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Final

**Non-time-critical Removal Action Work Plan
Surface Munitions and Explosives of Concern
at Munitions Response Area-Surface Impact Area,
Munitions Response Sites 1 through 7**

Former Vieques Naval Training Range (VNTR)
Vieques, Puerto Rico



Prepared for

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

Contract No. N62470-02-D-3052
CTO-0211

January 2009

Prepared by

CH2MHILL

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Under the

**NAVFAC CLEAN III Program
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Virginia Beach, Virginia

Executive Summary

The overall objective of the surface munitions and explosives of concern (MEC) interim removal action is to reduce the potential for unauthorized personnel to come in contact with MEC by removing all surface MEC from selected areas within the Munitions Response Area-Surface Impact Area (MRA-SIA). The areas selected for removal are based on the potential for unauthorized personnel to come in contact with MEC. These areas are restricted; however trespassing occurs regularly in these areas. More-specific objectives for this action include the following:

- Hand (manual) removal of vegetation within the areas selected for MEC removal
- Removal of all surface MEC within 100 meters on either side of select roadways in Munitions Response Sites (MRSs) 1 and 3 through 7
- Removal of all surface MEC within 100 meters inland of the SIA shoreline in MRSs 1 and 3 through 7
- Removal of all MEC from the eastern boundary of the SIA westward, to the approximate extent of where high explosives (HEs) containing bombs are expected to be located in MRSs 2 and 3

This Work Plan (WP) has been prepared for the Non-time-critical Removal Action (NTCRA) for the removal of surface MEC from select areas located within the MRA-SIA within the former Vieques Naval Training Range (VNTR). The WP provides sufficient detail of the procedures for detection, selection, and removal of surface MEC to ensure compliance with regulatory requirements. This WP also provides guidance for removal action contractors to develop site specific plans and procedures to ensure consistency with the approaches and procedures given in this WP.

Several of the procedures for the surface MEC removal action are provided in the MEC Master WP (MWP; CH2M HILL, 2006d). Therefore, the MWP is referenced throughout this WP, where applicable, to avoid duplication of information.

To reduce explosive hazards, a magnetometer assisted visual survey will be performed to locate all surface MEC within select removal areas, followed by the removal of all identified MEC. Selected removal areas include select roadways and the SIA shoreline in MRSs 1, and 3 through 7. In addition, MEC will be located and removed from the eastern boundary of the SIA westward to the approximate extent of where high explosives (HEs) containing bombs are expected to be located in MRSs 2 and 3. All MEC within 100 meters on either side of the roadways and within 100 meters inland of the shoreline will also be identified and removed. No sampling and analysis will be conducted as part of this removal action.

The actions performed and data/information collected during this interim removal action will be presented in a construction completion report following completion of the work.

Resumen Ejecutivo

El objetivo general de la acción de remoción superficial interina de municiones y explosivos de preocupación (MEC, por sus siglas en inglés), es reducir el potencial a personas no autorizadas de que entren en contacto con (MEC) removiendo todos los MEC superficiales de áreas seleccionadas dentro de la Respuesta de Municiones del Área de Impacto de Superficie (MRA-SIA, por sus siglas en inglés). Las áreas seleccionadas para la limpieza están basadas en el potencial de que personas no autorizadas entren en contacto con MEC. Estas áreas están restringidas; sin embargo, el ingreso no autorizado ocurre regularmente.

Los siguientes son los objetivos específicos para esta acción:

- Remoción manual (a mano) de la vegetación dentro de las áreas seleccionadas para la remoción de MEC
- Remoción de todos los MEC dentro de 100 metros a cada lado de las carreteras seleccionadas en los sitios de Respuesta de Municiones (MRSs, por sus siglas en inglés) 1 y 3 hasta el 7
- Remoción de los MEC de toda la superficie dentro de 100 metros tierra adentro desde la costa de los MRSs 1 y 3 hasta el 7 en el SIA y
- Remoción de todos los MEC del límite este del SIA hacia el lado oeste, aproximadamente hasta donde se espera se encuentren bombas que contengan explosivos altos (HEs, por sus siglas en inglés) en MRSs 2 y 3

Este Plan de Trabajo (WP, por sus siglas en inglés) ha sido preparado para la Acción de Remoción de Tiempo No crítico (NTCRA, por sus siglas en inglés) para la eliminación superficial de MEC de áreas seleccionadas dentro del MRA-SIA dentro del antiguo Campo de Adiestramiento Naval de Vieques (VNTR, por sus siglas en inglés). Este WP presenta suficientes detalles sobre los procedimientos de detección, selección y remoción de MEC para garantizar el cumplimiento de los requisitos reglamentarios. Este WP también presenta orientación para los contratistas de remoción para que puedan desarrollar planes específicos para el sitio y los procedimientos para así asegurar consistencia con los acercamientos y procedimientos de este WP.

Varios de los procedimientos para la acción de remoción de MEC superficiales se presentan en el WP Maestro ara MEC (MWP; CH2M HILL, 2006d). Por lo tanto, se hace referencia al MWP en este WP, donde sea aplicable, para evitar la duplicación de la información.

Para reducir el riesgo de explosión, se realizará una inspección visual con la ayuda de un magnetómetro para poder ubicar todos las MEC superficiales dentro de las áreas de remoción seleccionadas, seguida por la remoción de todos los MEC identificados. Estas áreas de remoción incluyen carreteras seleccionadas y la línea costera de SIA en MRSs 1, y 3 hasta 7. Además, se localizarán y removerán los MEC del límite este del SIA hacia el lado oeste hasta aproximadamente donde se espera se encuentren bombas que contengan explosivos altos (HEs) en MRSs 2 y 3. También se identificarán y removerán todos la MEC

dentro de 100 metros a cada lado de la carretera, y 100 metros tierra adentro desde la costa. No se realizarán muestreos ni análisis como parte de esta Acción de Remoción.

Las acciones realizadas y los datos o información recopilada durante esta acción de remoción se presentarán en un informe de terminación de la construcción luego que el trabajo sea finalizado.

Contents

Executive Summary

Resumen Ejecutivo

Acronyms and Abbreviations vii

1	Introduction	1-1
1.1	Introduction	1-1
1.2	Site History	1-2
1.3	Site Location.....	1-3
1.3.1	Former Vieques Naval Training Range	1-3
1.3.2	Munitions Response Area – Surface Impact Area.....	1-3
1.3.3	Area for Performance of Non-Time Critical Removal Action	1-4
1.4	Topography, Climate and Weather, Vegetation, Geology, and Hydrology.....	1-4
1.4.1	Topography	1-4
1.4.2	Climate and Weather.....	1-6
1.4.3	Vegetation	1-7
1.4.4	Geology	1-7
1.4.5	Hydrology.....	1-8
1.4.6	Surface Water	1-8
1.4.7	Groundwater	1-8
2	Technical Management Plan	2-1
2.1	General	2-1
2.2	Guidance, Regulations, and Policy.....	2-1
2.3	Project Organization and Personnel.....	2-4
2.3.1	Composition and Management of Removal Teams.....	2-5
2.4	Technical Scope	2-5
2.4.1	Mobilization.....	2-5
2.4.2	Field Office.....	2-5
2.4.3	Project Site Layout	2-5
2.4.4	Site Preparation	2-6
2.5	MEC Procedures	2-8
2.5.1	MEC Safety	2-8
2.5.2	MEC Identification.....	2-9
2.5.3	MEC Transportation.....	2-9
2.5.4	MEC Safe Holding Areas.....	2-9
2.5.5	Procedures When MEC cannot be Destroyed Onsite or cannot be Identified	2-10
2.5.6	Recovered Chemical Warfare Materiel.....	2-10
2.5.7	MEC Operations in Populated/Sensitive Areas.....	2-11
2.5.8	Demolition Procedures	2-11
2.5.9	Post-Demolition Operations.....	2-12

2.6	Engineering Controls	2-13
2.7	Management of MPPEH.....	2-13
2.8	Field Documentation.....	2-13
2.9	Data Management	2-13
2.9.1	Data Collection and Processing.....	2-13
2.9.2	Database Management and Integration with Geographical Information System.....	2-13
2.9.3	Military Munitions-related Items Identification	2-14
2.9.4	MEC Data Records	2-14
2.9.5	Record Keeping/Accountability	2-15
2.10	Site Safety and Communications	2-15
3	Explosives Management Plan	3-1
3.1	General.....	3-1
3.2	Licenses and Permits.....	3-1
3.3	Procedures	3-1
3.3.1	Acquisition	3-1
3.3.2	Initial Receipt	3-2
3.3.3	Quantity Distance.....	3-2
3.3.4	Transportation	3-4
3.3.5	Receipt Procedures.....	3-5
3.3.6	Inventory	3-6
3.3.7	Lost, Stolen, or Unauthorized Use of Explosives.....	3-6
3.3.8	Return of Unused Explosives	3-6
3.3.9	Disposal of Explosives	3-6
4	Explosives Siting Plan.....	4-1
5	Geophysical Investigation Plan.....	5-1
6	Site Safety and Health Plan.....	6-1
7	Location Surveys and Mapping Plan	7-1
7.1	Surveying.....	7-1
7.2	Mapping.....	7-1
7.2.1	Digital Data	7-1
7.2.2	Digital Format.....	7-2
7.3	Deliverables.....	7-2
8	Work, Data, and Cost Management Plan.....	8-1
8.1	Introduction.....	8-1
8.2	Project Tasks.....	8-1
8.3	Schedule.....	8-2
8.4	Communications.....	8-2
8.5	Records Management	8-2
8.6	Format and Content of Investigation Reports.....	8-3
9	Sampling and Analysis Plan.....	9-1

10	Quality Control Plan	10-1
10.1	Introduction	10-1
10.1.1	Project Background.....	10-1
10.1.2	Project Scope of Work	10-1
10.2	QC Personnel Organization and Responsibilities	10-1
10.2.1	QC Personnel Qualifications and Training	10-2
10.2.2	Documentation of Qualification and Training	10-3
10.2.3	Project Manager	10-3
10.2.4	Site Manager	10-4
10.2.5	UXO Quality Control Specialist.....	10-4
10.2.6	Program QC Manager	10-5
10.3	Definable Features of Work and the Three-Phase Control Process	10-6
10.3.1	Definable Features of Work.....	10-6
10.3.2	Mobilization.....	10-6
10.3.3	Location Surveying and Mapping.....	10-6
10.3.4	Vegetation Removal	10-7
10.3.5	MEC Surface Removal.....	10-7
10.3.6	MEC Disposal.....	10-7
10.3.7	Scrap Disposal	10-7
10.3.8	Site Restoration.....	10-7
10.3.9	Demobilization	10-7
10.3.10	Three Phases of Control	10-7
10.4	Inspection/ Audit Procedures	10-10
10.5	QC Testing	10-10
10.5.1	Testing Procedures	10-10
10.5.2	Documentation of Testing	10-16
10.6	Calibration and Maintenance	10-16
10.7	Government QA Activities	10-16
10.7.1	MEC Surface Removal or Investigations.....	10-17
10.8	QA Pass/Fail Criteria	10-17
10.9	Deficiency Management	10-17
10.9.1	Continual Improvement	10-17
10.9.2	Deficiency Identification and Resolution	10-17
10.9.3	Corrective Action Request.....	10-18
10.9.4	Deficiency and Corrective Action Tracking.....	10-18
10.9.5	Documentation.....	10-18
10.10	Reports.....	10-19
10.11	Submittal Management.....	10-20
10.11.1	Project Records.....	10-20
10.11.2	Transmittal to the Title II Services Contractor.....	10-21
10.11.3	Documentation.....	10-21
11	Environmental Protection Plan	11-1
12	Investigation-derived Waste Plan	12-1
12.1	Objective.....	12-1
12.2	Types of Potential IDW and Planned Disposition	12-1
12.3	Non-Hazardous Debris Disposal.....	12-1

12.4	Disposition of MPPEH/MD	12-2
12.5	Clearing and Grubbing.....	12-2
12.6	Contaminated Soil and Hazardous Waste.....	12-2
12.7	Transportation	12-2
13	Geographical Information System Plan	13-1
13.1	Geographical Information System Incorporation.....	13-1
13.2	Computer Files.....	13-3
14	References.....	14-1

Appendix

A Material Potentially Presenting an Explosive Hazard (MPPEH)/Munitions Debris (MD) Collection and Inspection Procedures

Tables

1-1	MRA-SIA MRS's Included in the NTCRA
1-2	Munitions Items Reported to Have Been Fired at MRA-SIA, Former VNTR
2-1	Potentially Applicable or Relevant and Appropriate (ARARs) and Guidance To Be Considered
8-1	Projected NTCRA Schedule
10-1	Definable Features of Work Auditing Procedures

Figures

1-1	Regional Location Map
1-2	Former VNTR Site Map
1-3	Surface Removal Action Area
1-4	Map of Range Related Site Features
1-5	Topographic Map
2-1	NTCRA Management, Contractor, and Subcontractor Organizational Chart

Acronyms and Abbreviations

AFWTF	Atlantic Fleet Weapons Training Facility
AHA	activity hazard analyses
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
ASR	Archive Search Report
ATF	Bureau of Alcohol, Tobacco, Firearms, and Explosives
ATG	air-to-ground
BD	base detonating
BIP	blow-in-place
BRAC	Base Realignment and Closure
CAD	computer-aided design
CAR	Corrective Action Request
CEHNC	United States Army Corps of Engineers Engineering and Support Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
CWM	chemical warfare materiel
°F	degrees Fahrenheit
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DFOW	definable features of work
DGM	digital geophysical mapping
DID	data item description
DoD	Department of Defense
ECA	Eastern Conservation Area
EIS	Environmental Impact Statement
EMA	Eastern Maneuver Area
EOD	Explosive Ordnance Disposal
ERA	Expanded Range Assessment
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FAA	Federal Aviation Administration
FM	Field Manual
FMFLANT	Fleet Marine Force, Atlantic
FMS	Facility Management Standards
ft	feet/foot
FUDS	Formerly Used Defense Sites

GIS	geographical information system
GPS	global positioning system
HAZWOPER	hazardous waste operations training
HD	Hazard Division
HE	high explosives
HTRW	hazardous, toxic, and radioactive waste
IDW	investigation-derived waste
IDWMP	Investigation-derived Waste Management Plan
LIA	Live Impact Area
M&TE	measuring and testing equipment
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
m	meter
mm	millimeter
MOA	Memorandum of Agreement
MOV	Municipality of Vieques
MPPEH	material potentially presenting an explosive hazard
MR	munitions response
MRA	Munitions Response Area
MRP	Munitions Response Program
MRS	Munitions Response Site
NASD	Naval Ammunition Support Detachment
NATO	North Atlantic Treaty Organization
NAVEODTECHDIV	Naval Explosives Ordnance Disposal Technical Division
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEW	net explosive weight
NGFS	Naval Gunfire Support
NOSSA	Naval Ordnance Safety and Security Activity
NOTAM	Notice to Airmen
NTCRA	Non-time critical Removal Action
OB/OD	open burn/open detonation
OE	ordnance explosives
OP	observation point
OSHA	Occupational Safety and Health Administration
PDF	Adobe Acrobat Portable Document Format
PM	Project Manager
PPE	personal protective equipment
PRASA	Puerto Rico Aqueduct and Sewer Authority
PREQB	Puerto Rican Environmental Quality Board
PZ	piezoelectric

QA	quality assurance
QC	quality control
QCP	Quality Control Plan
RCWM	recovered chemical warfare materiel
ROICC	Resident Officer in Charge of Construction
SARA	Superfund Amendments and Reauthorization Act
SDS	Spatial Data Standards
SI	Site Inspection
SIA	Surface Impact Area
SOP	standard operating procedure
SSHPP	Site Specific Health Plan
SUXOS	Senior UXO Supervisor
TAG	Technical Advisory Group
TSDS	Tri-spatial Data Standards
ttn	Topologically Triangulated Network
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
VL	verification level
VNTR	Vieques Naval Training Range
WP	white phosphorous

Introduction

1.1 Introduction

This Non-time-critical Removal Action (NTCRA) Work Plan for the removal of surface munitions and explosives of concern (MEC) from select areas located within the Munitions Response Area-Surface Impact Area (MRA-SIA) at the former Vieques Naval Training Range (VNTR), Vieques Island, Puerto Rico (Figure 1-1), has been prepared as part of the ongoing Munitions Response Program (MRP) in order to reduce risks to human health and the environment. The areas identified for surface clearance of MEC in this document have the potential for unauthorized public access and therefore present an explosive risk. The purpose of this document is to present the approaches that will be utilized during this interim remedial action for the removal of surface MEC that exist at the sites. Reducing risks to human health will be accomplished by minimizing the potential for human contact. This interim action will reduce the potential for unauthorized personnel to come into contact with MEC. CH2M HILL prepared this work plan for the Naval Facilities Engineering Command (NAVFAC) Atlantic to meet current Department of Defense (DoD) guidelines for the investigation and clean-up of MEC.

The NTCRA will include the removal of all surface MEC from selected areas within the MRA-SIA (Figure 1-2). Selected areas include the roadways, shoreline, and eastern boundary of the SIA westward. The removal action areas are identified on Figure 1-3. The objective of the NTCRA is to reduce risks at Munitions Response Sites (MRSs) identified as posing an explosive hazard due to MEC present on the ground surface. The primary risk is posed to unauthorized personnel accessing the areas identified on Figure 1-3. Access to the areas identified for removal is currently restricted; however, trespassing occurs regularly in these areas. The restrictions to these areas are currently not anticipated to be lifted. The objectives will be met by removing all MEC present on the ground surface or exposed at the ground surface. The bullets below present the areas of MEC removal within the MRA-SIA.

- The roadways plus 100 meters (m) each side. Because of the steep terrain and dense vegetation in the SIA it is unlikely that unauthorized users will access the central portion of the SIA. Therefore, a 100-m clearance area along each side of the roads is expected to significantly reduce the explosive risk in areas off the roadways that could reasonably be accessed by unauthorized personnel/recreational user.
- The shoreline inland 100-m. Because of the steep terrain and dense vegetation in the central portion of the SIA, it is unlikely that unauthorized users will access this area. However, several recreational boaters have been documented to trespass in the SIA from the shoreline. Therefore, a 100-m clearance inland from the shoreline is expected to significantly reduce the explosive risk in areas off the beaches that could reasonably be accessed by unauthorized personnel/recreational users.

- From the eastern boundary of the SIA westward to the approximate extent of where high explosives (HEs) containing bombs are expected to be located based on the Expanded Range Assessment (ERA)/Site Inspection (SI) data. The eastern portion of the MRA SIA transects show a mix of MEC items that are similar to that found in the MRA-Live Impact Area (LIA), specifically HE bombs. Therefore, this entire area will be surface cleared to reduce risk. There are also a number of access routes through this area (e.g., road to Observation Point [OP]-1) that present access points for unauthorized personnel.

The total land area of the removal action area is approximately 700 acres; however, areas inundated by water or areas with standing water will not be addressed as part of this removal action

This NTCRA is administered and managed by NAVFAC Atlantic with quality assurance (QA) support from the Naval Explosives Ordnance Disposal Technical Division (NAVEODTECHDIV). The Title II Services contractor will support NAVFAC Atlantic by providing site management, QA support to the NAVEODTECHDIV, contract administration, and data management. The removal action will be performed by a removal action contractor who is contracted directly by NAVFAC Atlantic. The removal action contractor will perform all MEC removal action operations, implement safety processes, perform quality control (QC), and will subcontract all support personnel as needed to carry out the removal action.

This Work Plan is intended to comply with the guidance for conducting NTCRAs under the Comprehensive Environmental Restoration, Compensation, and Liability Act (CERCLA) and was prepared by CH2M HILL under Navy Contract N62470-02-D-3052, Navy Comprehensive Long-term Environmental Action – Navy (CLEAN), District III, Contract Task Order 0211.

1.2 Site History

The Navy has owned portions of Vieques since 1941, when land was purchased for use as ammunitions storage facility in support of World War II training requirements. Although the Island of Culebra was the focal point for naval gunfire in the 1960s and early 1970s, VNTR, formerly known as the Atlantic Fleet Weapons Training Facility (AFWTF), began developing facilities on the eastern end of Vieques in 1964, when it established a gunnery range in the LIA. In 1965, the Navy established the LIA, also known as the Air Impact Area, and began construction of OP-1 on Cerro Matias.

By the 1970s, the LIA maintained several targets for aerial bombing including old tanks and vehicles used as mock-ups, two bulls-eye targets, and a strafing target. Additionally, several point and area targets for ships to practice naval gunfire support (NGFS) were established in the LIA. The locations of these targets are shown on Figure 1-4.

