* (manatee grass), *Udotea sp.* (Mermaid's fans), *Halimeda sp.*(leaf algae), *Dictyota sp.* (Y-branched algae)	18.30569582	-65.3256058	Submerged Vegetation-Macro algae - patchy
MRS 13- 12	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals), *Poritesporites* (finger coral)	18.3057034	-65.327029	Coral Reef and Colonized Hardbottom
MRS 13- 13	*Acroporacervicornis* (staghorn coral), Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals), *Poritesporites* (finger coral), *Briareumabestinum* (corky sea fingers)	18.30643876	-65.3275741	Coral Reef and Colonized Hardbottom
MRS 13- 14	*Syringodiumfiliforme* (manatee grass), *Udotea sp.* (Mermaid's fans), *Halimeda sp.*(leaf algae), *Dictyota sp.* (Y-branched algae), finger sponges.	18.31230841	-65.326197	Submerged Vegetation-Macro algae - patchy
MRS 13- 15	*Syringodiumfiliforme* (manatee grass), *Udotea sp.* (Mermaid's fans), *Dictyota sp.* (Y-branched algae)	18.31207968	-65.3276657	Submerged Vegetation-Macro algae - patchy
MRS 13- 16	*Thalassiatestudinum* (turtle grass), *Penicillusdumetosus* (bristle ball brush algae), *Udotea sp.* (Mermaid's fans)	18.31217208	-65.3291389	Submerged Vegetation-Seagrass - continuous
MRS 13- 17	Sea Rods (various species), *Pseudopterogorgia* sp.(sea plumes), *Gorgoniaventalina*(common sea fan), black ball sponges, finger sponges, vase sponges, *Mycetophylliaferox* **(Rough Cactus Coral)	18.31725585	-65.3291371	Scattered Coral/Rock in Unconsolidated Sediment
MRS 13- 18	*Acroporacervicornis* *(staghorn coral), Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.* **(star corals), *Poritesporites* (finger coral), *Briareumabestinum* (corky sea fingers), *Siderastrea radians* (lesser starlet coral)	18.31501783	-65.3327668	Coral Reef and Colonized Hardbottom
MRS 13- 19	Scattered rocks with Sea Rods (various species)	18.31212072	-65.3391418	Scattered Coral/Rock in Unconsolidated Sediment
MRS 13- 20	*Thalassiatestudinum* (turtle grass), finger sponges, *Syringodiumfiliforme* (manatee grass), *Dictyota sp.* (Y-branched algae)	18.30584494	-65.3409675	Submerged Vegetation-Seagrass - patchy

