Atlantic
Norfolk, Virginia

Draft Final

UXO 16.3 Site Screening Process at Mosquito Pier and Mosquito Pier Causeway
Quality Assurance Project Plan

Atlantic Fleet Weapons Training Area – Vieques
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

July 2024

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Vieques, Puerto Rico

Juy 2024

Prepared for NAVFAC Atlantic
by CH2M HILL, Inc.
Virginia Beach, Virginia
Contract N62470-21-D-0007
CTO N6247021F4140

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Executive Summary

This Quality Assurance Project Plan (QAPP) presents the rationale and technical approach for a munitions and explosives of concern (MEC) Site Screening Process (SSP) at UXO 16.3, the portion (or focus area) of the underwater site (UXO 16) associated with Mosquito Pier and Mosquito Pier causeway, located within the former Naval Ammunition Support Detachment (NASD). An SSP is being performed because munitions offloading and transport took place at Mosquito Pier and the associated causeway and it is unknown whether there was a release(s) of munitions into the surrounding waters during these activities that have resulted in the potential presence of an explosive hazard. There are no known historical records or knowledge of munitions having been released during munitions transfer at Mosquito Pier or munitions transport along the causeway. Further, if munitions were inadvertently dropped into the water during offloading, it is likely they would have been recovered at that time, and there have been no reports of finding munitions beneath and around the pier or along the causeway in the decades of commercial and public use there. In addition, there has been no past investigation of the UXO 16.3 area to determine whether a release occurred.

Based on the above information, UXO 16.3 possesses the characteristics suitable for an SSP. Further, performing an SSP in this area is consistent with regulatory guidance, the Navy Environmental Restoration Program Manual (ERPM; DON, 2018), Defense Environmental Restoration Program (DERP) Manual (DoD, 2012), and Vieques Federal Facility Investigation (FFA), all of which indicate a release assessment type of investigation is the appropriate mechanism for evaluating areas where there is the possibility of a hazardous substance/pollutant/contaminant release, but a release has not been confirmed. It is the information gathered through the SSP that will be used to confirm a release occurred (warranting a remedial investigation/feasibility study [RI/FS] for further characterization and/or removal action) or did not likely occur (warranting no further action [NFA]).

The goal of the UXO 16.3 SSP is to collect sufficient data to make determinations of: (1) whether there has been a release of MEC, specifically discarded military munitions (DMM), via falling into the water during offloading and/or transport at Mosquito Pier and associated causeway, resulting in potential explosive hazard(s) within UXO 16.3 that warrants further investigation (i.e., RI/FS) or action, and (2) whether NFA (i.e., Unlimited Use/Unrestricted Exposure [UU/UE]) is appropriate for the area if it is concluded a release did not likely occur and/or there is no explosive hazard likely present.

The planned SSP approach comprises an instrument-aided (i.e., underwater all-metals detection instrument) visual survey throughout UXO 16.3 by munitions divers to identify whether MEC is present on the seafloor surface and to identify sub-bottom metallic anomalies for intrusive investigation. The information gathered during the seafloor surface survey, coupled with the results of intrusive investigation of a subset of detected anomalies, will provide the basis for making decisions regarding the presence/absence of an explosive hazard and, therefore, the appropriate path forward for the site.

The former NASD comprises approximately 8,100 acres on the western side of Vieques, Puerto Rico (Figures ES-1 and ES-2). Military operations within the former NASD consisted mainly of ammunition loading and storage; vehicle and facility maintenance; destruction of retrograde and surplus munitions, fuels, and propellants via open burn/open detonation (OB/OD); and some training. Historical military activities at UXO 16.3 consisted of offloading of munitions from ships at Mosquito Pier and transporting the munitions via vehicles along the Mosquito Pier causeway to various locations in support of land-based training.

NOTE: THIS SUMMARY IS PRESENTED IN ENGLISH AND SPANISH FOR THE CONVENIENCE OF THE READER. EVERY EFFORT HAS BEEN MADE FOR THE TRANSLATIONS TO BE AS ACCURATE AS REASONABLY POSSIBLE. HOWEVER, READERS SHOULD BE AWARE THAT THE ENGLISH VERSION OF THE TEXT IS THE OFFICIAL VERSION.