The Environmental Impact Statement (EIS) for Vieques (Tippetts et al., 1979) provides a detailed discussion on the development of training facilities in the VNTR leading up to 1979. The VNTR provided logistics support, scheduling assistance, and facilities for NGFS and air-to-ground (ATG) ordnance delivery training for Atlantic Fleet ships, North Atlantic Treaty Organization (NATO) ships, air wings, and smaller air units from other allied nations and the Puerto Rican National Guard. The Fleet Marine Force, Atlantic (FMFLANT),

conducted training for Marine amphibious units, battalion landing teams, and combat engineering units in the Eastern Maneuver Area (EMA). Occasionally, naval units of allied nations having a presence in the Caribbean and the Puerto Rican National Guard also utilized the EMA.

Adjacent to and west of the SIA, the 10,673-acre EMA provided maneuvering space and ranges for the training of marine amphibious units and battalion landing teams in exercises of amphibious landings, small-arms fire, artillery and tank fire, shore fire control, and combat engineering tasks. The EMA was first established in 1947. It is demarcated by the western property line east to the western front friendly-fire line where the SIA begins. Marine artillery was fired from gun positions in the EMA and SIA toward targets in the LIA and SIA. Figure 1-4 presents a map showing the locations of the primary target areas, artillery gun positions and ranges established by the 1970s.

Portions of the training areas within the VNTR were in continuous use since World War II, when the Navy acquired title to the land, until 2003. The Atlantic Fleet's ships, aircraft, and Marine forces carried out training in all aspects of NGFS, ATG ordnance delivery, air-to-surface mine delivery, amphibious landings, small-arms fire, artillery and tank fire, and combat engineering. As part of normal operations, unexploded ordnance (UXO) was cleared periodically from the LIA and treated onsite by detonation. The Navy also operated a waste munitions open burn and open detonation (OB/OD) facility under a United States (U.S.) Environmental Protection Agency (USEPA) interim status Subpart X permit within the LIA.

1.3 Site Location

1.3.1 Former Vieques Naval Training Range

Vieques is located in the Caribbean Sea approximately 7 miles southeast of the eastern tip of the island of Puerto Rico and 20 miles southwest of St. Thomas, U.S. Virgin Islands. Vieques is the largest offshore island of the Commonwealth of Puerto Rico. It is approximately 20 miles long and 4.5 miles wide, and has an area of approximately 33,088 acres (51 square miles). Figure 1-1 shows the location of Vieques with respect to the island of Puerto Rico.

The former VNTR is situated in the eastern half of the Island of Vieques, and is bordered on the west by the community of Isabel Segunda, to the north by Vieques Sound, and to the south by the Caribbean Sea. The former VNTR consist of approximately 14,500 acres and is divided operationally into four MRAs that (from west to east) include: the EMA, an area approximately 10,673 acres; the SIA, approximately 2,500 acres; the 900-acre LIA and the 200-acre Eastern Conservation Area (ECA) on the easternmost tip of Vieques. Figure 1-4 presents a site map of VNTR.

1.3.2 Munitions Response Area—Surface Impact Area

The SIA was established in the 1950s, when several Marine targets were constructed there. Marine artillery ranging from 76 millimeter (mm) to 175mm were directed toward these targets from artillery gun positions within the SIA and EMA. During 1969, the construction of Bulls-eye Targets 1 and 2, used for inert bombing, established the eastern and western boundaries of the SIA. At that time, a permanent observation post with a helicopter pad was also constructed on Cerro Matias. In 1971, a strafing target was installed adjacent to one of

the targets. The aerial photo analysis identified numerous craters within the eastern two-thirds of the SIA that were caused by mortar and artillery fire, naval gunfire, and aerial bombing. The craters were most visible on the 1962 aerial photographs. In addition, the aerial photo analysis identified several artillery gun positions and OPs within the SIA that may have been used for artillery fire (CH2M HILL, 2006b).

Sandy beach areas are intermix with rocky beaches along the south marine boundary and predominate along the northern marine boundary of the SIA. Yellow Beach lies within the SIA along its southern coast.

1.3.3 Area for Performance of Non-Time Critical Removal Action

A NTCRA will be carried out along select roadways, shorelines, and “intermediate” areas in MRA-SIA MRSS 1 and 3 through 7, and along the eastern boundary of the SIA westward in MRSS 2 and 3. These areas are identified on Figure 1-2. These MRSS have been selected based on the HE hazards associated with the munitions identified at these locations and the trespassing of recreational boaters, horseback riders, and other unauthorized persons in these areas from the north and south of the MRSS. Table 1-1 lists the MRSS where the NTCRA will be performed and past use. Numerous different munitions items have been identified at these sites and are presented in Table 1-2. The items in Table 1-2 list only those items identified from investigations to date; therefore, munitions items may be present at the clearance areas that are not identified in the table.

1.4 Topography, Climate and Weather, Vegetation, Geology, and Hydrology

1.4.1 Topography

The topography of Vieques is characterized by gentle to steep rolling hills and valleys throughout the island, with the eastern side exhibiting a more rugged terrain. Figure 1-5 illustrates the topography of the VNTR. The SIA highly variable terrain predominated by steep slopes in the central portion to lagoons and beaches along the south and north boundaries. Elevations range from 0- to approximately 50-ft above mean sea level (amsl). Cerro Matias, located within the SIA as OP-1 (Figure 1-5) is the highest point on VNTR, at approximately 420 ft amsl. The average elevation across Vieques is approximately 246 ft amsl. The coastal area is relatively narrow; however, the southern coast exhibits wider expanses of beach.

TABLE 1-1
MRA-SIA MRS's Included in the NTCRA

Site Designation	MRA	Parcel	MRS	MEC Area Type	Description of Site	Status
PI 1	SIA	B-2	2	Strafing target	Within LIA. Interviews and records indicate former location of an aircraft-strafting target and water production well for residents prior to Navy activities. No evidence of hazardous waste or hazardous material or petroleum storage or disposal was observed. Non-explosive munitions were observed throughout the site (NAVFACENGCOCOM, 2003).	Site will be assessed during ongoing ERA/ Phase II SI
PI 17	SIA	B-5	6	Target	Interviews and records indicate area was historically used for landing exercises and might have been used as a target area or munitions storage area. No evidence of human disturbance was observed at this site (NAVFACENGCOCOM, 2003).	Site will be assessed during the ongoing ERA/ Phase II SI
PI 22	SIA	B-2	2	Potential Target Area	Interviews, site features, and records indicate this area was formerly used for loading and unloading of range support materials and for landing exercises. Adjacent to the LIA (NAVFACENGCOCOM, 2003)	Site will be assessed during ERA/ Phase II SI
Surface Impact Target Area (SWMU 11)	SIA	B-1, 2, 3, 4	1 - 7	Artillery/ Bombing Targets	Established in the 1950s for marine exercises; aerial photos indicate munitions craters covered over 1,800 acres; since 1974 over 100,000 rounds (over 2100 tons) of marine artillery fired at SIA.	The site will be further evaluated under the MRP Phase II SI
OP-5	SIA	B-1	1	Gun Position	Field reconnaissance detected bomb fragments, projectile fragments, small arms; was approved for firing of up to 300 rounds of 155mm per day.	The site will be further evaluated under the MRP Phase II SI
G-21	SIA	B-3	2	Photo-identified Gun Position	Aerial photos identified mortar at G-21.	The site will be further evaluated under the MRP Phase II SI

TABLE 1-2

Munitions Items Reported to Have Been Fired at MRA-SIA, Former VNTR

105mm Projectiles (Practice/HE/Illumination/Smoke/ White Phosphorus)
 106mm Projectiles (Practice/HE)
 107mm Mortars (HE /White Phosphorus)
 155mm Projectiles (Practice/HE/Illumination/Smoke//White Phosphorus)
 175mm Projectiles (HE)
 2.75" Rocket (Practice/HE)
 20mm Projectiles(Practice/HE)
 3"/50 Projectiles (MK-27, MK-29. MK-33) (Practice/HE)
 3.5" Rocket (Practice/HE/White Phosphorus)
 30mm Projectiles (HE/Practice)
 4.5 "(UK) Projectiles (HE/Practice)
 40mm Projected Grenade (Practice/HE/Smoke))
 5" Projectiles/ (Practice/HE/White Phosphorus/Illumination))
 5" Rocket (HE/Practice)
 60mm /Mortars (Practice/HE/White Phosphorous/Illumination)
 75mm Projectiles (HE/Practice)
 8" Projectiles (HE)
 81mm Mortar (Practice/HE/Illumination//White Phosphorus)
 90mm Projectiles (Practice/HE)
 LAW (M72 66mm) Rocket
 M47 Dragon Missile
 MK-106 (5lb) Practice Bomb
 BDU-48 (10lb) Practice Bomb
 MK-24 Aircraft Flare
 MK-45 Aircraft Flare
 MK-76/BDU-33 (25lb) Practice Bomb
 MK-77 Firebomb
 MK-81 (250lb) Bomb
 MK 82 (500lb) Bomb

1.4.2 Climate and Weather

The climate of Vieques is tropical-marine. Temperatures are nearly constant, with an annual average of approximately 79 degrees Fahrenheit (°F). August is the warmest month (82°F) and February is the coolest (76°F). Vieques lies directly in the path of the prevailing easterly

trade winds that regulate the climate of Puerto Rico and result in a rainfall pattern characterized by a dry season from December through July and a rainy season from August through November. Heavy precipitation may be induced by tropical storms from June to November. The eastern half of Vieques and annual rainfall averages 25 inches per year.

1.4.3 Vegetation

Vegetative cover on the eastern third of Vieques consists of thick vegetation dominating most available land space. The canopy consists primarily of deciduous trees, with the non-native mesquite dominating the species distribution. A number of tree species are thorny, and low-lying brush is present throughout. Tall grasses also populate the landscape in areas where the thorny tree and brush species have not populated. Most of the former VNTR's vegetation tends to form a complete ground cover. Leaves are mostly small and sclerophyllous (hard and dry).

Vegetation on the island's eastern side is slightly less dense than on the western side, with a larger percentage of thorny species, especially young to mid-age mesquite trees. Lower precipitation levels on the island's eastern end contribute to the thornier, rugged terrain observed there. The hillsides are densely vegetated, similar to the western side of the island.

The coastal areas in the island's eastern side contain level terrain made up primarily of lagoons and mangrove swamps. Coastal dunes and associated vegetation, including sea oats, are present throughout open beach areas on both the northern and southern sides of the EMA and SIA.

1.4.4 Geology

The geology of Vieques is characterized by volcanic rocks generally overlain by alluvial deposits and patches of limestone. The upland areas contain three rock types consisting of sedimentary rocks composed of limestone and volcanic rocks composed of granodiorite and diorite.

The Upper Cretaceous volcanic rocks in the upland areas appear to be the oldest exposed rocks on Vieques, and are believed to have been in a marine environment, as were rocks of the same age on the island of Puerto Rico. Limestone of Upper Tertiary age is found on peninsulas extending into the sea from the southern and eastern coasts. Limestone of the Tertiary-Miocene age is also found along these coasts, and is referred to as the "Puerto Ferro" limestone. Quaternary age deposits are found in the valleys and coastal areas and include beach, swamp, and alluvial deposits. Deposits of sand, swamp, and salt mud occur in the coastal areas and floodplains.

Limestone occurs in sectors of the island's northern, southern, and eastern parts. The most extensive areas of limestone are found on the southern coastal peninsulas. The limestone is generally soft, yellowish, and well-indurated where exposed to the atmosphere. The sedimentary deposits consist of a mixture of sand, silt, and clay.

Alluvial deposits are found in the valleys and coastal areas and include beach, swamp, and alluvial deposits. Deposits of sand, swamp, and salt mud occur in the coastal areas and floodplains. A recent investigation of the eastern end of Vieques indicated that the alluvial deposits there range from 5-ft to 50-ft thick (Baker, 1999).

Soils on Vieques Island are primarily residual, due to both climatic and subsurface rock conditions. They typically are classified into five groups and range from rock land soils where bedrock is exposed to deep, well-drained soils within the alluvial deposits to shallow soils (USDA, 1977).

1.4.5 Hydrology

The streambeds found on Vieques flow either northerly or southerly until they reach the Caribbean Sea or Atlantic Ocean. Vieques does not have any perennial surface drainage, and receives an average of 36 inches of rainfall per year, of which approximately 90 percent is lost to evaporation, based on statistics from the U.S. Virgin Islands. Of the remaining 10 percent, approximately 5 percent infiltrates into the groundwater system and 5 percent becomes surface runoff. (USGS, 1989).

1.4.6 Surface Water

Surface water deposits in the VNTR occur primarily in coastal lagoons and intermittent streams, known locally as *arroyos* and *quebradas* that channel water downward from hills during rain events. Some of these *arroyos* and *quebradas* have standing water year-round, especially in areas abutting the coastline where terrain has leveled sufficiently to allow for standing water. Several mid- to large-sized lagoons are present near the Purple Beach area just east of Puerto Negro and to the south within the Ensanada Honda area, the Bahía de la Chiva area, and the South Coast Bays area.

Surface water features are less prominent on the island's eastern side than they are on the western side, and exist primarily very close to the coast as lagoons. Some rainwater does pool for some time in low-lying areas following storm events, but these features dissipate within a few days.

1.4.7 Groundwater

The groundwater on Vieques is derived from rainfall. The water flows downhill as intermittent stream runoff or seeps into the soil and underlying deposits. Water in pore space, cracks, and fractures in bedrock eventually flows into alluvial deposits or to the ocean. Yearly variations in island-wide rainfall influence groundwater levels locally. Groundwater levels also exhibit fluctuations near the coastline because of tidal influences.

The groundwater on the island is broken up into two aquifers: the Valle de Resolución, located beneath the island's western portion (the only known groundwater aquifer on the former Naval Ammunition Support Detachment (NASD) property that contains potentially potable water), and the Valle de Esperanza located beneath the island's southern portion near Camp Garcia. As discussed above, approximately 5 percent of the annual precipitation infiltrates through the ground and supplies the aquifers. The Valle de Esperanza is the more productive of the two aquifers and, therefore, was used as a source of potable water by the Navy. The Puerto Rico Aqueduct and Sewer Authority (PRASA) managed a series of 16 wells which pumped approximately 450,000 gallons of water per day, although these wells are no longer active because of the installation of a water line from the island of Puerto Rico to Vieques in 1978.

The U.S. Geological Survey (USGS) performed a groundwater study on Vieques, including tests on the wells near Esperanza. The results indicated that the groundwater contained high concentrations of sodium bicarbonate. Because of its high sodium content, the groundwater on Vieques is not suitable for extended use for irrigation or other potable water use. The high levels of sodium result from sea spray infiltrating into the ground and saltwater entering the groundwater supply through excessive groundwater withdrawal (USGS, 1995).

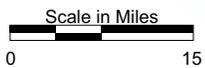
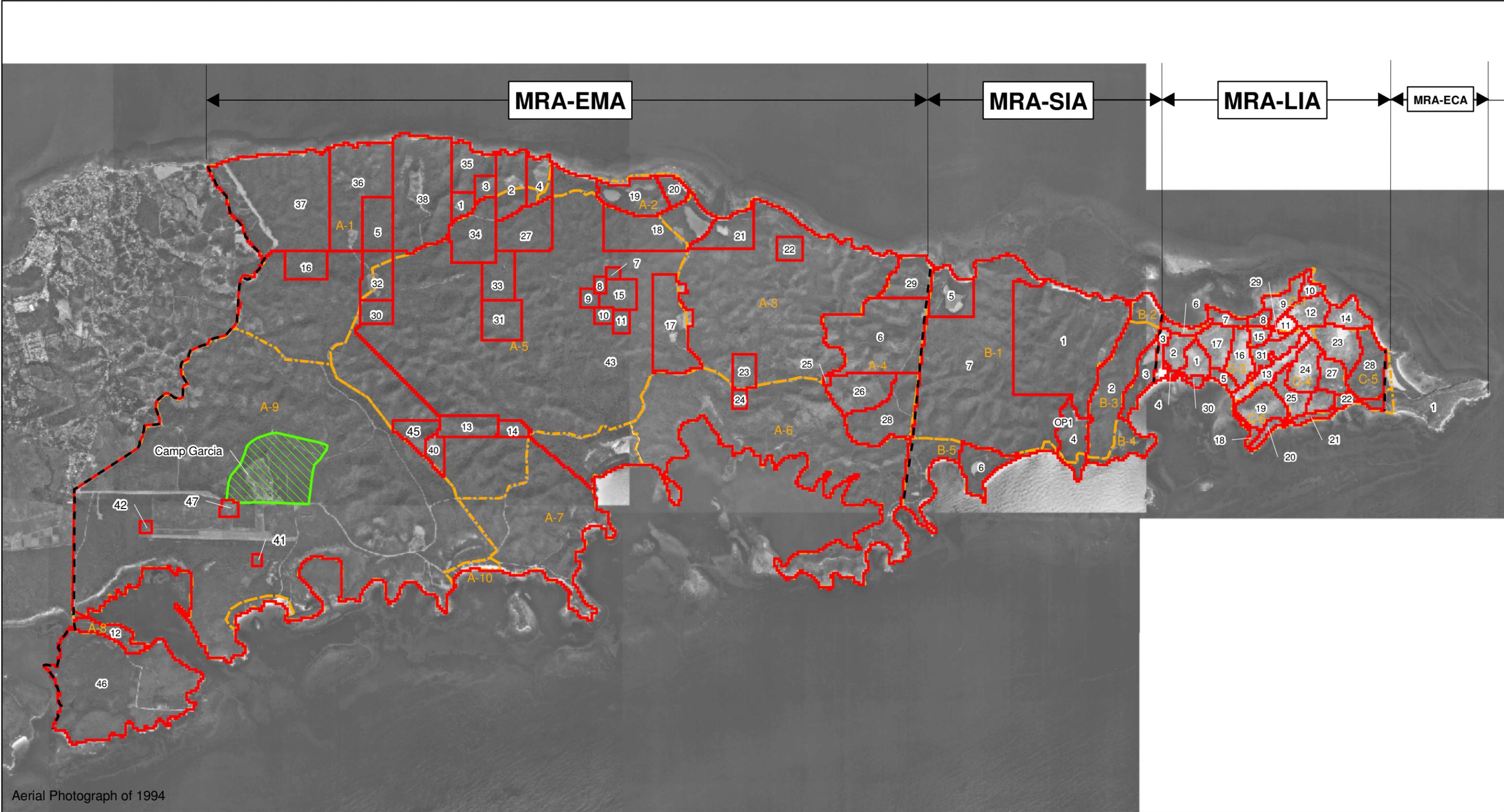


Figure 1-1
Regional Location Map
Vieques, Puerto Rico



Aerial Photograph of 1994

- Legend**
- MRA-LIA-MRS1
 - Camp Garcia
 - Parcel Boundary and Designation

Notes :

- MRS Numbers Do Not Signify Priority
- EMA-MRS 43 and SIA-MRS 7 include all terrestrial area within the range fan(s) not designated as other MRSs.