Location ID	Description	Longitude	Latitude	Benthic Habitat Classification
MRS 13-21	*Thalassiatestudinum* (turtle grass), finger sponges, *Syringodiumfiliforme* (manatee grass), *Dictyota sp.* (Y-branched algae), *Udotea sp.* (Mermaid's fans)	18.30705374	-65.3404282	Submerged Vegetation-Seagrass - patchy
MRS 13-22	*Thalassiatestudinum* (turtle grass), *Udotea sp.* (Mermaid's fans)	18.30546668	-65.3385791	Submerged Vegetation-Seagrass - continuous
MRS 9-1	*Syringodiumfiliforme* (manatee grass), *Thalassiatestudinum* (turtle grass), *Penicillusdumetosus* (bristle ball brush algae), *Udotea sp.* (Mermaid's fans)	18.28099933	-65.2876258	Submerged Vegetation-Seagrass - continuous
MRS 9-2	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraea sp.*** (star corals), *Poritesporites* (finger coral), *Briareumabestinum* (corky sea fingers)	18.28049341	-65.2870604	Coral Reef and Colonized Hardbottom
MRS 9-3	Sea Rods (various species), *Pseudopterogorgia sp.*(sea plumes), *Gorgoniaventalina*(common sea fan), *Montastraeasp.*** (star corals), tube sponges, vase sponges, finger sponges	18.27810792	-65.2881317	Coral Reef and Colonized Hardbottom
MRS 9-4	*Acroporapalmata**(elkhorn coral), *Acroporacervicornis* *(staghorn coral), Sea Rods (various species), *Gorgoniaventalina*(common sea fan), *Montastraea sp.*** (star corals), *Diploria sp.*(brain corals)	18.27844986	-65.2839924	Coral Reef and Colonized Hardbottom
MRS 9-5	*Thalassiatestudinum* (turtle grass), *Syringodiumfiliforme* (manatee grass), *Dictyota sp.* (Y-branched algae)	18.2821685	-65.2822333	Submerged Vegetation-Seagrass - patchy
MRS 9-6	*Thalassiatestudinum*(turtle grass), *Syringodiumfiliforme* (manatee grass),*Dictyota sp.* (Y-branched algae)	18.28177264	-65.2827746	Submerged Vegetation-Seagrass - patchy
MRS 9-7	*Syringodiumfiliforme* (manatee grass), *Halimeda sp.*(leaf algae), *Dictyota sp.* (Y-branched algae)	18.28244939	-65.2848129	Submerged Vegetation-Seagrass - patchy
MRS 9-8	*Syringodiumfiliforme* (manatee grass), *Halimeda sp.*(leaf algae), *Dictyota sp.* (Y-branched algae), *Penicillusdumetosus* (bristle ball brush algae)	18.28274019	-65.2840068	Submerged Vegetation-Seagrass - patchy
MRS 9-9	*Syringodiumfiliforme* (manatee grass), *Dictyota sp.* (Y-branched algae)	18.287082	-65.2817737	Submerged Vegetation-Seagrass - patchy
MRS 9-10	*Caulerpa sp.* (feather algae), *Halimeda sp.*(leaf algae),*Udotea sp.* (Mermaid's fans) with scattered rocks	18.29063372	-65.281651	Scattered Coral/Rock in Unconsolidated Sediment
MRS 9-11	*Thalassiatestudinum* (turtle grass)	18.29419589	-65.2830515	Submerged Vegetation-Seagrass - patchy

NOTES: (*) indicates a species currently listed as threatened or endangered
(**) indicates a species proposed for listing as threatened or endangered

At MRS 13, green sea turtles were observed off both the eastern and western sides of Luis Pena. Two were observed on the surface. Two were seen in the underwater videos. Those seen in the underwater videos appeared to be traveling at a normal pace and did not appear disturbed or stressed by the camera. Staghorn and elkhorn corals were observed along the eastern side of the island as well as in the northwest cove. *Montastraea sp* (star corals), *Mycetophylliaferox* (rough cactus coral), and *Dendrogyracylindrus* (pillar coral) were all observed within MRS13. Star corals were observed as part of the reef surrounding Luis Pena. The cactus coral was observed during ROV inspection dive 17. The pillar coral was seen during the video transect surveys within the northwest cove of Luis Pena.

At MRS 09, no sea turtles were observed. Staghorn coral was found in the reef area along the eastern side of the bay in the southwest corner of the MRS. The coral is growing both naturally and being raised for transplantation into other areas. Elkhorn coral was observed off the cove to the southeastern shore of Punta del Soldado. It was observed in both the transect video and during an ROV dive. *Montastraeasp* (star corals) and *Dendrogyracylindrus* (pillar coral) were observed within MRS 09. The star corals were seen along the reef bordering the shoreline around the southern point. The pillar coral was seen in the same vicinity as the staghorn coral.

During Phase 1, *Acroporacervicornis* (staghorn coral) and *Acroporapalmata* (elkhorn coral) were present in both MRS 09 and MRS 13 as indicated in Table 6-1 and Appendix B: Site Maps (Figures B-16 and B-17).

6.4 MEASURES TO AVOID OR MINIMIZE POSSIBLE IMPACTS TO THE ENVIRONMENT

The following paragraphs present the measures that will be implemented to avoid or minimize impacts to threatened or endangered species and their habitat during underwater investigation activities.