Following cessation of military operations, the former NASD was apportioned and transferred to the Department of Interior (DOI) to be managed by the United States Fish and Wildlife Service (USFWS) as part of the Vieques National Wildlife Refuge, the Municipality of Vieques (MOV), and the Puerto Rico Conservation Trust. On February 11, 2005, the EPA placed the Atlantic Fleet Weapons Training Area (AFWTA) – Vieques on the NPL. On September 7, 2007, the Navy, DOI, EPA, and the Commonwealth of Puerto Rico finalized a Federal Facility Agreement (FFA) that established the procedural framework and schedule for implementing the CERCLA activities for AFWTA-Vieques.

Due to the large size of UXO 16 (approximately 11,500 acres, comprising offshore areas adjacent to the east and west ends of Vieques, former anchorage areas, and the area around Mosquito Pier and causeway), the site is being subdivided for prioritization, investigation, and management purposes. The UXO 16.3 focus area (approximately 37 acres) comprises the underwater area beneath Mosquito Pier and an approximate 100-foot perimeter around Mosquito Pier and associated causeway (Figure ES-3). This area is bounded by the shoreline along the causeway and a water depth along the UXO 16.3 perimeter that varies between a few feet near the southern causeway end to 30 feet near the northern causeway end and 45 feet near the northwestern end of the pier. Mosquito Pier and the causeway are owned and maintained by the MOV, while the waters surrounding Mosquito Pier and the causeway are under Puerto Rico Department of Natural and Environmental Resources (PRDNER) jurisdiction.

For decades, Mosquito Pier and the causeway have been utilized by the public for both recreational and commercial uses. Recreational activities along the causeway and beneath the pier are primarily fishing, snorkeling, and SCUBA diving, including guided snorkeling and diving excursions provided by local outfitters. Both recreational and commercial boat launching/docking along the causeway also occur, including docking of the cargo/passenger ferry boat from Ceiba at the approximate mid-point of the western side of the causeway. Additionally, the Puerto Rico government, through joint efforts by the Puerto Rico Integrated Transportation Authority and MOV, is supporting a Mosquito Pier Rehabilitation Project that will include infrastructure improvements associated with passenger and cargo ferry docking in this area.

This QAPP was prepared under the Comprehensive Long-term Environmental Action – Navy (CLEAN) Contract N62470-21-D-0007, Contract Task Order N6247021F4140 in general accordance with the Uniform Federal Policy for Quality Assurance Project Plans, Munitions Response QAPP Toolkit, Module 1: Remedial Investigation (RI)/Feasibility Study (FS), December 2018 (IDQTF, 2020), modified as warranted to be applicable to the SSP.

This QAPP is issued by the Naval Facilities Engineering Systems Command Atlantic (NAVFAC), with consensus by EPA and PRDNER. NAVFAC, EPA, PRDNER, and, for terrestrial sites, USFWS work as a team to implement the Vieques CERCLA Environmental Restoration Program (ERP). Once finalized, this QAPP will be made publicly available by inclusion in the Administrative Record file for UXO 16.

Resumen Ejecutivo

Este Plan de Garantía de Calidad del Proyecto (QAPP, por sus siglas en inglés)) presenta la justificación y el enfoque técnico para un Proceso de Detección de Sitios (SSP, por sus siglas en inglés) de Municiones y Explosivos de Preocupación (MEC, por sus siglas en inglés) en UXO 16.3, la porción (o área de enfoque) del sitio submarino (UXO 16) asociado con el muelle Mosquito y la carretera elevada del muelle Mosquito, ubicado dentro del antiguo Destacamento de Apoyo de Municiones Navales (NASD, por sus siglas en inglés). Se está realizando un SSP porque la descarga y el transporte de municiones se llevaron a cabo en el muelle Mosquito y carretera elevada asociada y se desconoce si hubo liberación de municiones en las aguas circundantes durante estas actividades que hayan resultado en la posible presencia de un peligro de explosivos. No se conocen registros históricos ni conocimiento de que se hayan liberado municiones durante la transferencia de municiones en el muelle Mosquito o el transporte de municiones a lo largo de la carretera elevada. Además, si las municiones se hubieran dejado caer inadvertidamente al agua durante la descarga, es probable que se hubieran recuperado en ese momento, y no ha habido informes de que se encontraron municiones debajo y alrededor del muelle o a lo largo de la carretera elevada en las décadas de su uso y actividad comercial y pública. Además, no ha habido ninguna investigación previa del área de UXO 16.3 para determinar si se produjo una liberación.