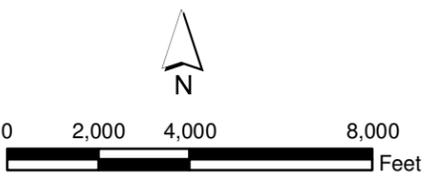
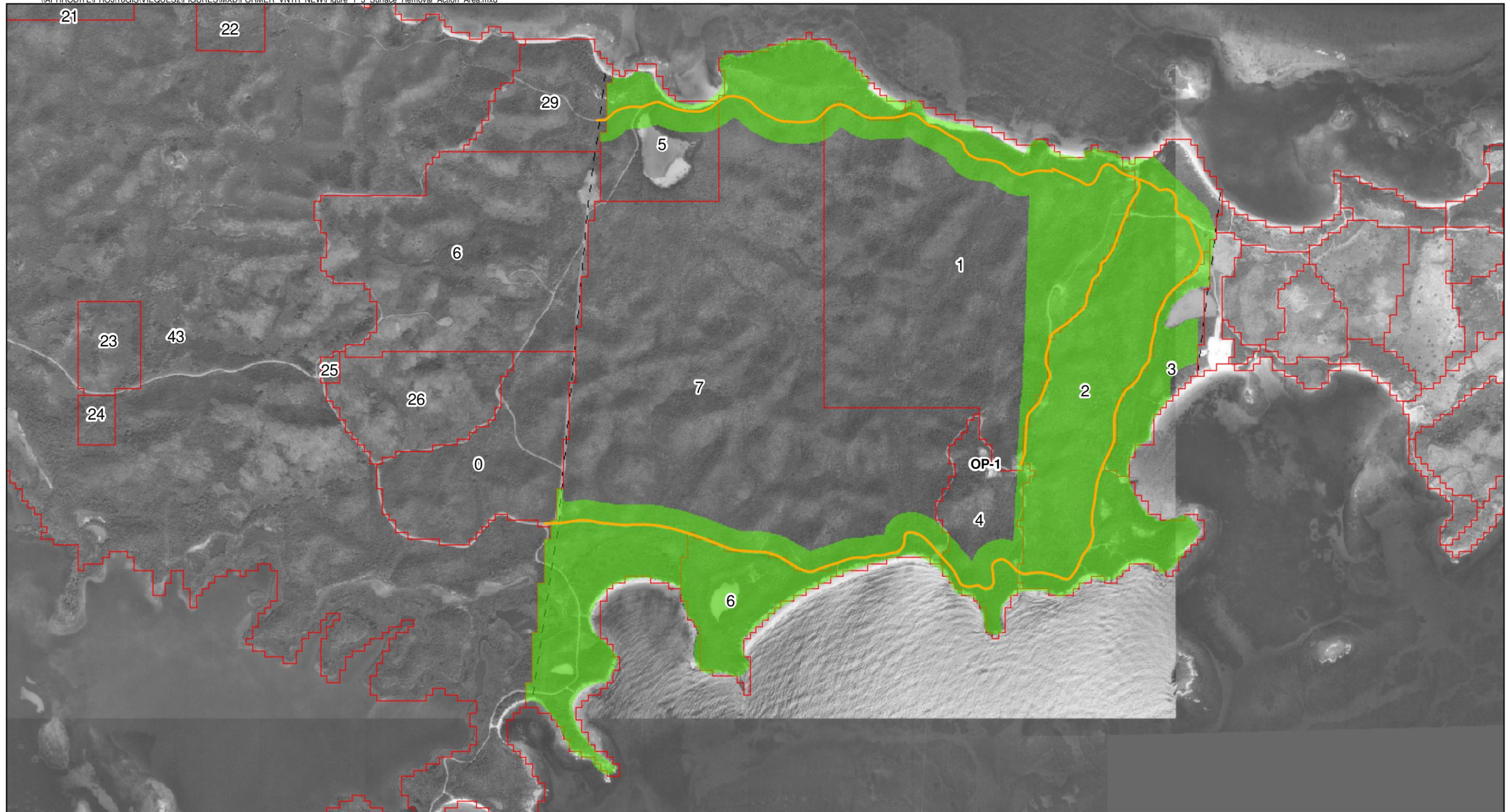


Figure 1-2
Former VNTR Site Map
Former VNTR
Vieques, Puerto Rico



- Legend**
- SIA Roads
 - Removal Action Area
 - MRS Boundary

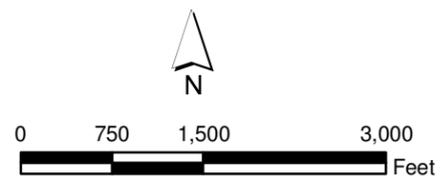
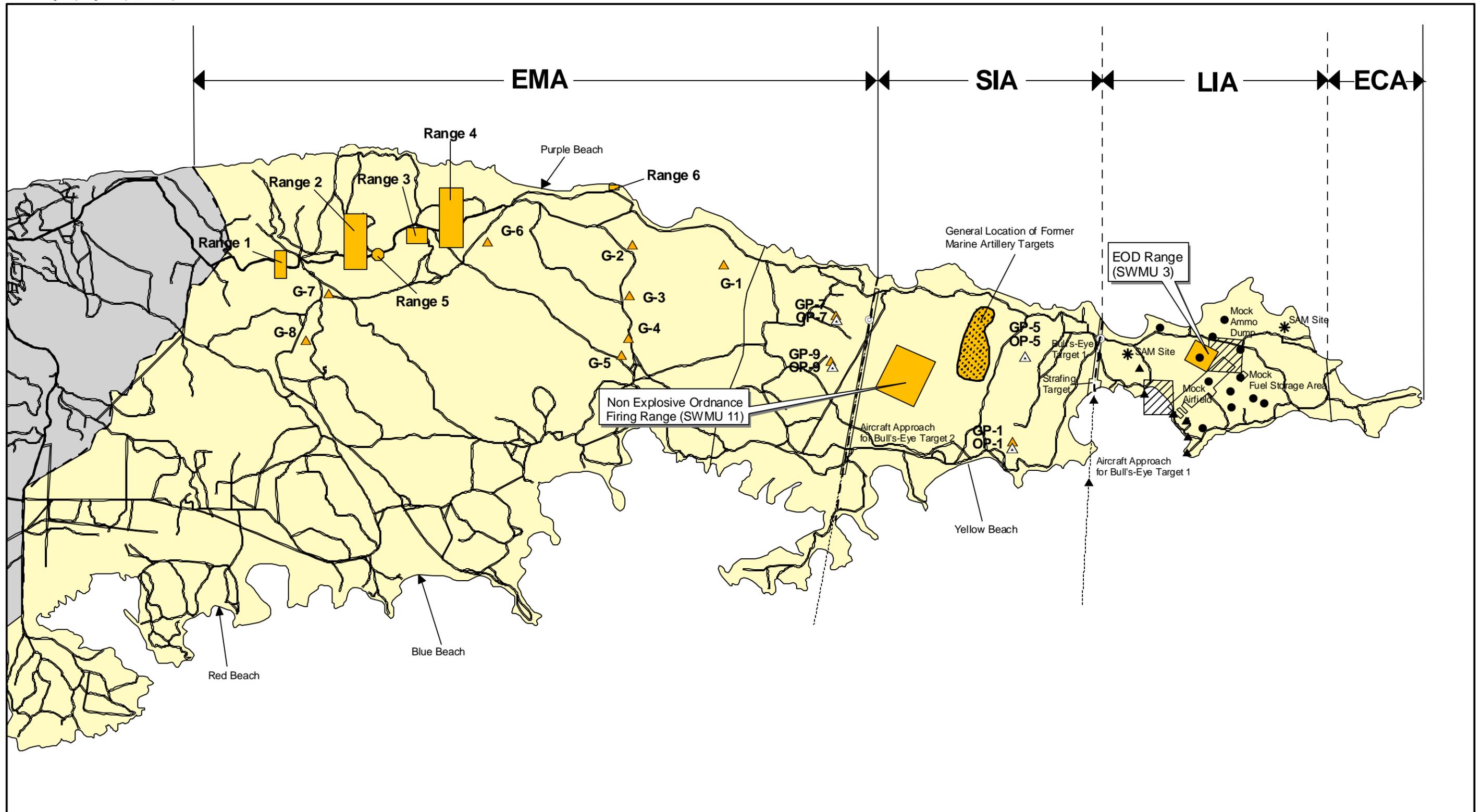


Figure 1-3
Surface Removal Action Area
MRA-SIA MRSs 1-7
Former VNTR
Vieques, Puerto Rico



LEGEND

- | | |
|--|--|
| Naval Gunfire Support (NGFS) Area Target | Property Line |
| Navy Property | Small Arms/Artillery Ranges |
| Non-Navy Property | General Location of Marine Artillery Targets |
| Air-To-Ground (ATG) Target | Observation Point |
| Naval Gunfire Support (NGFS) Target | Gun Position |

ECA - Eastern Conservation Area
 LIA - Live Impact Area
 SIA - Surface Impact Area

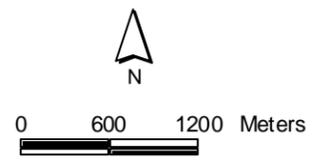
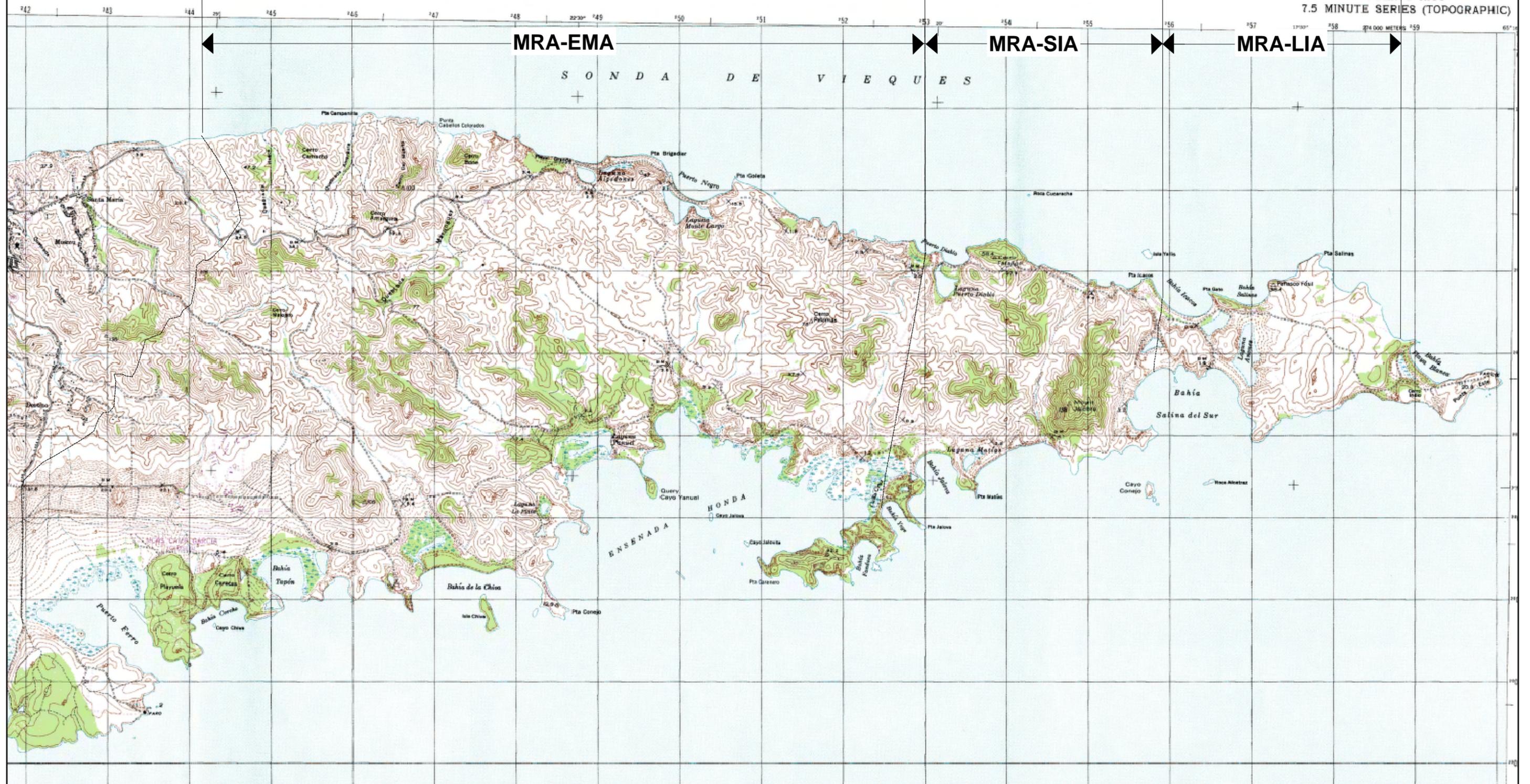


Figure 1-4
 Map of Range Related Site Features
 Expanded Range Assessment/Site Inspection
 Former VNTR, Vieques Island, Puerto Rico



MRAs - Munitions Response Areas
EMA - Eastern Maneuver Area
LIA - Live Impact Area
SIA - Surface Impact Area

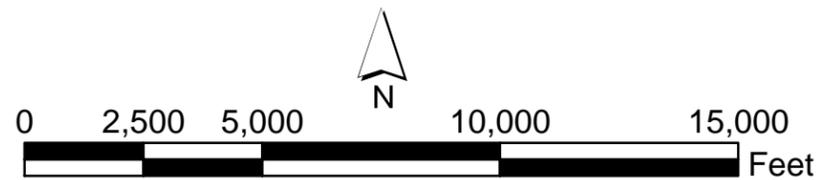


Figure 1-5
Topographic Map
Former VNTR,
Vieques, Puerto Rico

Technical Management Plan

2.1 General

This section of the work plan addresses specific field-level approach and procedures to execute the tasks required for the NTCRA in the SIA. Proposed changes to this work plan will be documented and forwarded to NAVFAC and the Title II Services Contractor and these changes will be provided to the U.S. Fish and Wildlife Service (USFWS), Naval Ordnance Safety and Security Activity (NOSSA), USEPA, and the Puerto Rican Environmental Quality Board (PREQB) for review and comment.

2.2 Guidance, Regulations, and Policy

Table 2-1 lists the MEC guidance, regulations, and policy that are applicable or potentially applicable during MEC assessment, recovery, and removal operations on the VNTR.

TABLE 2-1
Potentially Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance To Be Considered

Reference	Title
Federal Requirements	
27 CFR Part 55	Commerce in Explosives
29 CFR Part 1910	Occupational Safety and Health Standards
29 CFR Part, Subpart T, 1910.401	Commercial Diving Operations
29 CFR Part 1926	Safety and Health Regulations for Construction
40 CFR Part 300	National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (CERCLA Process)
40 CFR Parts 260-279	Hazardous Waste Management (RCRA ARARs)*Military Munitions Rule
40 CFR Parts 355, 370, and 372	Emergency Planning & Community Right-to-Know (Inventories and Release Reporting)
40 CFR Parts 50-73	Clean Air Act (Release Limits)
49 CFR Parts 100-199	Department of Transportation (Truck Transportation on Public Roads)
Bureau of Alcohol, Tobacco, Firearms and Explosives P 5400.7 (11/07)	Federal Explosives Law and Regulations 2007
DoD	
DoD 4160.21-M	Defense Reutilization and Marketing Manual
DoD 4160.21-M-1	Defense Demilitarization Manual
DoD 6055.9-STD	Ammunition and Explosives Safety Standards
Commonwealth of Puerto Rico ¹	
Law 134	Law of Explosives of Puerto Rico, 28 June 1969
Law Chapter XVIII	Guidance for the Administration, Application and Oversight of Puerto Rico Explosive's Law
U.S. Army Corps of Engineers	
EM 385-1-1	Safety and Health Requirements Manual

TABLE 2-1
Potentially Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance To Be Considered

Reference	Title
EM 1110-1-4009	Ordnance and Explosives Response
EP 75-1-2	Unexploded Ordnance Support for Hazardous, Toxic and radioactive Waste and Construction Support Activities
EP 385-1-95a	Basic Safety Concepts and Considerations for Ordnance Explosive Operations
EP 1110-1-17	Establishing a Temporary Open Burn/ Open detonation Site for Conventional Ordnance and Explosives Projects
EP 1110-1-18	Ordnance and Explosives Response
EP 1110-1-24	Establishing and Maintaining Institutional Controls for Ordnance and Explosives Projects
ER 5-1-11	Program and Project Management
ER 385-1-92	Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Activities
ER 415-1-10	Contractor Submittal Procedures
ER 715-1-19	Service and Supply Contractor Performance Evaluations
ER 1110-1-12	Quality Management
ER 1110-1-8153	Engineering and Design Ordnance Explosives Response
ER 1110-1-8158	Corps Wide centers of Expertise Program
U.S. Army Corps of Engineers Engineering and Support Center (CEHNC), Huntsville	
Interim Guidance Documents	
IGD 98-04	Reportable Material at Ordnance Explosives Response Sites
IGD 99-02	Small Arms Determination
Procedural Documents and Plans	
March 2000	Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives Sites
August 10, 1999	Procedures for Establishment of Anomaly Review Boards Site/Grid Statistical Sampling Based Methodology (SiteStats/GridStats) Documentation
Memoranda of Agreement (MOA)	
MOA (July18, 1997)	U.S. Army 52nd Ordnance Group and U.S. Army Engineering and Support Center, Huntsville
MOA (June 13, 1995)	Chemical Support Division, U.S. Army Edgewood Research, Development and Engineering Center and (then) U.S. Army Engineer Division, Huntsville
OE Guidance Memoranda	
	OE Mentoring Plan
December 19, 2000	Interim Final Management Principles for Implementing Response Action at Closed, Transferring, and Transferred Ranges
January 20, 1994	Application of the Hazardous Waste Operations and Emergency Response Regulation to Ordnance and Explosives Sites
November 27, 1996	Base Realignment and Closure (BRAC) Ordnance and Explosives (OE) Response Projects
May 7, 1997	Coordination with the Ordnance and Explosives Center of Expertise (OE CX)
July 6, 1994	OE Center of Expertise Technical Advisory Group (TAG) for Archive Search Reports (ASRs) Permit Equivalency Process for CERCLA Onsite Actions

TABLE 2-1
Potentially Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance To Be Considered

Reference	Title
	Sample Land Owner Notification Letters to be used in Support of Defense Environmental Restoration Program (DERP) Formerly Used Defense Sites (FUDS)
NAVSEA OP 5 Vol 1	Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping
NAVSEA OP 2165	Navy Transportation Safety Handbook for Ammunition, Explosives, and Related Hazardous Materials
NAVSEA OP 2239	Motor Vehicle Driver's Handbook, Ammunition, Explosives, and Related Hazardous Materials
NAVSEA 4570.1	Demilitarization and Disposal of Excess, Surplus, and Foreign Excess Ammunition, Explosives and Other Dangerous Articles and Inert Ordnance Material
NAVSEA 8020.9	Non-Nuclear Ordnance AND Explosives Handling Qualification and Certification Program
NAVSEAINST 8020.1H	DoD Ammunition and Explosives Hazard Classification Procedures Joint Technical Bulletin
OPNAVINST 5090.1	Environmental and Natural Resources Protection Manual
OPNAVINST 5100.23E	Navy Occupational Safety and Health Program
OPNAVINST 5102.1C	Mishap Investigation and Reporting
OPNAVINST 5530.13	Department of the Navy Physical Security Instruction for Sensitive Conventional Arms, Ammunition, and Explosives
OPNAVINST 8020.14	Department of the Navy Explosives Safety Policy
OPNAVINST 8023.2	U.S. Navy Explosives Safety Policies, Requirements, and Procedures
OPNAVINST 8026.2	Assignment for the Responsibility for Management of the Navy Munitions Disposition Program
OPNAVINST 8026.2A	Navy Munitions Disposition Policy
OPNAVINST 8027.1	Inter-service Responsibilities for Explosive Ordnance Disposal
OPNAVINST 8027.6E	Naval Responsibilities for Explosive Ordnance Disposal
OPNAVINST 8070.1B	Responsibilities for Technical Escort of Dangerous Materials
SECNAVINST 8023.3C	Responsibilities for Issuance and Administration of Waivers and Exemptions from Department of Defense Explosive Safety Standards
SWO60-AA-MMA-010	Demolition Materials
U.S. Marine Corps	
MCO P3570.1B	Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat
MCO P3570.2	Regulations for Firing Guided Missiles, and Heavy Rockets for Training, Target Practice, and Combat
MCO 3571.2	Explosive Ordnance Disposal Program
MCO 8020.1	Handling, Transportation, Storage, Reclassification and Disposal of Class V (W) Material
MCO 8020.10	Ammunition and Explosives Safety Policies, Programs, Requirements, and Procedures for Class V Material
MCO P8020.11	Department of the Navy Explosives Safety Policy
MCO 8023	Qualification and Certification Program for Class V Munitions and Explosive Devices
MCO 8027.1	Inter-service Responsibilities for Explosive Ordnance Disposal

TABLE 2-1
Potentially Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance To Be Considered

Reference	Title
USEPA	
July 26, 2000 (Draft)	USEPA FUDS Policy
42 U.S.C. Section 9601	CERCLA of 1980
42 U.S.C. Section 11001	Superfund Amendments and Reauthorization Act (SARA) of 1986
March 2000 (Draft)	Handbook on Management of Unexploded Ordnance at Closed, Transferring, and Transferred Ranges
42 U.S.C. Section 6901	Resource Conservation and Recovery Act
Title 126	Hazardous Waste Regulations*
Title 126	Emergency Planning & Community Right-to-Know and Contingency Planning Regulations (Reporting Requirements)
Title 129	Air Quality Regulations (Release Limits)

CFR = Code of Federal Regulations

RCRA = Resource Conservation and Recovery Act

* denotes substantive requirements of this regulation only

¹ NAVFAC Atlantic discussions regarding the requirements for security at explosives storage magazines with the PR State Police Explosives Division of Humaco determined that the process of having site workers check magazines during working hours throughout the work day meets the intent of the Puerto Rico Law.

2.3 Project Organization and Personnel

This NTCRA is administered and managed by NAVFAC Atlantic with QA support from NAVEODTECHDIV. The Title II Services contractor will support NAVFAC Atlantic by providing site management, QA support to the Resident Officer in Charge of Construction (ROICC), contract administration, and data management. The removal action will be performed by a removal action contractor who is contracted directly by NAVFAC Atlantic. The removal action contractor will perform all MEC removal action operations, implement safety processes, perform QC, and will subcontract support personnel as needed to carry out the removal action. Figure 2-1 gives the general areas of responsibility for each entity described above.

The Title II Services Contractor Munitions Response (MR) Manager will support QA services performed by the Navy and ensure that the work is completed in accordance with the requirements of the work plans and DoD/Navy Guidance.

The Removal Action Contractor Project Manager is responsible for ensuring all activities performed are conducted in accordance with contractual specifications and approved Work Plans. The MRP Contactor Project Manager (PM) is responsible for management of all operations conducted for the project. He will ensure all personnel assigned to the project, including subcontractors, have reviewed the technical plans before any task associated with the project begins. The PM will monitor the budget and schedule to ensure availability of necessary personnel, equipment, subcontractors, and services. He will participate in the development of the field program, evaluation of data, and reporting.