6.4.1 PHASE 2 TRANSECT DESIGN

6.4.1.1 Phase 2: Underwater Geophysical Transect Surveys

Phase 2 field activities will consist of performing geophysical surveys along the re-aligned RI transects established during Phase 1 (See Appendix B: Site Maps Figures B-1 through B-9). The objective of these activities will be to collect EM anomaly data while creating the least amount of impact and still acquiring the highest quality data possible. The data collected during Phase 1 was used to plan out Phase 2. The underwater EM 61 geophysical coil will be deployed using three types of system platforms. As there is not one single EM system that is both highly efficient and can guarantee no environmental impact in all habitat types present in the areas surveyed, multiple platforms will be used to survey the designated areas. The system used in any given area will depend primarily on depth of water and habitat type present. Based on the analysis of all of the EBS data, USA has assigned suggested EM platforms along each segment (as required) to each of the RI transects based on benthic habitat avoidance. Appendix B: Site Maps, Figures B-10 through B-13, illustrate the EM platform deployment for MRS 09 and MRS 13. Each EM platform shown on these figures are color coded.

6.4.2 EM PLATFORM SELECTION PROCESS

The underwater video and SSS data collected for each transect was reviewed by the RI team. While evaluating the SSS data and video of each of the transects, transect segment were designated an EM platform that would be best suited for the transect surveys during Phase 2. Consideration was provided to the depth of water (bathymetry data), type of bottom (corals, seagrass, etc.) as interpolated from SSS data and validated by transect videos, and the anticipated sea state and means in which the platform would be moved along segments of the transect. The start and stop points were also clearly identified by GPS coordinates to ensure the EM platforms are switched out at the correct points within the transect. Based on this analysis, maps were then generated depicting the proposed EM platform to be used for each RI transect segment.

The following is a list of the EM platforms anticipated to be used during Phase 2:

- EM Sled

  The EM sled is designed to keep the EM 61 coil as close to the seafloor as possible to maximize the detection depth of buried MEC/UXO. The system can be towed across the seafloor on wheels or skids depending on bottom conditions. The sled can have a forward facing camera mounted on it with a real-time feed to the survey vessel detection equipment.

- EM ROV

  The EM ROV platform is used to propel the EM 61 EM coil along the RI transect. The ROV is equipped with a pressure sensor, altimeter, pitch sensor, roll sensor, and video cameras allowing for positive control by the ROV operator at all times, lending the ability to maneuver the ROV/EM coil around challenging bottom types (coral heads/ boulders). The EM coil is mounted in front of the ROV so it will be visible in the camera view at all times. Accurate positioning for the ROV and coil will be supplied by an ultra-short baseline (USBL) system set up between the survey vessel and the ROV system.

- EM Float

  The EM 61 EM coil attached to a floating platform allows for the EM coil to be suspended in the water column. The EM floating platform provides a means to float the EM coil in shallow waters along the bathymetric contour line. The EM float can be towed by a boat or pushed along by snorkelers. RTK-DGPS provides real time positioning by using the antenna mounted on the floating platform which is centered over the EM coil.

6.4.3 PHASE 3: INTRUSIVE INVESTIGATIONS AND ENVIRONMENTAL SAMPLING

6.4.3.1 Underwater Intrusive Investigations

Phase 3 activities consist of underwater intrusive investigations of selected EM anomalies located along the RI (or EM) transects that were mapped as part of Phase 2. USA will be using UXO SCUBA divers (meeting DDESB TP-18 requirements) to perform intrusive investigations of these anomalies. Intrusive or excavation of the anomalies will only take place in unconsolidated sediments. If seagrass is present, the proper method for excavating for anomalies in seagrass is identified in Appendix K: (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat – See para 4.3.4).