De acuerdo con la información anterior, UXO 16.3 posee las características adecuadas para un SSP. Además, realizar un SSP en esta área es consistente con la guía regulatoria, el Manual del Programa de Restauración Ambiental de la Marina (ERPM; DON, 2018), el Manual del Programa de Restauración Ambiental de Defensa (DERP, por sus siglas en inglés) (DoD, 2012) y la Investigación de las Instalaciones Federales de Vieques (FFA, por sus siglas en inglés) lo cual indica que un tipo de investigación de evaluación de liberación es el mecanismo apropiado para evaluar áreas donde existe la posibilidad de una liberación de sustancia/contaminante/contaminante peligroso, pero no se ha confirmado una liberación. Es la información recopilada a través del SSP la que se utilizará para confirmar que se produjo una liberación (lo que justifica una Investigación de Remediación/Estudio de Viabilidad [RI/FS, por sus siglas en inglés] para una mayor caracterización y/o acción de eliminación) o que probablemente no ocurrió (que no justifica ninguna acción adicional [NFA, por sus siglas en inglés]).

El objetivo de la SSP de UXO 16.3 es recopilar datos suficientes para determinar: (1) si ha habido una liberación de MEC, específicamente municiones militares desechadas (DMM, por sus siglas en inglés), al caer al agua durante la descarga y/o el transporte en el muelle Mosquito y carretera elevada asociada, lo que resultaría en posibles peligros de explosión dentro de UXO 16.3 que justifican una mayor investigación (es decir, una RI/FS) o acción, y (2) si NFA (es decir, uso ilimitado/exposición no restringida [UU/UE, por sus siglas en inglés]) es apropiado para el área si se concluye que no es probable que haya ocurrido una liberación y/o no existe riesgo de explosión.

El enfoque SSP planificado incluye un estudio visual asistido por instrumentos (es decir, un instrumento de detección submarina de todos los metales) a lo largo de UXO 16.3 por parte de buzos de municiones para identificar si hay MEC presente en la superficie del fondo marino e identificar anomalías metálicas en el subfondo para una investigación intrusiva. La información recopilada durante el estudio de la superficie del fondo marino, junto con los resultados de la investigación intrusiva de un subconjunto de anomalías detectadas, proporcionará la base para tomar decisiones con respecto a la presencia o ausencia de un peligro explosivo y, por lo tanto, el camino apropiado a seguir para el sitio. .

El antiguo NASD consiste en aproximadamente 8,100 acres en el lado oeste de Vieques, Puerto Rico (Figuras ES-1 y ES-2). Las operaciones militares dentro de la antigua NASD consistieron principalmente en la carga y almacenamiento de municiones; mantenimiento de vehículos e instalaciones; destrucción de municiones,

NOTA: ESTE RESUMEN SE PRESENTA EN INGLÉS Y EN ESPAÑOL PARA LA CONVENIENCIA DEL LECTOR. SE HAN HECHO TODOS LOS ESFUERZOS PARA QUE LA TRADUCCIÓN SEA PRECISA EN LO MÁS RAZONABLEMENTE POSIBLE. SIN EMBARGO, LOS LECTORES DEBEN ESTAR AL TANTO QUE EL TEXTO EN INGLÉS ES LA VERSIÓN OFICIAL.

combustibles y propulsores retrógrados y excedentes mediante la quema abierta/detonación abierta (OB/OD, por sus siglas en inglés); y algo de entrenamiento. Las actividades militares históricas en UXO 16.3 consistieron en la descarga de municiones de barcos en el muelle Mosquito y el transporte de municiones en vehículos a lo largo de la carretera elevada del muelle Mosquito a varios lugares en apoyo del entrenamiento en tierra.