Section 2.3.13 of the Vieques MEC Master Work Plan (CH2M HILL, 2006b) provides the roles, responsibilities and qualifications for UXO personnel.

2.3.1 Composition and Management of Removal Teams

Section 2.3.14 of the Vieques MEC Master Work Plan (CH2M HILL, 2006b) provides the removal team composition guidelines.

2.4 Technical Scope

2.4.1 Mobilization

Prior to mobilization, the following actions require advance planning in preparation for mobilization:

- Finalize procurement actions for items and services needed during the mobilization
- Coordinate with the Federal Aviation Administration (FAA) for release of “Notice to Airmen” (NOTAM) if regular detonations are expected
- Coordinate with the U.S. Coast Guard for the release of a “Notice to Mariners” if regular detonations are expected
- Coordinate with USFWS representatives on Vieques Island

A mobilization period is necessary to organize and train project staff; inventory and test equipment. Mobilization will include the following activities:

- Transport and assembly of the work force
- Conduct site-specific training on the work plan, Site Specific Health Plan (SSHP), and MEC procedures and hazards.
- Ship and inventory project equipment (e.g., hand tools and supplies, portable toilets, backhoes, vegetation clearance equipment)
- Coordinate with local agencies including police, hospital, and fire department as appropriate.
- Organize support facilities and test communication equipment.
- Test and inspect equipment.

2.4.2 Field Office

The former Camp Garcia field office will be utilized for the project described in this plan. The field office is the central command location for MEC activities. Personnel will report to this location at the beginning of each work day for the daily health and safety briefing. The field office is the central point of communications for the project. The office will be equipped with one or more phones, facsimile machine, and radio base station for radio communication with the field crew(s). Health and safety records will also be maintained in the field office.

2.4.3 Project Site Layout

The area identified for removal of surface munitions is approximately 700 acres in area and is described in Section 1 and shown on Figures 1-2 and 1-3. The survey to establish the

project site layout includes the actions performed to identify the operating area boundaries, install grid corner stakes, and develop a project base map.

Following an initial reconnaissance of the work area, the survey team will locate and mark the site boundaries with stakes and establish ground controls in accordance with the location, surveying, and mapping plan. The spatial coordinates collected during the establishment of the survey monuments, operating area boundary, and individual grids will be used to develop a project base map.

The final product of this operation is the generation of a spatially-referenced site drawing that accurately depicts the location operating area boundaries and grid boundaries. Throughout operations, this map will be continually updated to reflect project performance and contamination encountered. Upon project completion, the data contained on this map will be an integral part of the final report.

The locations of all stakes will be checked for the presence of MEC using an appropriate geophysical instrument prior to driving the stake.

The project site will be divided into grids measuring 30 m × 30 m.

2.4.4 Site Preparation

All site preparation activities will be monitored by the appropriate UXO personnel described in this section.

A survey team will perform initial reconnaissance of the site upon mobilization. During the initial reconnaissance, the survey team will examine the site to determine the amount of vegetative material that must be removed to accomplish the scope of work and determine the amount of MEC and range/munitions debris (MD) on the surface of the site. The survey team will document the site reconnaissance. Photographs will be taken of the overall site vegetation, MEC, debris found on the surface, and any other notable features.

The survey team's observation, documentation, and analysis of the density of the vegetation and the presence of surface MEC will be used to determine the amount and method of vegetation removal. Possible appropriate vegetation removal scenarios include none, (if the area is free of vegetation that interferes with subsequent required work) or removal by hand cutting.

Vegetation Removal

It is estimated that vegetation removal will be required for most of the 700 acres identified for removal of surface munitions, roadways and beach areas may not require vegetation removal. Vegetation removal will be conducted by hand (manual) utilizing hand carried tools (e.g., weed eaters). Unless it is absolutely necessary, cutting trees larger than 3 inches in diameter will be prohibited. Trees will be felled into an area that has already been surface swept for MEC. The vegetation will typically be cut to a height of approximately 6 inches above ground surface to eliminate interference with MEC detection or survey activities. All cut vegetation will be accumulated onsite and left in place.

As the first step, the UXO Technicians will inspect all areas of the grid ahead of the vegetation removal crews with the aid of handheld magnetometers. The UXO Technicians will mark any MEC or other hazards by encircling the hazard with flagging tape.

The vegetation removal will be supervised by UXO Technician III and a UXO Technician II. The laborers will use hand tools that are appropriate for the vegetation being cut, such as chain saws, power string trimmers, and machetes to cut the vegetation.

Trees will be trimmed or removed on a case-by-case basis and only as required to accomplish the project tasks. If removal is required, the tree will be cut using chain saws or other hand held equipment. The tree will be sectioned, if necessary, to remove it from the immediate area, so it does not interfere with MEC detection or survey activities.

MEC Investigation Operations and Removal Actions

All removal activities will be monitored by the appropriate UXO personnel described in this section.

A magnetometer assisted visual survey will be performed to locate all surface MEC. All metallic items present at ground surface or partially exposed at the surface will be removed.

Magnetometer sweeps will be employed (“mag and flag”) for identification and clearance of all metallic items at the surface. UXO technicians will work individual search lanes approximately 3-ft to 5-ft wide and will search each lane using a hand held magnetometer (e.g., Schonstedt Model GA-52Cx), or similar approach to accomplish 100 percent coverage. UXO technicians will start at one end of each lane and move forward toward the opposing base line. During the forward movement the technician will move the magnetometer back and forth from one side of the lane to the other. Both forward movement and the swing of the magnetometer will be performed at a pace, which ensures the entire lane is searched and that the instrument is able to appropriately respond to anomalies. Whenever a metallic surface object is encountered the technician will halt and investigate the anomaly real-time. Throughout this operation the UXO Technician III will closely monitor individual performance to ensure these procedures are being performed with due diligence and attention to detail. If field teams determine an area is inaccessible or unsafe to work utilizing the work approaches prescribed, they will record the following data, which will be included in the report for that action:

- Reason(s) area was determined inaccessible or unsafe to work (e.g., water, steep slope)
- If area is inaccessible or unsafe to work due to slope, the percent slope
- Record the boundary using global positioning system (GPS) units
- Grid(s) location or MRS location
- Date and time
- Contractor team leader name
- Government representative verification of conditions

Section 2.9.4 describes the minimum information that will be collected for each surface item located. Munitions items that are safe to move will be removed by hand. MEC items which are safe to move may be consolidated for disposal/demilitarization within a grid, or several adjacent grids.

MEC items that are not safe to move will be clearly marked and all information will be gathered for the item as described in Section 2.9.4. Additionally, the accessibility, explosive hazard, location, and other factors will be assessed to determine if additional safety measures should be put in place. The item will then be demilitarized during a scheduled demolition event.

Non-MEC metallic items will be removed from the grid and will be consolidated onsite in a designated and established holding area. These metallic items will be thoroughly screened for MEC. Large items, such as target vehicles, will require additional screening for environmental pollutants (e.g., petroleum products, coolants, batteries). These items may also require onsite disassembly to facilitate removal.

2.5 MEC Procedures

2.5.1 MEC Safety

- In general, a projectile containing a base detonating (BD) fuze is to be considered armed if the projectile has been fired.
- Arming wires and pop-out pins on unarmed fuzes should be secured by taping in place prior to movement.
- Do not rely on the color-coding of MEC for positive identification.
- Avoid the area in front of MEC items until it can be determined the item does not contain a shaped charge. The explosive jet can be fatal at great distances forward of the longitudinal axis of the item. Assume any shaped charge munitions to contain a piezoelectric (PZ) fuze until the fuzing is positively identified. A PZ fuze is extremely sensitive, can function at the slightest physical change, and may remain hazardous for an indefinite period of time.
- Examine all projectile rotating bands for fired/unfired condition. Also examine projectiles for the presence/absence of an unfired tracer.
- Assume practice/training MEC contains a live charge until it can be determined otherwise. Expended pyrotechnic/practice devices may contain red/white phosphorus (WP) residue. Due to incomplete combustion, phosphorus may be present and re-ignite spontaneously if the crust is broken and the contents exposed to air (USACE, 2004). Additionally, red phosphorous is sensitive to shock/friction.
- Do not approach smoking WP MEC. Burning WP may detonate the burster or dispersal explosive charge at any time.

2.5.2 MEC Identification

The UXO Technician will carefully remove enough soil, without disturbing the MEC, to facilitate positive identification or to obtain its identification features. UXO Technicians will make every effort to identify MEC through visual examination of the item for markings and other identifying features such as shape, size, and external fittings.

Items will not be moved during the inspection/identification until the fuze condition can be ascertained. If the condition is questionable, consider the fuze to be armed. The fuze is considered the most hazardous component of a UXO, regardless of type or condition. The Senior UXO Supervisor (SUXOS) make final determination of identification of the item and the disposition of the item prior to implementing any disposal operations.

2.5.3 MEC Transportation

Transportation of MEC may be a consideration if safe to do and there is a compelling reason. Guidelines to determine whether to transport and procedures for transport are discussed below.

Determination to Transport MEC

Recovered military munitions or MEC will not be moved by personnel unless it is safe to do so. Movement of MEC by hand is authorized only after positive identification and a determination by the UXO Technician III and either the SUXOS or UXO Safety Officer (UXOSO) that the MEC is safe to move. A conservative approach to MEC transportation will be taken and only considered when the item is positively identified as safe to move.

Procedures for Transportation of MEC

If onsite movement of MEC for disposal or venting is approved, move the MEC in the position found. Movement over short distances for onsite consolidation will be done by hand-carrying the MEC in the position found.

Movement of greater distances (e.g., to another grid for disposal or venting) may be done in a specially-equipped pickup truck. The truck must have the appropriate placards and a non-sparking bed liner and tie-down points. The MEC will be stabilized with sandbags or placed in a wooden box filled with sand and securely tied down. The driver of the transport vehicle will be followed by another similar vehicle and driver to assist him in loading and unloading the MEC, and in the event of mechanical trouble.

2.5.4 MEC Safe Holding Areas

Depending on condition and quantity of MEC encountered, one of the two courses of action will be taken:

- MEC left in place pending disposal
- MEC transported to onsite consolidation point pending disposal

MEC items left in place pending disposal will have geographic coordinates and item information gathered. The specific location of the item will be evaluated to determine any security or access concerns. Finally, the next planned demolition event for the site will be considered to determine if additional measures will be necessary to maintain control/

security of the item. Additionally, activities that may result in increased trespassing or attempts to access the work areas will be evaluated to determine if additional measures should be taken to discourage access, prevent access, or minimize potential encounters with UXO. USFWS, USEPA, and PREQB will be notified if the site personnel are made aware of the possibility of increased trespassing, so they can provide notification to the appropriate enforcement agencies for both waterway access and land access.

2.5.5 Procedures when MEC Cannot be Destroyed Onsite or Cannot be Identified

MEC items encountered at the surface will be destroyed onsite. This will be accomplished through blow-in-place (BIP) or in-grid consolidation shots. Considering the remote location of the work site it is unlikely an MEC item will be encountered which cannot be safely destroyed onsite. However, in the event one or more MEC items are encountered which cannot be destroyed onsite, a suitable treatment site will be located at one of the nearby MRSs. The geographic coordinates for all consolidated shot locations will be recorded.

Military munitions will not be moved by any project personnel unless safe to do so. Movement of military munitions by hand is authorized only after positive identification and the determination is made by the UXO Technician III and SUXOS that the military munitions are safe to be moved.

Unidentified military munitions will not be handled or moved for the purpose of identification. All available data will be collected for the unknown MEC item (e.g., dimensions, external features, markings, color-code) and photos will be taken.

Assistance in identifying unknown UXO and MEC is available from the U.S. Army Corps of Engineers (USACE) Military Munitions Center of Excellence and the Navy's Explosive Ordnance Disposal (EOD) Technology Division. The contact information for the support centers are given below.

USACE Military Munitions Center of Excellence	(256) 895-1200
U.S. Navy EOD Technology Division	(301) 744-4069 or (877) 363-4636

2.5.6 Recovered Chemical Warfare Materiel

Recovered Chemical Warfare Materiel (RCWM) is not expected to be encountered at the VNTR based on range usage archival searches and previous investigations. If suspected RCWM is encountered the following procedures will be followed:

- Person discovering suspected RCWM will immediately notify the SUXOS.
- SUXOS will immediately direct the work team to stop work and evacuate the site in an upwind direction. The initial exclusion zone (EZ) for RCWM is 450 ft upwind per Field Manual (FM)-9-15 (U.S. Army, 1996).
- SUXOS should note the location of the suspected RCWM to help with its identification and reacquisition.

- SUXOS will designate a minimum of two UXO-qualified individuals to position themselves upwind as far as possible to prevent unauthorized personnel from accidental exposure.
- SUXOS will immediately contact the NAVFAC RPM and local Department of Interior (DoI) USFWS representatives to request military assistance.

Note: Assistance for RCWM will be requested through the U.S. Army's 52nd Ordnance Group at Fort Gillem, GA (404) 469-3333. Should the 52nd Ordnance Group at Fort Gillem be non-responsive, the Chemical Warfare Design Center will be contacted at (296) 895-1180.

- SUXOS will account for all personnel and notify the Title II Services Contractor PM.
- SUXOS will ensure the area is secured until relieved by proper authorities. The SUXOS will direct Title II Services Contractor personnel to support response units as appropriate.
- USEPA Region II, PREQB, and NOSSA will be notified if RCWM is discovered during removal action operations. The contact information for these agencies is given in given below.

USEPA Region II	(787) 741-5201
PREQB	(787) 365-8573
NOSSA	(301) 744-4450

Before work resumes, site plans will be reviewed for adequacy in consideration of this newly discovered hazard.

2.5.7 MEC Operations in Populated/Sensitive Areas

Due to the remote location of the work site, no operations will be conducted near populated areas.

2.5.8 Demolition Procedures

Prior to carrying out demolition activities, the U.S. Coast Guard and Federal Aviation administration will be contacted and the appropriate notices made for watercraft and aircraft safety (e.g., notice to mariners, NOTAM). Additionally the following will be notified prior to demolition activities; NAVFAC Atlantic, Title II Services Contractor, USEPA Region II, PREQB, USFWS, and the Municipality of Vieques (MOV).

During demolition activities, the SUXOS will have overall control of the Site. An EZ will be established around the demolition site according to the Explosive Operations Site Approval and Explosives Safety Submission (ESS). Only the SUXOS, UXO Team, and UXO-qualified safety personnel will be allowed within the EZ once the disposal operations have begun. The UXOSO will ensure safe work practices are observed, and the UXO Technician III will perform the necessary steps to safely dispose of the MEC. The following general procedures will be followed for all disposals by detonation:

- The UXO Team, comprised of the UXO Technician III and a UXO Technician II, will inspect the location, condition, and net explosive weight (NEW) of the MEC selected for disposal.
- The UXO Technician III will ensure that permission to detonate explosives has been obtained from the SUXOS and coordinated with the appropriate outside agencies.
- It is the responsibility of the SUXOS to schedule the detonations and to ensure that all project personnel are accounted for before disposal operations begin.
- The UXO Team will then prepare enough explosive charges to perform the planned detonations. The transportation vehicle will then be loaded with the properly containerized explosives and initiators, and other equipment required.
- Initiators will always be transported in a separate container from the main-charge explosives.
- A minimum separation distance of 25 feet will be observed for initiators and main-charge explosives while at the disposal site.
- If several MEC items are located in close proximity to each other, a mainline/branchline shot may be used to destroy these MEC simultaneously. Ensure the total NEW of the MEC to be destroyed does not increase the EZ minimum separation distance.
- All detonations will be dual-primed. The firing wire and initiators will be tested for continuity and the UXO Technician III will observe the UXO Technician II position the explosive charge against the MEC. The disposal shot may be tamped, however, initiators will never be buried.
- The initiators will then be connected to the firing wire and secured to the end of the detonating cord or placed into the main charge.
- The UXO Technician III will then inspect the disposal shot and return to the safe firing point.
- Prior to initiation, the UXO Technician III will ensure that guards are stationed at the roadblocks, scan the EZ for personnel, sound three distinct blasts on an air or vehicle horn, and then scan the area again and initiate the demolition charge if all is clear.
- In the event of a misfire, a 30-minute wait time for electric misfires or a 60-minute wait time for non-electric misfires will be observed. Then a new dual-primed initiator will be prepared and used to initiate the charges.
- All waterways, roadways, and other access routes will be monitored for non-essential personnel during all phases of demolition operations.

2.5.9 Post-Demolition Operations

After successful initiation of the explosive charge, the UXO Team will conduct an inspection of the disposal site and surrounding area to ensure complete destruction of the MEC. After verifying no more detonations will be required, an “all clear” notification will be issued.

The UXO Team will collect for disposal all large MEC fragments and other debris, and generally clean and restore the area.

2.6 Engineering Controls

Due to the remote location of the work site the need for engineering controls is not anticipated.

2.7 Management of MPPEH

The procedures for managing material potentially presenting an explosive hazard (MPPEH) and MD are given in Appendix A.

2.8 Field Documentation

Field documentation will be performed during the removal action. All observations and measurements of sites and any associated items collected during the removal action will be recorded digitally in the field, through the use of notebook computers, digital cameras, or video cameras, or recorded in the appropriate hard copy form such as log books or investigation forms. All investigation data, whether recorded digitally or by hand, will be given to the onsite data manager as soon as possible. After the onsite data manager has created backup and management copies of all the information, the data will be given to the Project QC staff to conduct checks on accuracy and methodology.

2.9 Data Management

2.9.1 Data Collection and Processing

Data will be collected from the field, processed, and used to generate project status reports and information that will be used for the project report and a subsequent risk assessment and feasibility study, if needed.

Data collected during the site clearance will consist primarily of field observations and measurements of the munitions items found. This data will be digitally recorded in the field on handheld electronic data collectors and written (backup) on data forms. Photographs of munitions items will be collected as deemed necessary (i.e., single photographs of like items may be taken). At a minimum the data parameters listed in Section 2.9.4 will be collected.

2.9.2 Database Management and Integration with Geographical Information System

The objective of data management plan is to integrate all related project data into a single, comprehensive project database. The database will store and manage tabular data, geo-referenced map information, and photographic images. Tabular data will consist of location data and data describing munitions items (at a minimum the data parameters given in Section 2.9.4 will be recorded). Geo-referenced map information will include existing maps of the study area, survey control information. Photographic images will include electronic

photographs of items recovered by UXO personnel, photographs of known ordnance types, and images of the Site or physical features within the Site.

The field data will be entered from the electronic data collectors and electronic data files generated on a daily basis. Database queries and reports will be written to verify data loading, perform data QC functions, map weekly progress, and provide investigators with access to the data.

Verified data will be uploaded into the project database and made accessible within the geographical information system (GIS) Data Management System.

2.9.3 Military Munitions-related Items Identification

Military munitions related items found during surface clearance activities will be assigned unique identification numbers when electronic field data is imported into the Vieques Munitions Database. The munitions item IDs will be assigned an auto number. These items are normally surface finds that are not associated with subsurface geophysical anomalies.

2.9.4 MEC Data Records

Field data collection is conducted using a GPS-enabled ruggedized Trimble Geo-XT unit with CartoPac GIS software installed. The GeoXT unit is a handheld mobile GIS and data collection system. Using standardized collection forms and drop down selection lists, the field team will document discovered MEC items, surface clearance progress and destruction/removal actions (to name a few). The information gathered in the handheld unit each day is transferred into a desktop computer application. Once the information has been transferred to the desktop computer, the handheld can be pre-loaded with information for next-day field operations. Attributes collected for surface items are listed below.

Field Name	Description
ITEM ID	Item found Identification Number
ITGROUP	Group
ITCLASS	Class
ITCATEGORY	Category
ITTYPE	Type/Filler
ITDESCRIP	Description/Fuze
QUANTITY	Quantity
DEPTH	Depth
WEIGHT	Weight
FRAG	Frag
DEMOREQ	Demo Required
ITEMCMNT	Item Comment
DSLOC	Location
ITMFNDDATE	Date Found
ITMGRDCELL	Grid
ACTIONTKN	Action Taken
ITMovedTO	Item Moved To
X_COORD	X Geographic Coordinate
Y_COORD	Y Geographic Coordinate
ITTEAM	Team
ITEMISOCQA	Item Found During QC/QA?
DEMOCMPDAT	Demo Complete Date

Project Team QC personnel will perform QC evaluations as described in the QC section of this work plan (Section 10) and will provide forms to data management personnel for entry into the project database. All records, forms, and logs resulting from the field investigation will become part of the permanent project files upon completion of field activities.

2.9.5 Record Keeping/Accountability

The SUXOS has overall responsibility for the accountability of all recovered MEC material and government or commercially procured explosive demolition materials. The electronic data collection system records the type, quantity, and condition of MEC from discovery to disposal. The SUXOS will also maintain the Scrap Residue Certification Form (Form 2-2), which certifies when MEC-related materials are explosively safe.