6.4.3.2 Underwater Detonations

MEC items and the surrounding environment will be documented by both digital photo and video prior to any action to the MEC item being taken. The team biologist will review all documentation for each MEC item and provide concurrence to the proposed action. The SUXOS will seek concurrence from the team biologist prior to relocating or disposing of a MEC item. If concurrence is not reached, the USA PM will be advised and will seek PDT recommendations.

To the extent possible, underwater detonations will be kept to a minimum. The preferred option is to move the munition either by hand or by remote means to MRS 09 beaching areas for disposal. This removes the munition from the water, reducing the environmental risk. However, if the munition cannot be brought to shore but it can be taken to an area with lower risk to the environment, such as a sandy bottom, this is considered a suitable alternative. Blow in place will only take place if the surrounding area that will be affected by the detonation does not contain corals that are Listed Threatened or Endangered Species, or seagrass which is a sea turtle critical habitat. Additional precautions will be taken for sea turtles and marine mammals prior to performing underwater detonations as are explained in Appendix K: (Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat see section 4.5)). MEC items that have corals that are Listed Threatened or Endangered Species growing on or near them may have to be left in place for further evaluation and direction from higher authorities and not undergo a detonation.

Post detonations will be documented by both digital photo, and video of the detonation site and all surrounding areas showing any effect, or lack thereof, to the environment due to disposal operations.

6.4.4 GENERAL CONSERVATION MEASURES

To find general conservation measures as it applies to marine habitat and Listed Threatened or Endangered Species see Appendix K: (Supplemental Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat see section 4.1).

6.4.5 DETONATION AREAS AND SEA TURTLE NESTING MONITORING

The SUXOS will use the MSD found in table 7-1 of the ESP (Appendix J) to determine if a turtle nest is inside or outside of the hazard arcs of a proposed beaching and detonation site. If the turtle nest is inside the arcs, mitigation measures such as using sandbags to reduce the fragmentation hazard, may be used to reduce the fragmentation distance and reduce the hazard arcs to an acceptable distance. If the turtle nests are still within the MSD, an alternate site will be selected for the beaching and disposal of the MEC item.

Detonation areas will not require any removal of coastal vegetation.

Section 3.3.1.10 discusses the location for the proposed detonation sites. The proposed detonation site is located in MRS 09 and was selected as a beach that is unencumbered by reef, which will allow for the munition to be pulled ashore as it is floated by a lifting balloon. The beach is under the control of the municipality'sgovernment and has vehicle access which allows for the delivery of equipment for beaching operations, also explosives and heavy equipment, if needed. The site also has a smaller human population (squatters) than on other possible locations who would have to be evacuated.This area possesses less danger to birds when compared to MRS 13 which is a bird sanctuary.

Any areas proposed for use as staging or detonation areas that form part of the Culebra National Wildlife Refuge will be closely coordinated with the refuge manager.

Monitoring will be conducted daily by qualified personnel (e.g. biologist, marine biologist, environmental scientist, among others) to identify the potential presence of new nests or sea turtle tracks during the activity period (Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat, 2012 see section 4.2).

If sea turtle nests are found at a detonation site, USA's personnel will notify USACE, who will notify the FWS Boquerón Endangered Species Specialist, NMFS Boquerón Office and DNER Point of Contact (POC). If agreed, the nest locations will be clearly marked and the staging area will be relocated. This information will be documented as described in this section.

6.4.5.1 Anchoring

Anchoring on an established seagrass beds is prohibited IAW Appendix K: (Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat, 2012, section 4.3.8). USA field teams will anchor small boats in areas with sand bottoms in waters with depths of at least 4 ft. The ROV and underwater camera, or snorkeling, can be utilized to survey the underwater area to ensure the condition of the seafloor is known prior to anchoring. If mooring buoys are available, these will be used rather than deploying an anchor.

If during the underwater investigation work, any "listed" coral is injured, whatever activity causing the damage will be stopped, the injured "listed" coral will be left in place and the USACE PM, USCG, NMFS Boquerón Office and DNER should be immediately notified. If listed corals are injured, the USA PM will also contact the NOAA Office of Law Enforcement at 1-800-853-1964. The following information must be provided:

- The time, date, and location (latitude/longitude) of the incident
- The name and type of the vessel involved

- The vessel's speed during the incident
- A description of the incident
- Water depth
- Environmental conditions (e.g. wind speed and direction, sea state, cloud cover, and visibility)
- The type of coral or description, if possible
- A description of the damage caused to any coral, if possible.

If the vessel runs aground, the operator will perform the following:

- Turn off the engine.
- Do not try to use the engine to power off the reef, hardbottom or seagrass.
- Raise the propeller, and allow the boat to drift free.
- Radio the Coast Guard, Marine Patrol or VHF Channel 16 for assistance.

If any "listed" coral or seagrass is injured, the USA PM will follow the procedures described above for damage to "listed" corals.

During an emergency to save a vessel or to protect the crew, such as during a boat fire or loss of power with the vessel on a lee shore, the vessel captain has an obligation to take whatever measures he deems necessary to protect the boats passengers and crew. The above anchoring restrictions will not apply. For additional information on anchoring guidance and restrictions, see Appendix K: Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat, 2012 section 4.3.

6.4.6 SPILL CONTROL AND PREVENTION

All fueling and maintenance of vehicles will be performed off-site at appropriate commercial or private facilities. If a severe leak of fuel or other fluids, such as antifreeze or transmission fluid, occurs in the field because of a tank puncture or a ruptured line, the following procedures should be implemented.

- Promptly berm the site with dirt so that the fuel or fluid does not spread along the ground surface.
- Apply oil-absorbing material such as sorbent booms, sawdust or kitty litter to the spill.
- Report the spill to National Response Center (NRC), at 1-800-424-8802, and follow their instructions for cleanup. It is anticipated that this cleanup usually will involve digging up and drumming contaminated soil, and subsequently disposing of it in an approved landfill. Spills of gasoline into the sea water will be reported to the EPA or State EPA through approved channels.
- The fuel tank will not be filled to more than about three-quarters full to prevent overfilling in the field.

6.4.7 ALL STORAGE AREAS

No storage areas are anticipated within any of the MRS water areas.

6.4.8 VEHICULAR ACCESS ROUTES

Although most of the Phase 2 and 3 field activities will be conducted on water, some areas of MRS 09 water areas may be accessed from land. USA crews entering and exiting the work sites will use existing roads and easements. Off-road vehicle travel will be kept to a minimum, and prior to establishing any off-road routes necessary to gain access to sites, consideration will be given to the possible consequences resulting from the channeling of run-off water in ruts. Additionally, local agencies, FWS, and the USACE OESS will be notified and approval from proper authority will be obtained prior to initiating off-road travel or operations. In such cases, the following measures will be taken to minimize the environmental effects.

- Personnel will remain at the off-road site until investigations there are completed for the day. For example, field crews will not start work at an off-road site, leave for a lunch break, and subsequently return to finish the job.
- Any ruts or new roads or tracks that are created by field activities will be restored. The ruts will be filled in and leveled.

In a situation where the area is wet and rut damage to the environment is certain, the crews should drive on roads and paths to a point as close to the site as possible, and then walk the remaining distance to the site.

6.4.9 TREES AND SHRUBS PROTECTION AND RESTORATION

It is unlikely that any trees will be removed during the Phase 2 and 3 field work. Therefore, no provisions for tree restoration are required.

6.4.10 TEMPORARY FACILITIES

USA will not establish a site trailer command post. Trash will be collected and dumpsters will be dumped or removed, as appropriate.

6.4.11 DECONTAMINATION AND DISPOSAL OF EQUIPMENT

This project does not involve any hazardous materials or hazardous wastes.

6.4.12 MINIMIZING AREAS OF DISTURBANCE

Procedures for minimizing areas of disturbance are described throughout this EPP and include such measures as:

- Complying with the procedures in Appendix K: Endangered Species Conservation and their Critical Habitat during Underwater Investigations.