2.10 Site Safety and Communications

Safety is the primary concern during efforts to locate and dispose of MEC. All personnel engaged in these efforts will adhere to the SSHP and any additional safety requirements. Personnel will also comply with guidelines provided in DoD 4145.26-M (March, 2008), Contractor Explosive Safety for Ammunition and Explosives. All contractors must develop Health and Safety Plans that address the hazards associated with their scope of work and site conditions.

In the event that sealed drums, contaminated soils, or other suspect materials or conditions are encountered during the removal action that would indicate a potential health or safety hazard, work efforts will temporarily cease pending an evaluation by the SUXOS and UXOSO. Operations will continue only when it has been determined it is safe to proceed.

All health and safety issues will be communicated to both the removal action contractor and Title II Services Contractor UXOSO. The appropriate actions for health and safety issues will be determined and the UXOSOs will communicate the information to all site personnel.

Hand-held radios will be used for any required communications between the UXO Teams and project command center/project office. The project office will relay all required communication with other station activities using established radio links or telephones (when available) as a secondary means of communication.

In the event that a suspected MEC item is discovered onsite, but outside the designated area of investigation, UXO personnel will respond to the site and examine the suspect item to confirm whether it is MEC. If the item is MEC, then notification will be made to the SUXOS (if not already involved), the PM, and the Navy Remedial PM (RPM) to coordinate the necessary response to the item. Upon request from installation and program management personnel, the item will be addressed in accordance with the MEC procedures presented in this document. Recommendations and identification information given for the item will be recorded in the Site logbook.

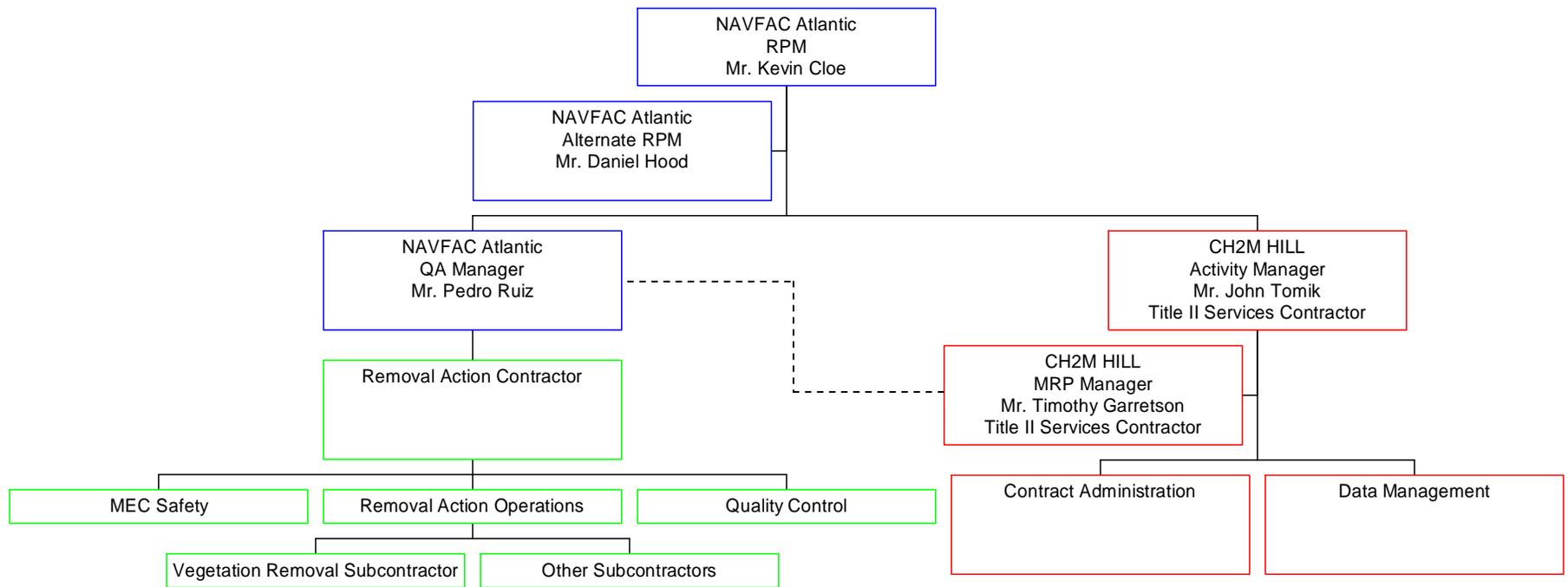


Figure 2-1
NTCRA Management, Contractor, and
Organizational Chart
Vieques, Puerto Rico

Explosives Management Plan

3.1 General

This section of the Site-Specific work plan addresses specific field-level explosive management practices required to support the NTCRA in the MRA-SIA. An ESS (CH2M HILL, 2006a) was submitted to NOSSA and Department of Defense Explosives Safety Board (DDESB) and approved (March 2008) as an independent document for investigation and removal of surface MEC (*Draft Final Explosives Safety Submission/Site Approval Request Former VNTR, Vieques, Puerto Rico, Revision 3, December 2006*).

3.2 Licenses and Permits

The project Munitions Removal Contractor should be prepared to acquire commercial explosives from a local vendor who will deliver the materials to the project site. The UXO contractor will maintain a valid ATF User of HE Permit. Explosives vendors cannot supply explosives without the required valid dealer ATF license. A copy of this dealer license will be maintained at the project office, and upon request, will be made available to any local, state, or federal authority.

3.3 Procedures

3.3.1 Acquisition

The types and estimated quantities of explosives and their intended use during the project may be revised as work progresses, but typically the following explosives will be used during explosive disposal of MEC:

- 1,000 lbs. high-explosive donor charge such as TNT, Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazine (HMX), or binary explosives that detonate at high velocities will be used to detonate MEC.
- 100 each Jet Perforators, or similar prepackaged shaped charges will be used to explosively vent hard-cased munitions.
- 5,000 feet detonating cord will be used to construct mainline-branch line shots, to link multiple shots together, or to transmit the explosive train to the main charge explosive when the main charge is buried (tamped), underwater, or otherwise inaccessible.
- 500 each electric and/or non-electric blasting caps will be used as initiators.
- 20,000 feet NONEL (shock-tube) will be used to transmit the explosive train from the igniter to the demolition devices. Shock-tube priming of explosives offers the instantaneous action of electric detonation without the risk of accidental initiation of the

blasting cap (and the charge) by radio transmitters in the area, or by static electricity discharge. The explosion of the shock-tube is totally contained within the plastic tubing.

All explosives are expected to be purchased through commercial suppliers in Puerto Rico. Military explosives are not expected to be requested/issued for this project.

3.3.2 Initial Receipt

Explosive shipments will normally originate from the island of Puerto Rico. The mode of delivery to Vieques may vary based upon the DOT Hazard Classification of the explosives being delivered. Binary explosives, NONEL, and certain initiators may be delivered by commercial air carrier to the Vieques Airport. HE main charges, Jet Perforators, detonating cord, and certain initiators may be delivered by special chartered aircraft or delivered to Vieques Island via watercraft.

Regardless of delivery mode, all incoming shipments will be met by project personnel qualified to transport explosives such as the SUXOS and/or USOSO and taken directly to explosive storage magazines near OP1 (buildings 4710A and 4710B).

Explosives in unsealed boxes containing partial lots will be opened, and the contents counted. Any discrepancies between the actual type and quantity of explosives received and the shipping documentation will be noted on the shipping documentation with the signatures of both the delivery driver and the individual authorized to receive the explosives. A legible copy will be filed onsite. The authorized individual receiving the explosives will immediately inform the SUXOS of the discrepancy, who will in turn notify the Title II Services Contractor Munitions Response Manager. Project personnel will take the appropriate action as described below.

Establishment of Explosives Storage Facilities

Explosives items will be stored in accordance with its Hazard Division (HD) and the storage compatibility group criteria listed in DoD 6055.9-STD and NAVSEA OP 5 Volume 1.

Permanent explosives storage magazines are available onsite; however, if temporary explosives magazines are required, they will be Type 2 magazines as described in Section 555.208 of ATF P 5400.7, Alcohol, Tobacco, and Firearms Explosives Law and Regulations, will be used. If a portable magazine is used, DDESB site approval will be obtained. The maximum NEW to be stored in each temporary magazine is 50 pounds. This explosives storage area will meet the requirements of:

- ATF P 5400.7 – Alcohol, Tobacco, Firearms, and Explosives Laws and Regulations;
- DoD 6055.9-STD – DoD Ammunition and Explosives Safety Standards, and
- NAVSEA OP 5 Volume 1, Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping

3.3.3 Quantity Distance

For building 4710B, storage of 2,000 pounds NEW of HD 1.1 explosives, the IBD is 1,250 ft, the PTR distance is 60 percent of the IBD, or 750 ft. For building 4710A, storage of 100 pounds NEW of HD 1.4 explosives the IBD is 75 feet and the PTR distance is 75 feet.

Physical Security

Each explosive storage magazine (buildings 4710A and 4710B) is surrounded by a chain-link security fence with a lockable gate. The magazine doors are fitted with tamper-resistant hardware which has two independent padlock hasps. The gate keys will be issued to the SUXOS and the magazine keys will be issued to the UXOSO. Keys will be secured in the project office or by the contractor storing explosives when not in use.

If temporary magazines are required, locks will meet the standards for ATF Type 2 magazines, as specified in Section 55.208(a)(4), ATF P 5400.7. Each magazine will have two locks. The SUXOS will hold a key to one of the locks, and the UXOSO will hold the key to the other. Access to the explosives will require both individuals. Keys will be secured in the project office when not in use.

A guard will check the security of the magazines every 2 hours during non-working hours when explosives are stored in building 4710A and 4710B. The guard will have reliable communications to notify Fish and Wildlife Services and local law enforcement in case of emergency. During working hours site personnel will verify the security of the magazines.

Placards

Explosive storage magazines will be clearly marked with DoD fire symbols and NFPA 704 markers. Signs stating “EXPLOSIVES” and “NO SMOKING” will be posted on the outside of the magazines.

Lightning Protection System

Buildings 4710A and 4710B have installed lightning protection systems that comply with the specification given in the *Draft Final Explosives Operations Site Approval, Former VNTR, Vieques, Puerto Rico, October 2004*.

Fire Protection

Fire extinguishers of 10 pounds and type BC will be located in the magazine area. Smoking, matches, open flames, spark producing devices, and firearms will not be permitted within 50 feet of the magazines. The area surrounding the magazines will be kept clear of all combustible materials for a distance of at least 50 feet.

Stocking Procedures

When explosives are stored onsite to meet project requirements, the containers of explosive materials are to be stored so that markings are visible. Stocks of explosive materials are to be stored so that they can easily be counted and checked upon inspection.

Except for fiberboard and other non-metal packages, containers of explosive materials are not to be unpacked or repacked inside a magazine or within 50 feet of a magazine, and must not be unpacked or repacked close to other explosive materials. Containers of explosive materials must be closed while in storage.

Tools used for opening and closing containers of explosive materials are to be of non-sparking materials, except that metal box-cutters may be used for opening fiberboard containers. A wood wedge and a fiber, rubber or wooden mallet is to be used for opening

and closing wood containers of explosive materials. Metal tools other than non-sparking transfer conveyors are not to be stored in any magazine containing explosives.

3.3.4 Transportation

This section presents the vehicle requirements and onsite transportation procedures of explosives.

Onsite Transportation Procedures

Explosives will be delivered to the magazines by a licensed and permitted commercial explosives transporter. When explosives are required at the work site, the UXO team will transport the explosives in an appropriately placarded vehicle following the procedures stated in this section.

Procedures for transporting explosives from the storage facility to the demolition site include the following rules:

- The driver of any explosive-laden vehicle will ensure that the load is properly braced and that the initiators are carried separately from main charge explosives.
- The UXO Technician in charge of the explosives movement will ensure the driver and any passengers are not carrying any smoking products or flame producing devices. Smoking is strictly forbidden by all personnel involved in the handling or transportation of explosives.
- Drivers transporting explosives on roads that are not controlled by the U.S. Government must possess a valid commercial driver's license with a hazardous materials endorsement.
- The amount of explosives issued and transported will be limited to the amount needed to perform the day's demolition operations and any quantity limitations imposed by transportation regulations.
- WP munitions will not be transported unless immersed in water, mud, or wet sand.
- If loose pyrotechnic, tracer, flare, and similar mixtures are transported, they shall be placed in #10 mineral oil or equivalent to minimize fire and explosion hazards.
- If an unfired rocket motor must be transported, it shall be positioned in such a manner as to offer the maximum protection to personnel in the event of an accident.
- If base-ejection type projectiles must be transported to a disposal area or collection point, the base will be oriented to the rear of the vehicle and the projectile secured in the event the ejection charge functions in route.
- If a UXO with exposed hazardous filler (HE, etc.) has to be moved to a disposal area, the item shall be placed in an appropriate container with packing materials to prevent migration of the hazardous filler. Padding should also be added to protect the exposed filler from heat, shock, and friction.

Vehicle Requirements

Vehicles transporting explosives on the Site will comply with the following requirements:

- Vehicles transporting explosives will be properly placarded.
- All vehicles transporting explosives will be equipped with reliable communications, a first aid kit, and two 10-pound BC fire extinguishers.
- Vehicles transporting explosives will be inspected daily when in use and the inspections will be documented in a Motor Vehicle Inspection Form (Form 3-1).
- The vehicle used to transport the explosives will have a non-sparking bed liner, and all explosive loads will be covered prior to departure.

3.3.5 Receipt Procedures

This section describes the procedures the UXO Team will use to maintain records of explosives inventories.

Inventory Control and Records Management

If storage of explosives onsite is required, an accurate running inventory of all explosives will be maintained on the Magazine Data Card. One copy of the Magazine Data Card will be kept with the specific lot of explosives, and one copy, which mirrors the original, will be kept in the field office.

At the time of explosives delivery, and at the time of explosives issue, the SUXOS will ensure all additions and subtractions from the inventory of a magazine are recorded on the Magazine Data Card. If issued explosives are not used, they will be added back in to the inventory and recorded on the Magazine Data Card.

Explosives will be tracked by lot number on the Magazine Data Card. All explosives inventory records generated will be archived by Title II Services Contractor for a period of at least 5 years in accordance with ATF regulations.

Authorized Individuals

Written authorization for individuals who can purchase, store, or use explosives must be included in the site specific work plans.

The SUXOS will be responsible for the proper receipt of explosives from the explosives vendor. Only personnel designated in writing may conduct the receipt and initial inventory of the explosives. Individuals authorized to receive explosives will be at least a UXO Technician III.

End-User Certification

The UXO Technician III or SUXOS, as the end-user of explosives, will certify in writing that the explosives were used for their intended purpose.

Reconciling Discrepancies

In the event there is a discrepancy following daily deliveries or onsite storage between the explosives on hand and the explosives inventory recorded on the Magazine Data Card, the

SUXOS will be notified. The SUXOS, together with the UXOSO, will review documentation to determine whether the discrepancy is a paperwork error or whether explosives have been lost or stolen. If it is concluded explosives are lost or stolen, the procedures listed below will be followed.

3.3.6 Inventory

If explosives are stored onsite, each Magazine Data Card will be audited weekly by project staff, such as the Title II Services Contractor PM or UXOSO, on a rotating basis. The SUXOS will ensure that the contents of each magazine are inventoried on a weekly basis and that the quantities of explosives on hand match the quantities listed in the Magazine Data Cards. During this inventory, the numbers of each item stored in the magazine will be determined by inspection and counting. Sealed containers will be left unopened and counted as full. Discrepancies discovered at any time will be handled as described in the following section.

3.3.7 Lost, Stolen, or Unauthorized Use of Explosives

If explosives are discovered to be lost, stolen, or used without authorization, the incident will be immediately reported to the SUXOS, who in turn will inform the Title II Services Contractor PM. The PM shall immediately notify the NAVFAC RMP.

The Federal licensee is required by law (27 CFR 55.30) to report the theft or loss of explosives to the ATF within 24 hours. In the event of such an occurrence, the following procedures will be followed:

- The magazine will be secured, and the area will be sealed until the appropriate authorities complete their investigation.
- Notify the ATF [(800) 424-9555] and the local law enforcement authorities.
- The Federal licensee is responsible for completing and forwarding ATF Form 5400.5. This form will be completed by the SUXOS, and a copy will be provided to the RPM.
- Puerto Rico State Police will be notified [(787)-723-3221] of any lost or stolen explosives

3.3.8 Return of Unused Explosives

If explosives are being stored onsite and a situation arises where explosives have been issued to the Project Team MEC staff but not used during the course of the workday, the unused explosives will be returned to the magazine prior to that shift ending. All unused explosives will be returned to the magazine that they came from, and the Magazine Data Cards will be annotated.

3.3.9 Disposal of Explosives

If explosives were being stored onsite and some quantity remains at the end of the project, the PM will consult with NAVFAC and contracting representative to determine the appropriate disposition. A detailed accounting of remaining explosives and an economic analysis of possible alternatives. Consideration will be given to transfer the remaining explosives to another project via a licensed and permitted commercial explosives carrier. If economically advantageous transfer opportunities cannot be identified, the explosives will be detonated consistent with procedures contained in this work plan.

SECTION 4

Explosives Siting Plan

A Draft Final Explosives Operations Site Approval was submitted to NOSSA and DDESB and received approval December 29, 2004 (Draft Final Explosives Operations Site Approval, Former Vieques Naval Training Range [VNTR], Vieques, Puerto Rico, Naval Facilities Engineering Command Atlantic, October 2004). If clearance operations require explosives currently stored in magazines 4710 A/B, explosives may have to be temporarily relocated until the operations have been completed or suspended for the day. If relocation is required, the explosives will be transported to a location a sufficient distance away, to allow clearance operations to continue. Personnel will remain with the explosives at all times at the temporary location. When the clearance operation that required the relocation is completed or suspended for the day, the explosives will be returned to magazines 4710 A/B. The Explosives Operations Site Approval will be maintained on the Project Site along with the approved NTCRA Work Plan.

SECTION 5

Geophysical Investigation Plan

No subsurface digital geophysical mapping (DGM) will be performed as part of this Non-Time Critical Removal Action.

SECTION 6

Site Safety and Health Plan

All contractors must develop a site specific health and safety plan that addresses hazards associated with their scope of work and the site conditions and will be maintained in project files and onsite during the performance of all removal action activities.

Location Surveys and Mapping Plan

Survey and mapping tasks are key components of the MEC investigations for identifying the location of each MEC component in the field, reporting the locations of these components on maps and in spatial queries conducted in the GIS, and assisting with disposition of MEC components. This Location Surveys and Mapping Plan describes the methods, equipment, and accuracy requirements for location surveys and mapping for the removal action, MEC survey, and anomaly reacquisition described in this work plan.

7.1 Surveying

Surveying for this scope of work will be conducted by a professional land surveyor or the Remedial Action Contractor using GPS, USRADS, or other suitable navigation systems.

7.2 Mapping

All control points and their corresponding location, identification, coordinates, and elevations will be stored digitally and will be reproducible for accurate plotting on maps. Each map will include a north arrow (grid, true, and magnetic) with the differences between them posted in minutes and seconds. Grid lines or tic marks posted at systematic intervals with their corresponding grid values will be shown on the edges of the maps. The legend will include standard symbols and a map index showing the relationship of the map to the overall project or site boundary. The state plane coordinates will be established for the corners of each grid area investigated.

GPS technology may be used to locate MEC components if this technology is readily available on the project and protocols are in place for recording, documenting, and integrating the location and MEC attributes with the MEC data management system.

7.2.1 Digital Data

The survey information collected will be sufficient to accurately relocate the position of the target component in the field and accurately plot the position of each component on a computer-aided design (CAD) map, in the GIS, or for use in statistical applications and tabular reports.

An overall planimetric design file will be created and digitized into a Microstation. DGN file at an elevation of zero. For contours and spot elevations, all associated data will be digitized into a second Microstation 3-D design file with each element at its correct elevation; topologically triangulated network (ttn) files will be created to model the topographic surface. The ttn file will be created using elements of the topographic file, and the appropriate spot elevations, contours, and breaklines necessary to create the ttn files will be used. The ttn files will be set up so they can be used with INROADS to create contours at their exact locations.

Each map sheet will be a standard metric A-1 size drawing (33.1 x 23.4 inches). Each sheet will include a standard border, revision block, title block, complete index sheet layout, bar scale, legend, grid minutes and seconds, and shall be plotted at the horizontal scale required.

The cell library, digital data, and all other supporting files or information will be provided. Production work files will be documented, tabulated, and described in the data manual. The manual will include the necessary information for a third party to recreate the products. The manual will be included as a "readme.txt" file with all distributed digital data.

Digital data will comply and be compatible with U.S. Navy requirements.

7.2.2 Digital Format

All data will conform to the Tri-Spatial Data Standards (TSDS) or CAD/GIS Technology Center Spatial Data Standards (SDS) and as outlined in the specific task order. Any and all deviations from these standards will be done only at the request of the U.S. Navy.