6.5 PROCEDURES FOR POST-ACTIVITY CLEANUP

All wastes will be removed from each site immediately upon completion of each day's field activities. Therefore, no post-activity cleanup will be required.

6.6 AIR MONITORING PLAN

Air monitoring is not being performed during this RI. USA work procedures are designed to minimize vapors, gases, and particulate emissions.

6.7 PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) AND "TO BE CONSIDERED" INFORMATION

As amended, the 1986 Superfund Amendments and Reauthorization Act (SARA), Section 121(d)(2) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that on-site remedial actions attain (or waive) Federal and more stringent State applicable or relevant and appropriate requirements (ARARs) of environmental laws upon completion of the remedial action. The revised National Contingency Plan of 1990 (NCP) requires compliance with ARARs during remedial actions as well as at completion, and compels attainment of ARARs during removal actions to the extent practicable, considering the specifics of the situation.

The "Applicable" portion of the term is defined as:

- Cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under Federal environmental or state environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a

state in a timely manner and that are more stringent than Federal requirements may be applicable.

The "Relevant and Appropriate" portion of the ARAR term is defined as:

- Cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under Federal environmental or state environmental or facility cting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Although compliance is not required, in order to incorporate guidance and other information into the alternatives developed, some remedial actions identify "To Be Considered (TBC)"criteria which are defined as:

- Non-promulgated advisories, criteria, and guidance are not ARARs, but may sometimes be useful in developing a CERCLA remedy. When this is the case, at the discretion of the lead agency, they can be specified as "To-Be-Considered (TBC)" criteria. TBC criteria can be taken into consideration during evaluation of remedial alternatives, but unlike ARARs, identification of TBCs is not mandatory nor is compliance with TBCs a selection criterion for a remedial action.

The documents that are TBC are incorporated as appropriate into the RI and FS reports and are not called out in a table, to avoid confusion with the ARARs. Compliance with these documents is not required under CERCLA or the NCP, therefore, no tabulation is provided.

Any substantive environmental or facility citing requirement has the potential to be an ARAR. To assist in identification, ARARs are divided into three categories: chemical-specific ARARs, location-specific ARARs, and action-specific ARARs. These three categories are defined as follows:

- Chemical-specific ARARs are promulgated health-based or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Where more than requirement addressing a contaminant is determined to be an ARAR, the most stringent requirement should be used. Risk-based screening levels (for example, EPA Regional Screening Levels) are not considered chemical-specific ARARs because they are not promulgated.
- Location-specific ARARs generally are restrictions placed on the concentration of a hazardous substance or the conduction of activities solely because they are in special locations. Requirements addressing cultural resources, historic places, floodplains, wetlands, or sensitive ecosystems and habitats are potential location-specific ARARs.
- Action-specific ARARs are usually technology or activity-based requirements or limitations placed on actions taken with respect to remedial/removal actions, or requirements to conduct certain actions to address particular circumstances at a site. Regulations that dictate the design, construction and operating characteristics of air stripping units, incinerators, landfills or other waste management facilities are examples of action-specific ARARs. No action-specific ARARs have been identified for this site.

ARARs are identified during the response process prior to issuance of the ROD/DD, and they may continue to evolve over time. The NCP requires the lead agency to formally request ARARs from support agencies at completion of the RI. For an alternative to pass into the detailed analysis stage of the RI/FS, and thus become eligible for selection, it must comply with its ARARs or a waiver should be identified and the justification provided for invoking it. An alternative that cannot comply with ARARs, or for which a waiver cannot be justified, should be eliminated from consideration for further discussion as a potential alternative. Updates to ARARs are then requested during development of the FS as details of remedial alternatives become known. Thus, potential ARARs are initially identified on a broad basis, refined to specific requirements during the FS, and finalized at signature of the DD.