All location survey data and digital maps are transportable and can be copied to portable media for archiving or transfer to other team members. Available formats include CD (the preferred method), digital tape, or DVD. The media used is dictated in part by the size of the files. All survey coordinates will be stored as part of the site-wide relational database.

7.3 Deliverables

The following deliverable items and data will be maintained as part of this scope of work:

- After Action Report.
- Field Survey – Original copies of field books, layout sheets, computation sheets, and computer printouts. These items will be suitably bound, marked, and packaged for delivery.
- Location Survey Points – Tabulated list of all surveyed control points showing the adjusted coordinates and elevations that were established for the specific MEC project.
- MEC Inventory – Tabular list of all MEC components with associated location and descriptions.
- All survey coordinates and MEC-related digital information will be stored as part of the site-wide relational database. These digital data will be backed up on the same schedule as the site-wide database.
- All unique items created or used to generate the deliverables, as requested in each task order.
- Drawings and Data – All maps and associated data will be provided.

Work, Data, and Cost Management Plan

8.1 Introduction

This Work, Data, and Cost Management Plan outlines how the project work will be managed and accomplished. Items pertaining to cost control are in general terms for tasks awarded under NAVFAC Atlantic to the Removal Action Contractor. Data will be managed by the Removal Action Contractor and will be transferred daily to Title II Services Contractor and will be compiled as part of the complete Vieques data management system (see Section 2.9).

8.2 Project Tasks

This project will be executed through a series of tasks, which are outlined in the Scope of Work for the Task Order awarded to the removal action contractor. The general task categories are given below and unless indicated otherwise will be carried out by the Removal Action Contractor. The general roles of the various contractors who will be carrying out work associated with this TCRA are shown in Figure 2-1.

- **Site Visit** (Removal Action Contractor and Title II Services Contractor)
- **Technical Project Planning** (Removal Action Contractor and Title II Services Contractor)
- **Removal Action Work Plan** (Title II Services Contractor)
- **Vegetation Clearance** (Removal Action Contractor)
- **Location Surveying and Mapping** (Removal Action Contractor and Title II Services Contractor)
- **Establishment and Management of GIS** (Title II Services Contractor)
- **ESS** – developed and submitted as independent document by Title II Services Contractor
- **Munitions Removal** (Removal Action Contractor)
- **Site Specific Report** (Title II Services Contractor)
- **Project Management** (Removal Action Contractor)
- **Site Management** (Title II Services Contractor)

8.3 Schedule

Table 8-1 gives the projected schedule for performing the NTCRA.

TABLE 8-1
Projected NTCRA Schedule
Former VNTR, Vieques, Puerto Rico

Work Phase	Date
Final NTCRA Work Plan	November 2008
Initial mobilization for removal action (UXO avoidance personnel and equipment)	December 2008
Initiate vegetation clearance and boundary survey	December 2008
Mobilization of removal action UXO crews and initiation of removal action activities	December 2008
Removal action operations	December 2008 - May 2011
Demobilization of equipment and site personnel	June 2011

8.4 Communications

Project management communications for this project will generally be conducted as:

Field Investigation Tasks

Removal Action Contractor PM will communicate field investigation/removal action information to the Title II Services Contractor Site Manager. The Title II Services Contractor Site Manager or UXO Quality Control Specialist (UXOQCS) will communicate information to the Title II Services Contractor PM. The NAVFAC Atlantic Coordinator will be informed of all field related activities by the Title II Services Contractor or other Program Management staff.

Removal Action Contractor Task Order Management

The Removal Action Contractor PM or other staff will address all task order management information (e.g., budgetary issues, change orders) directly to the NAVFAC Atlantic RPM and Contracts Administrator. If necessary the NAVFAC Atlantic Coordinator will communicate information to the Title II Services Contractor.

8.5 Records Management

Hard copies of primary records for the site will be retained by the Removal Action Contractor and Title II Services Contractor. Upon completion of phases of work prescribed under each task order, all files pertinent to the Vieques project will be compiled by Title II Services Contractor and will be maintained by the Title II Services Contractor Vieques

Program Manager at the Virginia Beach Office of CH2M HILL, Virginia Beach, Virginia. The records will include, but are not limited to:

- Correspondence
- Draft document submittals
- Responses to comments
- Final document submittals

During field investigations, records will be maintained in the respective contractor field offices and originals and/or copies of all files will be maintained by Title II Services Contractor. Following completion of definable phases of work all files will be transferred to the Title II Services Contractor Program Management office. These files will include, but are not limited to:

- Daily summary sheets
- Field logs/notes
- Daily logs
- Health and safety records

8.6 Format and Content of Investigation Reports

All investigation reports will follow the formats and will contain the information given the scope of work for the task order under which the report is funded.

SECTION 9

Sampling and Analysis Plan

No sampling and analysis will be conducted as part of the work described in this work plan. However, sampling and analysis procedures for projects at the Former VNTR are documented in the Final Master Work Plan, Atlantic Fleet Weapons Training Facility, Vieques Island, Puerto Rico (CH2M HILL, 2003).

Quality Control Plan

This Quality Control Plan (QCP) details the approach, methods, and operational procedures to be employed by the Removal Contractor to perform quality control during MEC removal actions at the Former VNTR. This plan was developed in accordance with NOSSAINST 8020.15, NAVSEA OP 5 VOL I (Revision 7), DDESB TP 18, ANSI/ASQC Q10011-1994, ANSI 14010-1996, and OE MCX DID OE-005-11.01, and where applicable, USACE ER 1180-1-6: Construction Quality Management (1995); USACE ER 1110-1-12: Engineering and Design Quality Management (1993); and USACE ER 415-1-10: Contractor Submittal Procedures (1997). Additionally, local and state laws and regulations, ATF P 5400.7, DoD 6055.9-STD, DOT regulations, and OPNAVINST 5530.13: Dept. of Navy Physical Security Instructions for Sensitive Conventional Arms, Ammunition and Explosives.

10.1 Introduction

This QCP, and the requirements and systems established herein, are relevant and applicable to project work performed by the Removal Contractor and its subcontractors and suppliers.

The objectives of this QCP are to anticipate the specific operating requirements of the project, and to establish procedures to ensure that achieved quality meets technical design specifications and conforms to the requirements of the Task Order. Specifically, this plan:

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

10.1.1 Project Background

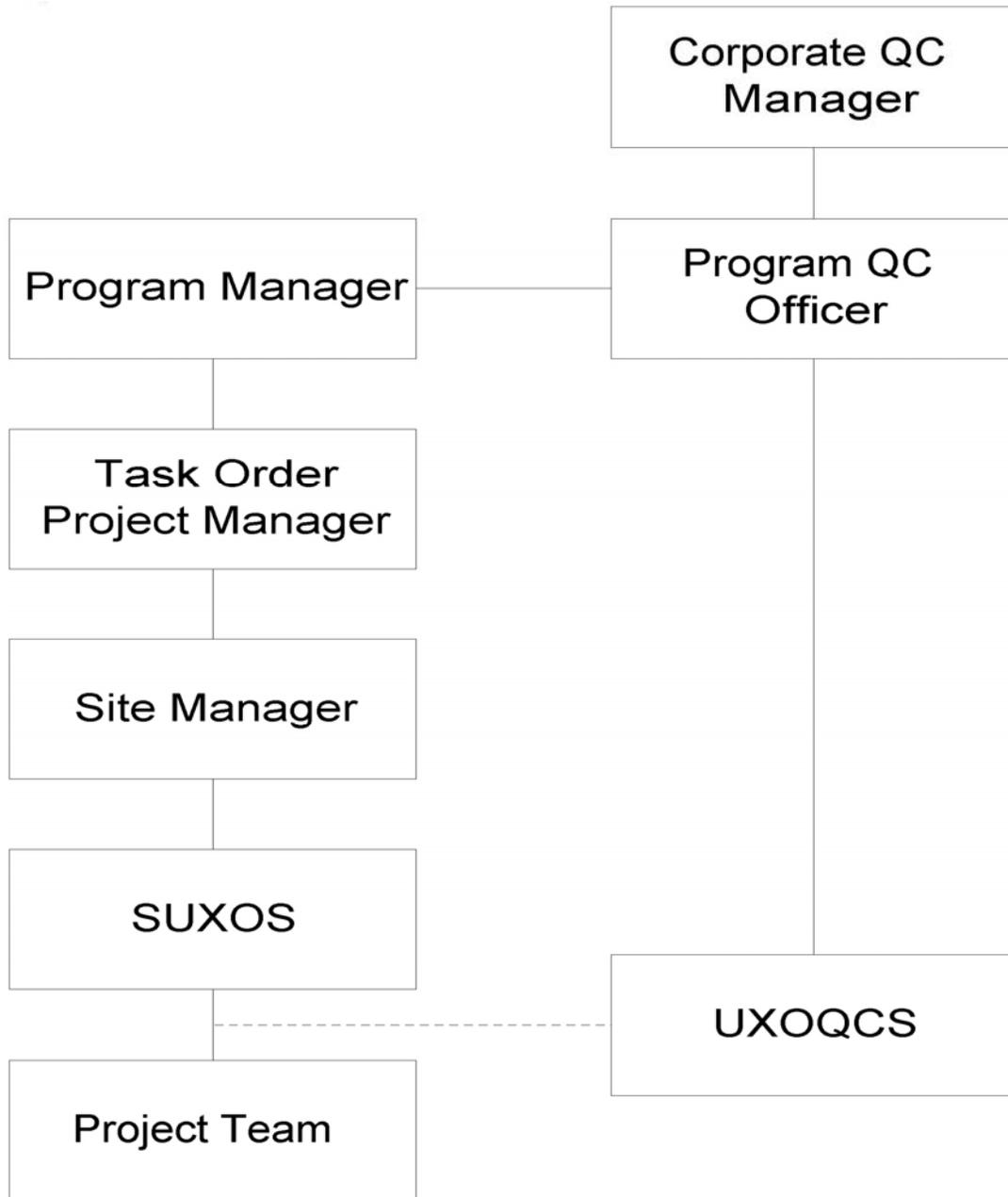
A detailed discussion of the project background was presented in Section 1 of this Work Plan.

10.1.2 Project Scope of Work

The project scope of work and detailed approach for completion was presented in Sections 1 and 2 of this work plan.

10.2 QC Personnel Organization and Responsibilities

The overall project organization and reporting structure is presented in this QCP and illustrated in the figure below. Quality Control personnel, organization, qualifications, and responsibilities are addressed in more detail in this section. Additional details of the QC personnel will be presented in the removal action contractor site specific work plans.



10.2.1 QC Personnel Qualifications and Training

Project staff members will be qualified to perform their assigned jobs in accordance with terms outlined by the scope of work. Resumes for proposed key personnel will be included in Removal Contractor SSWPs. All site personnel must have the appropriate safety training, which includes the Occupational Safety and Health Administration (OSHA) 40-hour hazardous waste operator (HAZWOPER) training and annual 8-hour refresher (29 CFR 1910.120).

10.2.2 Documentation of Qualification and Training

The review and verification of personnel qualifications are to be documented on Form 10-1, provided at the end of this section. The UXOQCS will maintain records documenting the required qualifications and training for each site worker. The UXOQCS will monitor expiration dates to provide advance warning to the PM of when employees will require refresher training or other requirements. The UXOQCS will maintain records of site specific and routine training for personnel and visitors, as required by this Work Plan. These records will be maintained onsite for audit purposes.

10.2.3 Project Manager

The primary responsibility of the PM is the overall direction of the project and accountability for work activities undertaken as part of this project. As such, the PM will provide the managerial administrative skills to ensure that resource allocation, planning, execution, and reporting meet Contract and TO requirements. The global quality-related responsibilities of the PM may include, but are not limited to, the following:

- Organizing project staff and assigning responsibilities.
- Understanding the Contract and scope of work for the specific project.
- Ensuring that submittals are completed and submitted as required in the TO PWS.
- Communicating to the project staff regarding client requirements and QC practices.
- Identifying, providing documentation, and notifying the client and project team of changes in the scope of work, project documentation, and activities.
- Supervising the preparation and approval of project-specific procedures, work plans, and QC project plans.
- Approving project documents.
- Approving project execution methodologies.
- Disseminating project-related information from the client.
- Serving as liaison for communications with the client and subcontractors.
- Serving as liaison between the project staff and other internal groups.
- Deciding whether project documents require independent review.
- Investigating nonconformance and implementation of corrective actions.
- Evaluating the effect of nonconformance on the project and the appropriateness of reporting such items to the client.
- Providing appropriate documentation of nonconformance when reporting to the client.
- Serving as final reviewer prior to release of project information.
- Approving and signing outgoing correspondence.

- The PM may assign a portion of these responsibilities to the Site Manager and SUXOS, who will remain onsite throughout the project field activities.

10.2.4 Site Manager

The Site Manager is responsible for efficiently applying the resources of the project team to execute the field phase of this project. In addition, the Site Manager is responsible for local client interface regarding details of the project and the project team while assigned to the site. The Site Manager will assist the PM in maintaining sufficient resource allocations to meet the project schedule and budget and will provide daily feedback to the PM on project progress, issues requiring resolution, and other project-specific issues, as required. The quality-related responsibilities of the Site Manager include, but are not limited to, the following:

- Notifying the PM if problems arise with the schedule.
- Providing scheduling and integration of subcontractor services in support of the SUXOS.
- Serving as liaison for communications with project staff and subcontractors, as well as with the onsite client and regulatory agency representatives.
- Providing logistical support for field operations.
- Continuously monitoring work progress and adherence to authorized work scopes, budgets, and schedules.
- Aiding in the preparation of submittals.
- Leading weekly onsite status meetings.
- Reviewing the project work plans regularly.
- Interfacing daily with the subcontractors.

10.2.5 UXO Quality Control Specialist

The designated UXOQCS will be specified in the Removal Contractor's Site Specific Work Plan. The UXOQCS has authority to enforce the procedures defined in this QCP. In alignment with this authority, the UXOQCS has the authority to stop work in order to ensure that project activities comply with specifications of this QCP, the contract, and the Task Order. This authority applies equally to all project activities, whether performed by the Contractor or its subcontractors and suppliers.

The UXOQCS is responsible for planning and executing QC oversight of project operations, and ensuring compliance with specified QC requirements. Specifically, the UXOQCS is responsible for:

- Developing, assessing the effectiveness of, and maintaining this QCP and related procedures.
- Reviewing and approving the qualifications of technical staff and subcontractors.

- Planning and ensuring the performance of preparatory, initial, follow-up, and completion inspections for each definable feature of work (DFOW).
- Identifying quality problems and verifying that appropriate corrective actions are implemented.
- Ensuring that the requisite QC records including submittals are generated and retained as prescribed in this QCP.
- Notifying the Title II Services Contractor 48 hours prior to beginning any required action of the preparatory and initial phases. At a minimum, the UXOQCS will use weekly QC Reports for the purposes of this notification.

The UXOQCS is to be physically onsite whenever project-related fieldwork is in progress. If the UXOQCS is to be absent from the site, with client approval, an alternative UXOQCS will be designated and will be given equivalent responsibilities and authority.

10.2.6 Program QC Manager

The Program QC Manager is responsible for developing, maintaining, and ensuring implementation of the quality program. This responsibility includes overseeing activities under the guidance of this QC plan, performing periodic reviews of the processes being implemented, evaluating any recommendations made by the project team over the course of the program regarding use of these processes, and implementing continuous improvement evaluations of the quality program. The Program QC Manager reports directly to the Corporate Quality/HS&E Manager. Specific responsibilities of the Program QC Manager include:

- Developing program-level QC program consistent with corporate guidance and requirements for MR projects.
- Approving project-level QC plans.
- Performing reviews to ensure that sound professional engineering and other technical and regulatory capabilities are applied during planning and execution of MEC operations.
- Monitoring results of site audits.
- Conducting project audits.
- Ensuring that corrective actions are implemented promptly and fully.
- Developing lessons-learned for team distribution.
- Conducting quality training for UXOQCS.
- Evaluating the qualifications of the quality team.

10.3 Definable Features of Work and the Three-Phase Control Process

Quality control on the VNTR project will be monitored through all of the DFOWs using a three-phase control process. The DFOWs and the three-phase control process are discussed in the following subsections.

10.3.1 Definable Features of Work

The DFOW for this task order are divided into activities related to planning, field operations and final project reports and close-out:

Planning

- Pre-Mobilization Activities: System set-up for GIS, document management and control, data management and subcontracting
- Technical Project Planning: Technical and operational approach
- Removal Contractor Site Specific Work Plan and Standard Operating Procedure's (SOP): Preparation and obtaining approval.

Field Operations

- Site Preparation: Mobilization, survey, vegetation removal, surface clearance
- MEC investigation and removal
- MPPEH/MD management (inspection, demilitarization, certification, verification, disposition)
- Demilitarization of MEC
- Site Restoration and Demobilization

Final Project Reports and Close-Out

- Site-Specific Final Report: Preparation and obtaining approval
- Proposed Plan and Decision Documents: Preparation and obtaining approval
- Obtain MEC Response Complete Acceptance
- Data Archiving and Project Closeout

10.3.2 Mobilization

This DFOW includes all required activities associated with mobilizing at the start of the project.

10.3.3 Location Surveying and Mapping

This DFOW includes all activities relating to grid layout activities.

10.3.4 Vegetation Removal

This DFOW includes all activities relating to the removal of vegetation. This feature may need to be subdivided as needed, especially if a more involved phased approach is used such as prescribed burning followed by manual clearance.

10.3.5 MEC Surface Removal

This DFOW includes all activities relating to MEC sweeps to ensure that no surface MEC is present.

10.3.6 MEC Disposal

This DFOW includes all required activities associated with disposing of MEC or explosively venting items.

10.3.7 Scrap Disposal

This DFOW includes all required activities associated with managing and disposing of scrap metal recovered during MEC operations.

10.3.8 Site Restoration

This DFOW includes all required activities associated with restoring the site to acceptable condition.

10.3.9 Demobilization

This DFOW includes all required activities associated with demobilizing at the completion of the project.

10.3.10 Three Phases of Control

The UXOQCS is to ensure that the three-phase control process, including the Preparatory Phase, Initial Phase and Follow-Up Phase, is implemented for each DFOW listed in this QCP. Each control phase is important for obtaining a quality product and meeting the project objectives; however, the preparatory and initial audits are particularly valuable in preventing problems. Production work is not to be performed on a DFOW until a successful preparatory and initial phase has been completed.

Preparatory Phase

The preparatory phase culminates with the planning and design process leading up to actual field activities. Successful completion of the Preparatory Phase verifies that the project delivery, QC, and safety plans have been completed and are ready to be implemented. The following actions will be performed as applicable for each DFOW:

1. Confirm that the appropriate technical procedures are incorporated into the project work plan and review procedures.
2. Confirm that adequate testing is called for to assure quality delivery.

3. Confirm definition of preliminary work required at the work site and examine the work area to confirm required preliminary work has been properly completed.
4. Confirm availability of required materials and equipment. Examine materials and equipment to confirm compliance with approved submittals and procedures. Ensure equipment testing procedures are in place, with control limits and frequency.
5. Confirm qualifications of personnel and that roles/ responsibilities are well-defined and communicated.
6. Confirm with the UXOSO that the site health and safety plan and activity hazard analyses (AHA) adequately address the work operations and that applicable safety requirements have been incorporated into the plan.
7. Discuss methods to be employed during the field activities.
8. Confirm any required permits and other regulatory requirements are met.
9. Verify that lessons learned during previous similar work have been incorporated as appropriate into the project procedures to prevent recurrence of past problems.

Project staff must correct or resolve discrepancies between existing conditions and the approved plans/procedures identified by the UXOQCS and the team during the Preparatory Phase. The UXOQCS or designee must then verify that unsatisfactory and nonconforming conditions have been corrected prior to granting approval to begin work.

Results of the activity are to be documented in the Preparatory Inspection Checklist (Form 10-2) specific for the DFOW and summarized in the Weekly QC Report.

Initial Phase

The initial phase occurs at the startup of field activities that are associated with a specific DFOW. The initial phase confirms that the Project QCP, other applicable work plan sections, and procedures are being effectively implemented and the desired results are being achieved.

During the initial phase, the initial segment of the DFOW is observed and inspected to ensure that the work complies with contract and work plan requirements. The initial phase should be repeated when acceptable levels of specified quality are not being met.

The following shall be performed for each DFOW:

1. Establish the quality of work required to properly deliver the TO in accordance with contract requirements. The UXOQCS ensures that supervision has made the work crews aware of expectations associated with the field methods established under the preparatory phase.
2. Resolve conflicts. Should conflicts arise in establishing the baseline quality for the DFOW, the responsibility to resolve the conflict falls to the PM. Should the conflict not be resolved in a manner that satisfies the project requirements, the UXOQCS must elevate the conflict to the program level (Program QC Manager) and issue a non-conformance report. The UXOQCS may direct a cessation of work activity, with the

concurrence of the Program QC Manager, should the issue jeopardize the results of the DFOW, or put the project at risk of non-compliant performance.

3. Verify with the UXOSO that the site health and safety plan and activity hazard analyses were developed to ensure that the identified hazards adequately addressed field conditions. Confirm that applicable safety requirements are being implemented during field activities.

Upon completion of the initial phase activities, results are to be documented in the Initial Phase Inspection Checklist (Form 10-3), the QC logbook and summarized in the Weekly QC Report. Should results be unsatisfactory, the initial phase will be rescheduled and performed again.

Follow-up Phase

Completion of the initial phase of QC activity then leads directly into the follow-up phase, which addresses the routine day-to-day activities on the field site. Inspection/audit activities associated with each DFOW are addressed in Section 10.4. Specific concerns associated with the follow-up include:

1. Inspection of the work activity to ensure work is in compliance with the contract and work plans.
2. Evaluation and confirmation that the quality of work is being maintained at a level no less than that established during the initial phase.
3. Evaluation and confirmation that required testing is being performed in accordance with procedures established during the preparatory phase and confirmed during the initial phase.
4. Confirmation that non-conforming work is being corrected promptly and in accordance with the direction provided by the UXOQCS.

To conduct and document these inspections, the UXOQCS is to generate the Follow-up Phase Inspection Checklist (Form 10-4). The follow-up phase inspections will be performed daily, or as otherwise identified in this QCP until the completion of each DFOW.

The UXOQCS is responsible for onsite monitoring of the practices and operations taking place and verifying continued compliance with the specifications and requirements of the contract, TO, and approved project plans and procedures. He is also responsible for verifying that a daily Health and Safety Inspection is performed and documented as prescribed in the project SSHP. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the UXOQCS or a designee prior to granting approval to continue work. Follow-up inspection results are to be documented in the QC logbook and summarized in the Weekly QC Report.

Additional Audits

Additional audits performed on the same DFOW may be required at the discretion of the Program QC Officer or the UXOQCS. Additional preparatory and initial audits are generally warranted under any of the following conditions: unsatisfactory work, changes in key

personnel, resumption of work after a substantial period of inactivity (e.g., 2 weeks or more), or changes to the project scope of work/specifications.

Final Acceptance Audit

The Final Acceptance Inspection is performed, upon conclusion of the DFW and prior to closeout, to verify that project requirements relevant to the work are satisfied. Outstanding and nonconforming items are to be identified and documented on the Final Inspection Checklist (Form 10-5). As each item is resolved, it is to be noted on the checklist.

10.4 Inspection/Audit Procedures

The UXOQCS is responsible for verifying compliance with this QCP through audits and surveillance. The UXOQCS or a designee is to inspect/audit the quality of work being performed for the DFW. The UXOQCS or a designee is to verify that procedures used conform to applicable specifications stated in this Work Plan or other applicable guidance. Identified deficiencies are to be communicated to the responsible individual and documented in the QC log and Weekly QC Report. Corrective actions are to be verified by the UXOQCS and recorded in the Weekly QC Report.

The specific QC audit procedures for the DFWs, including the phase during which it is performed, the frequency of performance, the pass/fail criteria and actions to take if failure occurs, are presented in Table 10-1.

The Inspection Schedule and Tracking Form (Form 10-6) is to be used by the UXOQCS for planning, scheduling and tracking the progress of audits for this project. The information on the form is to be kept up to date and reviewed by the UXOQCS for planning purposes. Audit records are to be maintained as part of the project QC file.

10.5 QC Testing

QC testing will be performed to ensure that MEC removal is being performed according to the project Definable Quality Objective and prior to submitting to the Navy Technical Representative and Title II Services Contractor for QA testing.

10.5.1 Testing Procedures

The UXOQCS will inspect each grid to determine whether or not the grid has been cleared IAW performance requirements presented in the QC Section of the Removal Action Contractor's Work Plan. The UXOQCS will re-sweep this portion of the grid using the same geophysical instrument. The results of the QC inspections, both passing and failing, will be recorded in the QC log. For any grid that fails a QC inspection, the grid will be completely reworked and re-QC'd before submitting the grid for QA inspection.

TABLE 10-1
Definable Features of Work Auditing Procedures

Activity	DFOW with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Planning	GIS Setup (<i>Pre-Mobilization Activities</i>)	Verify GIS system has been set up and is ready for site data	PP	Once	GIS system has been set up and is ready for site data	Do not proceed with field activities until criterion is passed
Planning	Document management and control (<i>Pre-Mobilization Activities</i>)	Verify appropriate measures are in place to manage and control project documents	PP	Once	Appropriate measures are in place to manage and control project documents	Do not proceed with field activities until criterion is passed
Planning	Data Management (<i>Pre-Mobilization Activities</i>)	Verify appropriate measures are in place to manage and control project data	PP	Once	Appropriate measures are in place to manage and control project data	Do not proceed with field activities until criterion is passed
Planning	Subcontracting (<i>Pre-Mobilization Activities</i>)	Verify Subcontractor qualifications, training, licenses	PP/IP	Once	Subcontractors' qualifications, training, and licenses are up to date and acceptable	Ensure subcontractor provides the qualifications, training, and licenses or change subcontractor
Planning	Technical approach (<i>Technical Project Planning</i>)	Verify that technical approach has been agreed on by project team	PP/IP	Once	Technical approach has been agreed on by project team	Do not proceed with field activities until criterion is passed
Planning	Operational approach (<i>Technical Project Planning</i>)	Verify that operational approach has been agreed on by project team	PP/IP	Once	Operational approach has been agreed on by project team	Do not proceed with field activities until criterion is passed
Planning	Work Plan preparation and approval (<i>Technical Project Planning</i>)	Verify that Work Plan has been prepared and approved	PP/IP	Once	Work Plan has been prepared and approved	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify all project plans are approved	PP/IP	Once	All project plans are approved	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify local agencies are coordinated	PP/IP	Once	Local agencies are coordinated	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify equipment and services are procured	PP/IP	Once	Equipment and services are procured	Proceed only with activities for which equipment has been procured Procure remaining equipment
Field Operations	Site preparation (including mobilization)	Verify communications and other logistical support are coordinated	PP/IP	Once	Communications and other logistical support are coordinated	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify Emergency Services are coordinated	PP/IP	Once	Emergency Services are coordinated	Do not proceed with field activities until criterion is passed

TABLE 10-1
Definable Features of Work Auditing Procedures

Activity	DFOW with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Field Operations	Site preparation (including mobilization)	Verify operating schedules are finalized	PP/IP	Once	Operating schedules are finalized	Proceed only with those operations with finalized operating schedules
Field Operations	Site preparation (including mobilization)	Verify explosive storage and MEC debris/scrap storage areas are established	PP/IP	Once	Explosive storage and MEC debris/scrap storage areas are established	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify site-specific training is performed and acknowledged	PP/IP	Once	Site-specific training is performed and acknowledged	Do not proceed with field activities until criterion is passed
Field Operations	Site preparation (including mobilization)	Verify project plans are reviewed and acknowledged	PP/IP	Once	Project plans are reviewed and acknowledged	Do not proceed with field activities until criterion is passed
Field Operations	Site survey	Verify Surveyor Qualifications	PP/IP	Once	Surveyor's qualifications are up to date and acceptable	Ensure surveyor provides the qualifications change surveyor
Field Operations	Site survey	Verify Surveyor Licenses	PP/IP	Once	Surveyor's licenses are up to date and acceptable	Ensure surveyor provides the licenses or change surveyor
Field Operations	Site survey	Verify benchmarks for survey are established and documented	PP/IP	Once	Benchmarks for survey are established and documented	Ensure benchmarks for survey are established and documented prior to performing survey
Field Operations	Site survey	Verify site boundaries have been established	PP/IP	Once	Site boundaries have been established	Do not proceed with dependent field activities until criterion is passed
Field Operations	Site survey	Verify proper marker type, material and placement method	PP/IP	Once	Proper marker type, material and placement method were used	Replace markers as necessary to comply with requirement
Field Operations	Site survey	Verify Surveyor notes are legible, accurate and complete	IP	Once	Surveyor notes are legible, accurate and complete	Ensure surveyor replaces deficient notes with legible, accurate and complete notes
Field Operations	Site survey	Verify Stake Alignment and spacing intervals	IP	Once	Stake Alignment and spacing intervals are as specified in Work Plan	Replace stakes not aligned as specified
Field Operations	Vegetation removal	Verify personnel qualifications and training	PP/IP	Once	Personnel qualifications and training are appropriate	Ensure subcontractor provides appropriately trained and qualified personnel or replace subcontractor

TABLE 10-1
Definable Features of Work Auditing Procedures

Activity	DFOW with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Field Operations	Vegetation removal	Verify environmental controls are correct and functional	IP/FP	Once	Environmental controls are correct and functional	Ensure that appropriate environmental controls are in place prior to proceeding with vegetation removal
Field Operations	Vegetation removal	Verify vegetation removal conducted IAW WP Technical Management Plan	FP	Daily	Vegetation removal conducted IAW WP Technical Management Plan	Stop vegetation removal activities until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Surface Clearance	Verify equipment testing	IP/FP	Once/Daily	Equipment passes daily function test in equipment check area	Repair or replace instrument
Field Operations	Surface Clearance	Verify area/boundary	PP/IP	Once	Area/boundary is correct	Stop activities until area/boundary can be verified
Field Operations	Surface Clearance	Verify work methods	IP/FP	Daily	Work methods are being performed IAW the WP and SOPs	Stop activities until WP and SOPs are being followed and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Surface Clearance	Verify Team separation distance	IP/FP	Daily	Team separation distance is appropriate for work being performed	Stop activities until appropriate separation distance is being followed
Field Operations	Surface Clearance	Verify clearance conducted IAW WP Technical Management Plan	IP/FP	Daily	Clearance conducted IAW WP Technical Management Plan	Stop activities until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Surface Clearance	Check a portion of each grid/lot to insure Acceptance Criteria are met as defined in the RAC Work Plan.	FP	Each Occurrence	See Section 10.8	See Section 10.8
Field Operations	Inspection (MPPEH Management)	Verify personnel qualifications	IP/FP	Once	Personnel are qualified	Replace unqualified personnel with qualified personnel

TABLE 10-1
Definable Features of Work Auditing Procedures

Activity	DFOW with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Field Operations	Certification (MPPEH Management)	Verify Inspection conducted IAW MPPEH Management Plan	IP/FP	Daily/Each Occurrence	Inspection being conducted IAW WP MPPEH Management Plan	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Certification (MPPEH Management)	Verify personnel qualifications	IP/FP	Once	Personnel are qualified	Replace unqualified personnel with qualified personnel
Field Operations	Certification (MPPEH Management)	Verify Certification is conducted IAW WP MPPEH Management Plan	IP/FP	Daily/Each Occurrence	Certification is conducted IAW WP MPPEH Management Plan	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Disposal (MPPEH Management)	Verify Disposal is conducted IAW WP MPPEH Management Plan	IP/FP	Daily/Each Occurrence	Disposal is conducted IAW WP MPPEH Management Plan	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Demilitarization of UXO	Verify personnel qualifications	IP/FP	Once	Personnel are qualified	Replace unqualified personnel with qualified personnel
Field Operations	Demilitarization of UXO	Verify operations conducted IAW contractor SOP	IP/FP	Each Occurrence	Operations conducted IAW Subcontractor SOP	Stop activity until full compliance can be assured and any activities not performed within compliance are re-evaluated and re-performed if necessary
Field Operations	Demobilization	Verify that all equipment is inspected, packaged, and shipped to appropriate location.	FP	Once	All equipment is inspected, packaged, and shipped to appropriate location.	Ensure equipment is inspected, packaged, and shipped to appropriate location
Field Operations	Demobilization	Verify facilities-support infrastructures are dismantled and shipped to appropriate location.	FP	Once	Facilities-support infrastructures are dismantled and shipped to appropriate location.	Ensure facilities-support infrastructures are dismantled and shipped to appropriate location

TABLE 10-1
Definable Features of Work Auditing Procedures

Activity	DFOW with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Final Project Reports and Close-out	Site Specific Final Report preparation and approval	Verify field site is returned to original condition	FP	Once	Field site is returned to original condition	Ensure field site is returned to original condition
Final Project Reports and Close-out	Site Specific Final Report preparation and approval	Verify tabulation of all MEC, MD, and other material recovered during the removal actions are accurate and complete	IP	Once	Tabulation of all MEC, MD, and other material recovered during the removal actions are accurate and complete	Ensure tabulation of all MEC, MD, and other material recovered during the removal actions are accurate and complete
Final Project Reports and Close-out	Decision Document preparation and approval	Verify reviews performed by project, senior technical and program teams	FP	Once	Reviews performed by project, senior technical and program teams	Ensure reviews performed by project, senior technical and program teams
Final Project Reports and Close-out	MEC Response Completion Acceptance	Verify Final Report, Proposed Plan and Decision Document has been approved	IP	Once	Final Report, Proposed Plan and Decision Document has been approved	Take appropriate actions to ensure document get approved
Final Project Reports and Close-out	Archiving	Verify data back-up systems are in place	IP	Once	Data back-up systems are in place	Ensure data back-up systems are in place
Final Project Reports and Close-out	Project Closeout	Verify purchase orders have been closed out	IP	Once	Purchase orders have been closed out	Ensure purchase orders are closed out
Final Project Reports and Close-out	Project Closeout	Verify invoices completed and approved	IP	Once	Invoices completed and approved	Ensure invoices are completed and approved

Pass/Fail Criteria

Grid failure will result if:

- More than two munitions items which have a shape, size, or mass greater than or equal to a 20mm and less than a 30mm projectile is not removed from a grid
- More than one munitions item which has a shape, size, or mass greater than or equal to a 30mm and less than a 40mm projectile is not removed from the grid
- Any munitions items, which have a shape, size, or mass equal to or greater than a 40mm projectile is not removed from the grid

If grid failure occurs the entire grid will be reworked.

Level of QC Inspection

The Mil-Std-1916 (DoD, 1996) (and accompanying Mil-Hdbk-1916 (DoD, 1999)) will be implemented for performing QC as part of this TCRA for inspection of cleared grids. The Mil-Std-1916 will be used to determine the level of QC using the following:

- Initial Verification Level (VL) will be IV (100 percent) for attributes sampling plan
- The switching method will be used as given in the Mil-Hdbk-1916 to determine decreases or increases in QC level
- A lot will be comprised of 80 lanes, which are defined as 1.5m wide by 30m long. This is the equivalent number of lanes for 4-30m × 30m grids and approximates 0.9 acre in area

10.5.2 Documentation of Testing

Test results are to be documented by the individual performing the test. Calibration and maintenance records associated with the measuring and testing equipment (M&TE) are to be generated by the individual performing the activity. Documentation for calibration and maintenance of M&TE is to be made available to the COR upon request.

The UXOQCS is responsible for ensuring that the tests are performed and that the results are summarized in and provided with the Weekly QC Report. Any failing test will be noted on the deficiency log so it can be tracked until such time as rework and re-testing can be performed and corrective action is verified.

10.6 Calibration and Maintenance

Calibration and maintenance of geophysical instruments, radios, cell phones, vehicles, machinery, air monitoring equipment (if present), etc., will be performed per manufacturer's specifications. Geophysical detection equipment will be tested daily. Records of these activities are to be generated by the individual performing the activity with copies provided to the UXOQCS for retention in the project QC file.

10.7 Government QA Activities

Although the government QA procedures will be subject to change depending on revisions to Navy procedures, the following QA procedures can be expected as a minimum.

10.7.1 MEC Surface Removal or Investigations

Utilizing the same geophysical detection equipment as the Removal Contractor, The Navy Technical Representative and/or the Title II Services Contractor will perform a QA inspection on a portion, as determined by the Navy's QA Plan, of a grid that has passed the Removal Contractor's QC process. If a grid fails as defined by the Navy's QA Plan, then the Navy Technical Representative and/or the Title II Services Contractor will implement corrective actions, which may include more stringent QA standards.

10.8 QA Pass/Fail Criteria

A grid will be considered a QA failure if:

- More than two munitions items which have a shape, size, or mass greater than or equal to a 20mm and less than a 30mm projectile is not removed from a grid
- More than one munitions item which has a shape, size, or mass greater than or equal to a 30mm and less than a 40mm projectile is not removed from the grid
- Any munitions items, which have a shape, size, or mass equal to or greater than a 40mm projectile is not removed from the grid

10.9 Deficiency Management

This section includes provisions for preventing quality problems and facilitating process improvements as well as for identifying, documenting, and tracking deficiencies until corrective action has been verified. Deficiency notices and corrective action requests will be provided to USEPA, PREQB, NOSSA, and USFWS during project status meetings or in project status documentation.

10.9.1 Continual Improvement

Project staff at all levels are to be encouraged to provide recommendations for improvements in established work processes and techniques. The intent is to identify activities that are compliant but can be performed in a more efficient or cost-effective manner. Typical quality improvement recommendations include identifying an existing practice that should be improved (e.g., a bottleneck in production) and/or recommending an alternative practice that provides a benefit without compromising prescribed standards of quality. Project staff are to bring their recommendations to the attention of project management or the QC staff through verbal or written means. However, deviations from established protocols are not to be implemented without prior written approval by the PM and concurrence of the UXOQCS. Where a staff-initiated recommendation results in a tangible benefit to the project, public acknowledgment is to be given by the PM.

10.9.2 Deficiency Identification and Resolution

While deficiency identification and resolution occurs primarily at the operational level, QC inspections provide a backup mechanism to address problems that either are not identified or cannot be resolved at the operational level. Through implementation of the inspection program, the QC staff is responsible for verifying that deficiencies are identified,

documented, and corrected in a timely manner. If the UXOQCS determines that a specific action can be taken to prevent the cause or similar cause for failure, the action will be implemented. An attempt to identify additional potential causes of failure will also be made (e.g., weather event, site condition change, other activities that would result in items being introduced to a worked grid).

10.9.3 Corrective Action Request

A Corrective Action Request (CAR) (Form 10-8) can be issued by any member of the project staff, including the Contractor and subcontractor employees. If the individual issuing the CAR is also responsible for correcting the problem, then he or she should do so and document the results on Part B of the CAR. Otherwise, the CAR should be forwarded to the PM, who is then responsible for evaluating the validity of the request, formulating a resolution and prevention strategy, assigning personnel and resources, and specifying and enforcing a schedule for corrective actions. Once a corrective action has been completed, the CAR and supporting information are to be forwarded to the UXOQCS for closure.

In addition to observing actual work operations, CARs are to be reviewed during follow-up QC inspections. The purposes of this review are: to ensure that established protocols are implemented properly; to verify that corrective action commitments are met; to ensure that corrective actions are effective in resolving problems; to identify trends within and among similar work units; and to facilitate system root cause analysis of larger problems. Particular attention is to be given by the QC staff to work units that generate either an unusually large or unusually small number of CARs.

The UXOQCS will determine whether a written Corrective Action Plan (CAP) (Form 10-9) is necessary, based on whether or not any of the following are met: the CAR priority is high; deficiency requires a rigorous corrective action planning process to identify similar work product or activities affected by the deficiency; or deficiency requires extensive resources and planning to correct the deficiency and to prevent recurrence. The CAP is developed by a PM designee and approved and signed by the PM. The CAP is to indicate whether it is submitted for informational purposes or for review and approval. In either event, operational staff are to be encouraged to discuss the corrective action strategy with the QC staff throughout the process.

10.9.4 Deficiency and Corrective Action Tracking

Each CAR is to be given a unique identification number and tracked by the appropriate line manager until corrective actions have been taken and documented in Part B of the form, and the CAR is submitted to the UXOQCS or a designee for verification and closure.

10.9.5 Documentation

The lessons learned through the deficiency management process are documented on CARs and CAPs. To share the lessons learned with the Title II Services Contractor and the Government, these documents are submitted to the Title II Services Contractor through the Weekly QC Report.

CARs should be cited in the Weekly QC Report. Minor deficiencies that are identified during a QC inspection but can be readily corrected and verified in the field are to be

documented in the QC log and Weekly QC Report without initiating a CAR. Deficiencies identified in a QC inspection but that cannot be readily corrected are to be documented by the QC staff on a CAR and in the Weekly QC Report. Copies of CARs are to be referenced in and attached to the Weekly QC Report. CAPs will also be attached to Weekly QC Reports to document the final outcome of the deficiency. Similar or related deficiencies may be addressed on a single CAP. All CARs and CAPs will be maintained onsite with the project files and will be subject to audit.

10.10 Reports

The UXOQCS is responsible for the preparation and submittal of the Weekly QC Report to the NTR, the Project Superintendent for the project file, and providing concurrent courtesy copies to the PM. The original and one copy of the Weekly QC Report with attachments are to be submitted to the Title II Services Contractor on the first work day following the date covered by the report. All calendar days, including weekends and holidays, are to be accounted for throughout this project. As a minimum, one report is to be prepared and submitted for every continuous 7 days of no work.