As the RI/FS process continues, the list of ARARs will be updated, particularly as the response actions are selected and reviewed by state and federal agencies. ARARs will be used to establish the appropriate extent of site cleanup; to aid in scoping, formulating, and selecting proposed treatment technologies; and to govern the implementation and operation of the selected remedial alternative. As part of the FS, primary consideration should be given to remedial alternatives that attain or exceed the requirements of the identified ARARs. Throughout the RI/FS, ARARs are identified and used by taking into account the following:

- Contaminants suspected or identified to be at the site;
- Chemical analysis performed or scheduled to be performed;
- Types of media (air, soil, groundwater, surface water, and sediment);
- Geology and other site-specific characteristics;
- Use of site resources and media;
- Potential contaminant transport mechanisms;
- Purpose and application of potential ARARs; and
- Remedial alternatives considered for site cleanup.

The potential ARARs identified for the RI are presented in Table 6-2.

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Table 6-2: Potential ARARs

Requirement	Status /Synopsis of Requirement	Action to be Taken to Attain Requirement
Endangered Species Act (USC Title 16 chapter 35§1538)	Relevant and Appropriate -Location-Specific /The ESA protects federally listed species (fish, wildlife, and plants) which are either endangered or threatened and preserves critical habitat. The substantive requirement within the Act prohibits the "taking" of listed species (reference: 16 USC 1538; 50 CFR 17.95; 50 CFR 226.208))	When evaluating remedial alternatives, consideration must be given to avoiding impacts to the endangered species and its habitat. The development of the Environmental Baseline Survey Report identified critical Habitat and the presence or absence of Listed Threatened or Endangered Species. USACE in coordination with NOAA and DNER authored the: Supplemental Standard Operating Procedures for endangered Species Conservation and their Critical Habitat Standard Operating Procedures for Endangered Species Conservation and their Critical Habitat, 2012 Addendum to the Standard Operating Procedures for Endangered Species Conservation and their Habitat (2011) Standard Operating Procedures for Endangered Species Conservation and their Habitat (2008) The processes identified in the above listed SOPs provides procedures that allow for the RI to be completed and avoids impact to endangered species. A remedial alternative which "takes" an endangered species or destroys its habitat does not qualify as a suitable remedial alternative because the ESA ARAR would not be satisfied. Either a different alternative which does not impact the endangered species be pursued or an exception allowing the taking of the species is needed, or a waiver of the ARAR is required.
RCRA, 40 CFR 262.11 (Hazardous Waste Identification), 264 Subparts I (Container Management), X (Miscellaneous Units – OB/OD), and 266.202 Subpart M (Solid Waste Identification)	Relevant and Appropriate -Action-Specific /Establishes rules for identification, management, and treatment of hazardous wastes (explosives) including container management and open burn / open detonation and management.	Remedial actions must appropriately identify and manage investigative derived wastes and remedial wastes (that are hazardous wastes) stored on-site and including post demolition samples to document lack of, or measure the amount of, MC that is released.

7.0 PROPERTY MANAGEMENT PLAN

NOT APPLICABLE

This plan is required only when government property is used. USA will not use government property in the execution of this Task Order.

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8.0 INTERIM HOLDING FACILITY SITING PLAN FOR RECOVERED CHEMICAL WARFARE MATERIEL

NOT APPLICABLE

Not authorized by the Performance Work Statement.

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9.0 PHYSICAL SECURITY PLAN FOR RECOVERED CHEMICAL WARFARE MATERIEL SITES

NOT APPLICABLE

Not authorized by the Performance Work Statement.

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10.0 REFERENCES

The following are references applicable to this project. USA will comply with applicable Federal, state, and local requirements. Following all applicable requirements and regulations listed in the following publications will ensure the safety and health of on-site personnel and the local community.