The Weekly QC Report is to provide an overview of QC activities performed each day, including those performed for subcontractor and supplier activities. The QC reports are to present an accurate and complete picture of QC activities. They are to report both conforming and deficient conditions, and should be precise, factual, legible, and objective. Copies of supporting documentation, such as checklists and surveillance reports, are to be attached.

A field QC log is to be maintained by the UXOQCS and assigned to each member of the QC staff for use in documenting details of field activities during QC monitoring activities. At the end of each day, copies of the log entries are to be attached to the Weekly QC Report. The information in the QC log provides backup information and is intended to serve as a phone log and memory aid in the preparation of the Weekly QC Report and in addressing follow-up questions that may arise.

QC and Health and Safety staff input for the Weekly QC Report is to be provided in writing to the UXOQCS at a previously agreed upon time and place, generally no later than about 1 hour before normal close of business. For the sake of simplicity and completeness, the format for QC staff input should follow the same as for the Weekly QC Report with only the relevant sections completed.

Each Weekly QC Report is to be assigned and tracked by a unique number comprised of the Delivery Order number followed by the date expressed as "DDMMYY". In the case of "no work day" reports, the report number is to comprise the Delivery Order, the last date covered, the number of days covered, and the initials "NW." For example, DO #XXXX-041104 is the report for site work performed on 11 April 2004, and DO #XXXX-052904-3NW is the report for the three no work days from 27 May 2004 through 29 May 2004. Copies of Weekly QC Reports with attachments and QC logs no longer in use are to be maintained in the project QC file. Upon project closeout, all QC logs are to be included in the project QC file.

10.11 Submittal Management

The UXOQCS is responsible for ensuring, through detailed review, that submittals as well as the materials and the work they represent, are in full compliance with applicable contract specifications. The UXOQCS is also responsible for ensuring that a project file is established and maintained, and that accountable project documents are retained and controlled appropriately.

10.11.1 Project Records

The Removal Action Contractor PM is to establish and maintain an onsite project file in accordance with contract requirements and NAVFAC Atlantic policies for document control. The PM is responsible for controlling access to the project file to ensure that records are not lost or misplaced. The purpose of this file is to maintain a complete set of all documents, reports, certifications, and other records that provide information on project plans, contract agreements, and project activities. The initial file will be structured to include a record copy of the following documents:

- Schedule and progress reports
- Technical specifications, including addenda and modifications thereof
- Change orders and other contract modifications
- Engineer Field Orders
- Manufacturer's certificates
- Survey Records
- Daily work activity summary reports, which may include:
 - Weekly QC Report
 - Daily Health and Safety Report
 - Reports on any emergency response actions
 - Test records
 - Records of site work
 - Chain-of-custody records
 - Reports on any spill incidents
 - Truck load tickets and shipping papers
- Other items as required by the Contracting Officer Representative:
 - Conversation logs
 - Meeting minutes and agenda
 - Inspection logs and schedules
 - Photo documentation
 - Site maps
 - As built drawings

As the project activities progress, the Removal Action Contractor PM will monitor usefulness of the project filing system for information retrieval. If he or she finds that additional file sections are needed, he or she will expand this initial filing structure to include additional sections.

10.11.2 Transmittal to the Title II Services Contractor

Submittals to the Title II Services Contractor are to be accompanied by a completed submittal form. This form is to be used for submittals requiring the Title II Services Contractor response and for information-only submittals in accordance with the instructions on the reverse side of the form. This form is to be properly completed by filling out the heading blank spaces and identifying each item submitted. Care is to be exercised to ensure proper listing of the Task Order, specification paragraph, and/or sheet number of the plans pertinent to the data submitted for each item.

10.11.3 Documentation

In addition to the documentation requirements specified above, the following requirements apply to this project. The QC file is to be maintained by the UXOQCS and is to be controlled as an integral component of the project files. Shop drawings, work orders, and change orders issued are to be provided to the UXOQCS. It is the responsibility of the UXOQCS to maintain this technical information and keep it current and recorded as it is revised. Technical information is not to be replaced or revised without receipt of a properly authorized change order or revision. Copies of purchase orders or subcontracts requiring inspection are to be provided to the UXOQCS for receiving and recording purposes. Copies of required certifications received are to be maintained in the QC file and are to be submitted to the Title II Services Contractor in accordance with agreements made at the coordination meeting. Changes in submittal progress and QC activities related to submittals are to be summarized in the Weekly QC Report.

SECTION 11

Environmental Protection Plan

Section 10 of the MEC Master Work Plan (CH2M HILL, 2006b) presents the Environmental Protection Plan. Additionally, the recommendations presented in the Biological Assessment for the LIA (GMI, 2006a), Amendment 1 to the Biological Assessment for the LIA (GMI, 2007), and the *Final Methods and Approach for Threatened and Endangered Species and Habitat Surveys within the ECA, SIA, and EMA on Vieques, Puerto Rico* (GMI, 2006b) will be implemented for all areas to avoid impacts to threatened/ endangered species. Concurrence from the USFWS will be obtained prior to finalizing any amendments or other documents of findings and mitigation measures.

Investigation-derived Waste Plan

This Investigation-derived Waste (IDW) Management Plan (IDWMP) describes the handling of materials during MEC removal and hazardous, toxic, and radioactive waste (HTRW) activities, and was developed in accordance with NAVSEA OP5, Ammunition and Explosives Ashore: Safety Regulations for Handling, Storing, Production, Renovation, and Shipping and DoD 4160.21-M, Defense Reutilization and Marketing Manual. General IDW procedures for environmental investigations at Former VNTR were addressed in the *Final Master Work Plan Atlantic Fleet Weapons Training Facility, Vieques Island, Puerto Rico* (CH2M HILL, 2003).

12.1 Objective

The primary objective of this plan is to identify when material removed requires special management as IDW.

12.2 Types of Potential IDW and Planned Disposition

During this removal action, media most likely encountered will be soil removed while excavating MEC MPPEH, and non-hazardous scrap. No hazardous waste, liquid waste, or chemical warfare material (CWM) is expected to be encountered.

IDW will be segregated, inventoried, demilitarized (if required) and disposed of. The following paragraphs outline the planned procedures for dealing with materials excavated or uncovered.

12.3 Non-Hazardous Debris Disposal

The following procedures apply to non-hazardous scrap or debris removed from the sites:

- Economically recyclable debris (such as scrap metal) will be collected and delivered to an appropriate local recycling facility. Recycling will be coordinated with the Navy
- Non-MEC debris will be accounted for in estimated pounds recovered and type of material, and then shipped offsite
- Vegetative debris will be mulched and left onsite as ground cover. This will reduce soil erosion from the brush clearing activities
- Non-recyclable and other debris, such as concrete and asphalt rubble, tires, plastic, wood, personal protective equipment (PPE), and metal that is not considered recyclable will be placed at the Vieques Landfill as part of the general fill as required

12.4 Disposition of MPPEH/MD

Procedures for disposal of MPPEH/MD are addressed in Section 2 and Appendix A, *Technical Management Plan*. MPPEH/MD materials will be evaluated as indicated below.

- MPPEH will be inspected by a minimum of two UXO Technicians and verified that it is free from explosives prior to it being removed from the temporary staging locations in the work area
- Material documented as safe (MDAS) will be containerized onsite and sent to a recycling facility
- Materials that cannot be certified as free from explosive hazards will be disposed of in the operating grids by the MRP Contractor
- MPPEH/MD must be demilitarized to a point that they are not recognizable as hazardous ordnance

12.5 Clearing and Grubbing

Vegetation that may interfere with the MEC or HTRW activity will be removed, as required, according to Section 2. Brush, grass, roots, and stumps, along with other debris that may be grubbed before implementing the activity, will be left onsite as mulched material.

12.6 Contaminated Soil and Hazardous Waste

If unexpected contaminated soil or hazardous waste is encountered during MEC activities, the SUXOS, UXO Safety Specialist, and UXOSO will be notified immediately and all site activities will stop if necessary. The PM, in coordination with the Navy and appropriate regulatory agencies, will develop appropriate removal and disposal procedures.

12.7 Transportation

Non-MEC related debris, vegetation, and contaminated soil will be transported to the Vieques Landfill or to the appropriate recycling facility for final disposition. A spill patrol will be implemented to monitor the transport route and pick up spills that may occur from the haul trucks.

The vegetation, soil, and other non-recyclable debris will be placed in the general fill by spreading with a bulldozer in thin lifts. The soil may also be used as foundation for the landfill cover provided that it meets the following specifications:

- Soil used in the upper 6-inch zone of the foundation layer will be, to the extent practicable, free of rocks greater than 0.5 inch
- The soil will not contain materials that could be deleterious to the geomembrane

A UXO technician will observe the soil as it is being spread out. The location of the soil in the landfill will be surveyed.

Transport of encountered MEC-related material, including UXO, will be in accordance with Section 2.

Geographical Information System Plan

This GIS Plan describes the integration of the webGIS with the data collection and management system in place at the Former VNTR. This plan was developed in accordance with MMRP MCX data item description (DID) OE-005-14.01.

The webGIS and associated database track and manage the data generated during the course of MEC investigations and the disposition of MPPEH/MD and detonated MEC. The hardware and software tools to be used have been specifically chosen to provide a flexible system that allows effective and timely data management, long-term storage and archival of data, and expansion of the database to include new information that can readily be integrated into the existing database as appropriate. The database and webGIS are also designed to be transportable to existing project applications developed and maintained by other members of the Vieques project team. This will provide an efficient mechanism for retrieving MEC -related information for technical evaluation, removal efforts, reporting, and ultimately to assist in the efficient transfer and reuse of parcels at the Former VNTR.

The data will be managed using the CAD/GIS Technology Center SDS as outlined in SDS/Facility Management Standards (FMS) release 1.95 where applicable. The intent of SDS is to provide data in an accessible and predictable format that can be used by standard, readily available GIS software applications.

13.1 Geographical Information System Incorporation

The purpose of this task is to leverage GIS technology to effectively manage and integrate MEC-related data collected as part of the ongoing investigations being conducted in Vieques. When properly set up, GIS applications can integrate spatial data (maps) with tabular data (such as MEC type, location, and status).

Significant amounts of background and location data collected during the various investigations that have been conducted or are currently being conducted are already integrated into a webGIS for the site. The intent of this webGIS is to allow immediate visual analysis of the data collected to assist ultimately assist with making decisions regarding future reuse of parcels.

The central database and webGIS were developed to manage, evaluate, and report site information, including MEC encountered and disposed of. The webGIS system includes geographic data for the former VNTR as well as field data collected using the handheld GPS devices. Attribute data are to be stored in a geodatabase that provides data to an ArcIMS website, which allows users to perform custom queries and spatial analysis of the data collected. All existing data is currently referenced to the 1983 North American Datum 83, UTM coordinate system.

Widely used, commercially available hardware and software were utilized in the development and maintenance of the MEC database and GIS. No proprietary software will

be used to prepare these applications. Tools developed for interim analysis will be documented and may be evaluated by the Navy. This ensures that data will be readily accessible by all members of the project team authorized to use these data. This also ensures that the data is portable should it be necessary to transfer the GIS and associated database to other servers and workstations.

The existing Vieques webGIS has been developed using ArcIMS, and in the ArcView GIS environment. ESRI ArcMap will be the primary GIS software for all GIS data management and mapping. The Microsoft Office 2000 suite of programs (including Microsoft Access, Microsoft Word, Microsoft Project, and Microsoft Excel) will also be used on this project, where applicable.

The Title II Services Contractor will maintain all data collected in a central Microsoft Access 2000 database file. The database will include functionality to import electronic field data, QC the field data, and print reports for contractor and Navy review. The file will be backed up on a daily basis. Data will be provided to the Navy and removal contractors on a weekly or as-needed basis by exporting the database to Microsoft Excel format.

A computer system with the central database is available onsite at Camp Garica for upload of field data, data management, and reporting. The Contractor will provide GIS and database support on an as-needed basis to assist with GIS system functionality and use.

All field data will be collected using ruggedized handhelds with integrated GPS receivers, and uploaded to the Access database on a daily basis. The pre-determined nomenclature for MEC Items is loaded into the handhelds to ensure consistency and database integrity. MEC Items found are stored and managed in table separate from other database tables (such as safety meetings, QC/QA operations, Team Leader Dailies, etc).

Data that are used to join tables include:

- MRS number assigned to each study area
- Grid ID-Unique ID of sampling grid investigated for MEC
- Identification number-Unique identification number assigned by the database to each item encountered in the field and imported into the Access database

MEC spatial data will be imported into the database as point data identified by a unique northing and easting coordinate pair (a unique point designator will also be assigned) collected by the handheld GPS unit. In the event that multiple MEC items encountered in the field are grouped and classified together, the cluster location will be entered into the database and webGIS as a single point.

MEC item attribute data includes both qualitative and quantitative information such as ordnance type, quantity, and status. In addition, a munitions database can be linked to the MEC item table to provide physical, chemical, and explosive data regarding each MEC or MEC item found in the field. This anomaly validation study will not require the use of various models for evaluation of buried explosives, trajectory, and other assessments related to the unintentional detonation of munitions. If required (as a result of field conditions), this analysis will be scoped in a separate task.

The workflow for transferring the field data to the database is summarized below:

1. Field observations are recorded on pre-defined field forms and using handheld Trimble GeoXT GPS units.
2. Data from the geophysical survey will be processed by the field team leader daily, and the processed files will be submitted to the project data manager for QA and incorporation into the standard data management structure. Each file will be stored in original format and converted to the standard GIS or database format to be included in the system.
3. At the end of the field day, data on field forms and in handheld GPS units are verified for completeness and accuracy (i.e., number of observations made match the number of observations recorded). Copies of the field forms are made and hard copies of the electronic forms are printed for the field office. The data from the handheld units is uploaded to the database on the field computer.
4. The onsite database is sent to the Data Manager and loaded to an FTP site, where it is used as a geodatabase to provide data to the webGIS.
5. QC checks of the data are based on a set of reports generated from the database and provided to the PM and field team leader for review.
6. Once daily data is uploaded, the database can be used for data analysis and reporting and map generation.

The MEC database is also be used to track demolition events, consolidation points, and treatment of MEC Items. If MEC is moved and detonated onsite, this information will also be included in the webGIS/database system.

Additional data will be incorporated as necessary into the onsite GIS as layers. These layers consist of pre-existing data, or other non-MEC data collected during the MEC investigation. Sources for such data include existing CAD files, published data, and output from other software applications. Examples of these layers include existing anomaly data, and spatial and attribute data collected and mapped by previous investigators, if available.

The GIS will not be used to store all raw data generated during the MEC investigations. For example, data points collected by geophysical instruments, gridded data used by modeling programs to generate contour maps, and similar types of backup data will likely be archived as separate tables in the database or as independent databases. An attribute field will be added to the GIS coverage that identifies a file location or similar reference to document these data. The interpreted results of analysis (such as interpreted geophysical results), however, will be included in the GIS.

13.2 Computer Files

All data, text, and digital maps will be available in standard file formats. Text will be delivered in either Microsoft Word 2000 or Adobe Acrobat Portable Document Format (PDF), as requested in the specific project task order. The shareware PDF viewer will be provided along with the PDF documents.

All GIS and associated database and digitized aerial photographs are transportable and can be copied to CD-ROM or DVD for archiving or transfer to other team members.

References

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Appendix A
MPPEH/MD Collection and Inspection
Procedures

APPENDIX A

Material Potentially Presenting an Explosive Hazard (MPPEH)/Munitions Debris (MD) Collection and Inspection Procedures

During removal operations, UXO Technicians will encounter many different types of material. It must be initially assumed that all of this material contains some amount of explosives until further inspection proves differently. Because the material recovered will ultimately be disposed of off-site, it is imperative that procedures be established to provide a system for the recovery, inspection and documentation of all material that will leave the site. Appendix A gives the procedures for addressing MPPEH.

Current and past practices have only required the inspection of MPPEH/MD and a certification by a qualified EOD/UXO technician that it is safe to the best of their knowledge. There are several pitfalls with this approach, depending on the type of ordnance being inspected. The following paragraphs provide guidance for avoiding these pitfalls. Specific procedures regarding the collection, certification as no longer presenting an explosive hazard, processing and the demilitarization of MPPEH will be addressed in contractor site specific work plans, however they must follow the guidance contained in this attachment.

References:

DoD 4160.21-M	<i>Department of Defense Reutilization and Marketing Manual</i>
DoD 4160.21-M-1	<i>Department of Defense Demilitarization Manual</i>
DoD 6055.09-STD	<i>DOD AMMUNITION AND EXPLOSIVE SAFETY STANDARDS</i>
TB 700-4	<i>Department of the Army Technical Bulletin - Decontamination of Facilities and Equipment</i>
NAVSEA OP 5	<i>Ammunition and Explosives Safety Ashore</i>

Collection Procedures

A systematic approach for collecting and inspecting material recovered during munitions removal activities will be used. The approach is designed to ensure that the materials undergo a continual evaluation and inspection process from the time acquired until finally removed from the site.

At the operating site, the UXO Team Leader will designate separate staging areas for recovered material to be placed. These areas should be adjacent to the grid they are working in. At a minimum, an area for explosive free material that does not retain an ordnance appearance such as fragments and another area for items that are free from explosives but still retain an ordnance appearance such as expended ejection projectiles will be established.

An area for MEC that is safe to move and will eventually be consolidated for disposal may also be designated at the contractors preference. These items however may be left in the location found prior to consolidation if desired. For the purpose of this work plan these areas are designated as temporary staging areas for MD Scrap , MD Demil and MEC Holding area ,if used.

Inspection procedures begin at the time the material is discovered by the UXO Technician. Contractors will develop procedures to ensure that a minimum of two UXO Technicians inspect all material prior to it being removed from the temporary staging areas. The first inspection is by the UXO technician discovering the material. The second inspection is performed by the UXO Team leader. The UXO Team leader may perform this second inspection at any time prior to the material being moved from the temporary staging areas. Upon completion of operations within a grid, the UXO Team leader for the team that cleared the grid will direct movement of the inspected material from the temporary staging areas to the consolidation point. The material may be moved by the UXO Team that cleared the grid or by a Final Clearance team at a later date. When Material is placed in the consolidation point the, MD demil will be not be located in the same pile as the MD Scrap.

Removal of Material from Consolidation Points

Material from the consolidation points will be removed by a separate scrap management contractor. Out of an abundance of caution, the scrap management contractors UXO Technician will perform a third inspection of all material prior to it being transported to the Central Processing Center (CPC) If any suspect items are discovered, the removal contractors UXO Quality Control Specialist (UXOQCS) will be notified to rectify the situation. At the CPC, the material recovered from each consolidation point will be weighed separately and that weight will be entered in to the appropriate form on the PDA. The material will then be sorted and staged in the appropriate location within the CPC. At a minimum, areas within the CPC will be established for Range Related debris (RRD), material requiring further demilitarization and material requiring thermal treatment. The scrap management contractor may and will likely establish additional staging areas to enhance efficiency.

Demilitarization Requirements

Many items entering the CPC, will still retain the appearance of being an ordnance item, although they have been inspected and are free of explosives. When scrap metal is released to the recycling market it is often stored for a period of time and even sold and resold before being smelted. The mere appearance of an item being a live ordnance item can cause undo alarm and may require the services of military explosive ordnance disposal. Therefore, demilitarization should to the greatest extent possible, process certified MPPEH until it no longer looks like ordnance. This means process it until a reasonable person will not mistake it for a hazardous item Strive to remove the "military look- alike. This is the guidance provided in OP5 regarding demilitarization requirements and will be followed for all material leaving the site.

Certification as material documented as safe (MDAS)

Material that is taken to the CPC will have met the substantive requirements of DoD 6055.9-STD and NAVSEA OP 5 regarding the dual inspection of MPPEH. However, since this

material will remain at the CPC for some time, further inspection and documentation is required before any material enters the recycling stream. The scrap management contractor will develop procedures for the treatment, inspection and documentation of MPPEH based on the following guidance.

Munitions Debris

All MD with the exception of MD items constructed from aluminum will be treated in a furnace to a temperature of 650 degrees F for a period of 10 minutes. Aluminum MD items are except from thermal treatment because of their low melting point but all surfaces of the item must be visible for inspection in order for it to be exempt from thermal treatment. When these items are not thermally treated, they be inspected following the procedures for range related debris (RRD).

Thermocouples will be used in each batch being thermally treated to monitor the temperature of the feedstock. These temperature readings are recorded at 30 second intervals and a printout is produced for verification. The scrap management company UXO Quality Control Specialist (UXOQCS) and the government QA manager or title II services QA assessor verify that the required time and temperature criteria have been met for each batch.

Range Related Debris

RRD and any other material not subjected to thermal treatment must receive a 100% inspection by one individual followed by another 100% inspection by another individual. The first individual will be the scrap management company UXOQCS and the second individual will be the SUXOS qualified government QA manager or a SUXOS qualified title II QA assessor.

The scrap management contractor will provide documents to verify that each lot has received a 100% inspection by two individuals. Both individuals conducting the inspection must sign these documents.