10.1 U.S. ARMY CORPS OF ENGINEER GUIDANCE DOCUMENTS

- EM 200-1-4. Environmental Quality – Risk Assessment Handbook, 1999.
- EM 1110-1-1002. Engineering and Design – Survey Markers and Monumentation, 1990.
- EM 1110-1-4009. Engineering and Design – Military Munitions Response Actions, 2007.
- EM-1110-1-100 Engineering and Design – Conceptual Site Models for Ordnance and Explosives (OE) and Hazardous, Toxic, and Radioactive Wastes (HTRW) Projects, 2003.
- EM 385-1-97 Explosives Safety and Health Requirements Manual
- EM 385-1-1. Safety and Health Requirements Manual, 2008.
- ER 200-3-1. Environmental Quality – Formerly Used Defense Sites (FUDS) Program Policy, 2004.
- ER 385-1-92. Safety - Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, 2007.
- ER 1110-1-12. Engineering and Design – Quality Management, 2006.
- EP 1110-1-18. Military Munitions Response Process, 2006.
- EP 1110-3-8. Engineering and Design – Public Participation in the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS), 2004.
- EP 1110-1-24. Establishing and Maintaining Institutional Controls for Ordnance and Explosives Projects, 2000.
- EP 75-1-2. Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities
- EP 75-1-4. Recurring Reviews on Ordnance and Explosives (OE) Response Actions, 2003.

10.2 U.S. ARMY DOCUMENTS

- Army MMRP, Remedial Investigation / Feasibility Study Guidance, 2009.
- TM 60A 1-1-31, Explosive Ordnance Disposal Procedures, 1994.
- AR 385-64, Ammunition and Explosives Safety Standards, 1999.
- AR 190-11, Physical Security of Arms, Ammunition and Explosives, 2006.

10.3 DEPARTMENT OF DEFENSE DOCUMENTS

- DOD 6055.9-M, Ammunition and Explosive Safety Standards
- DOD 4145.26-M, Contractor's Safety Manual for Ammunition and Explosives
- DDESB TP-18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel

10.4 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

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

10.5 U.S. ENVIRONMENTAL PROTECTION AGENCY

Risk Assessment Guidance for Superfund (RAGS), 1989.

10.6 FEDERAL REGULATION

- Code of Federal Regulations (CFR)
  - 33 CFR 320 Wetlands Protection Act
  - 40 CFR 300.430 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 1993.
  - 40 CFR Part 261.23 Resource Conservation and Recovery Act.
  - 49 CFR Parts 100-199 Transportation.
  - 62 Federal Register 6622, 1997 Military Munitions Rule.
- Fish and Wildlife Coordination Act 16 U.S.C. 661 et seq.
- Endangered Species Act 16 U.S.C. 1531-154.
- Migratory Bird Treaty Act 16 U.S.C. 703-712.
- National Historic Preservation Act 16 U.S.C. 1470.
- Clean Water Act 33 U.S.C. 1151 et seq., 1251 et seq., 40 U.S.C. 3906 et seq.
- Comprehensive Environmental Response, Compensation, and Liability Act 42 U.S.C. 9601-11050.
- U.S. Fish & Wildlife Service, Culebra National Wildlife Refuge, undated.

10.7 OTHER DOCUMENTATION/SURVEYS AND STUDIES

- Kendall, M.S.1, M.E. Monaco1, K.R. Buja1, J.D. Christensen1, C.R. Kruer2, and M. Finkbeiner3, R.A. Warner1. 2001. (On-line). Methods Used to Map the Benthic Habitats of Puerto Rico and the U.S. Virgin Islands URL: http://biogeo.nos.noaa.gov/projects/mapping/caribbean/startup.htm. Also available on U.S. National Oceanic and Atmospheric Administration. National Ocean Service, National Centers for Coastal Ocean Science Biogeography Program. 2001. (CD-ROM).Benthic Habitats of Puerto Rico and the U.S. Virgin Islands. Silver Spring, MD: National Oceanic and Atmospheric Administration.

  1. NOAA National Ocean Service, Biogeography Branch; N/SCI 1, SSMC4; 1305 East West Highway; Silver Spring, MD 20910
  2. P.O. Box 753; Sheridan, MT 59749
  3. NOAA Coastal Services Center, 2234 South Hobson Avenue; Charleston, SC 29405

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