Tras el cese de las operaciones militares, el antiguo NASD fue repartido y transferido al Departamento del Interior (DOI, por sus siglas en inglés) para ser administrado por el Servicio de Pesca y Vida Silvestre de los Estados Unidos (USFWS, por sus siglas en inglés) como parte del Refugio Nacional de Vida Silvestre de Vieques, el Municipio de Vieques (MOV, por sus siglas en inglés), y el Fideicomiso de Conservación de Puerto Rico. El 11 de febrero de 2005, la EPA colocó el Área de Adiestramiento de Armas de la Flota del Atlántico (AFWTA, por sus siglas en inglés) – Vieques en la NPL. El 7 de septiembre de 2007, la Marina, el DOI, la EPA y el Estado Libre Asociado de Puerto Rico finalizaron un Acuerdo de Instalación Federal (FFA, por sus siglas en inglés) que estableció el marco procesal y el cronograma para implementar las actividades CERCLA para AFWTA-Vieques.

Debido al gran tamaño de UXO 16 (aproximadamente 11,500 acres, que incluyen áreas costa afuera adyacentes a los extremos este y oeste de Vieques, antiguas áreas de anclaje y el área alrededor del muelle Mosquito y la carretera elevada), el sitio se está subdividiendo para priorización, investigación, y fines de gestión. El área de enfoque de UXO 16.3 (aproximadamente 37 acres) comprende el área submarina debajo del muelle Mosquito y un perímetro aproximado de 100 pies alrededor del muelle Mosquito y la carretera elevada asociada (Figura ES-3). Esta área está definida por la costa a lo largo de la carretera y una profundidad de agua a lo largo del perímetro de UXO 16.3 que varía entre unos pocos pies cerca del extremo sur de la carretera hasta 30 pies cerca del extremo norte de la carretera y 45 pies cerca del extremo noroeste del muelle. El muelle Mosquito y la carretera son propiedad del MOV y son mantenidos por él, mientras que las aguas que rodean el muelle Mosquito y la carretera están bajo la jurisdicción del Departamento de Recursos Naturales y Ambientales de Puerto Rico (PRDNER, por sus siglas en inglés).

Durante décadas, el público ha utilizado el muelle Mosquito y la carretera para usos recreativos y comerciales. Las actividades recreativas a lo largo de la carretera y debajo del muelle son principalmente pesca, snorkel y buceo, incluidas excursiones guiadas de snorkel y buceo proporcionadas por proveedores locales. También se producen las salidas y atraque de embarcaciones recreativas y comerciales a lo largo de la carretera, incluido el atraque del ferry de carga y pasajeros desde Ceiba en el punto medio aproximado del lado oeste de la carretera. Además, el gobierno de Puerto Rico, a través de esfuerzos conjuntos de la Autoridad de Transporte Integrado de Puerto Rico y el MOV, está apoyando un Proyecto de Rehabilitación del muelle Mosquito que incluirá mejoras de infraestructura asociadas con el atraque de ferry de pasajeros y carga en esta área.

Este Plan de Garantía de Calidad del Proyecto (QAPP, por sus siglas en inglés) fue preparado por CH2M HILL, Inc. (CH2M), una subsidiaria de Jacobs, bajo la Acción Ambiental Integral a Largo Plazo – Marina (CLEAN, por sus siglas en inglés) Número de Contrato N62470-21-D-0007, Orden de Trabajo de Contrato N6247021F4140 en general, de acuerdo con la Política Federal Uniforme para Planes de Proyectos de Garantía de Calidad, Conjunto de Herramientas QAPP de Respuesta a Municiones, Módulo 1: Investigación de Remediación (RI, por sus siglas en inglés)/Estudio de Viabilidad (FS, por sus siglas en inglés), de Diciembre de 2018 (IDQTF, 2020), modificado según se justifique para ser aplicable a la SSP.

Este QAPP es emitido por el Comando de Sistemas de Ingeniería de Instalaciones Navales del Atlántico (NAVFAC, por sus siglas en inglés), con el consenso de la EPA y el PRDNER. NAVFAC, EPA, PRDNER y, para sitios terrestres, USFWS trabajan en equipo para implementar el Programa de Restauración Ambiental (ERP, por sus siglas en inglés) CERCLA de Vieques. Una vez finalizado, este QAPP se pondrá a disposición del público mediante su inclusión en el archivo de Registro Administrativo de UXO 16.

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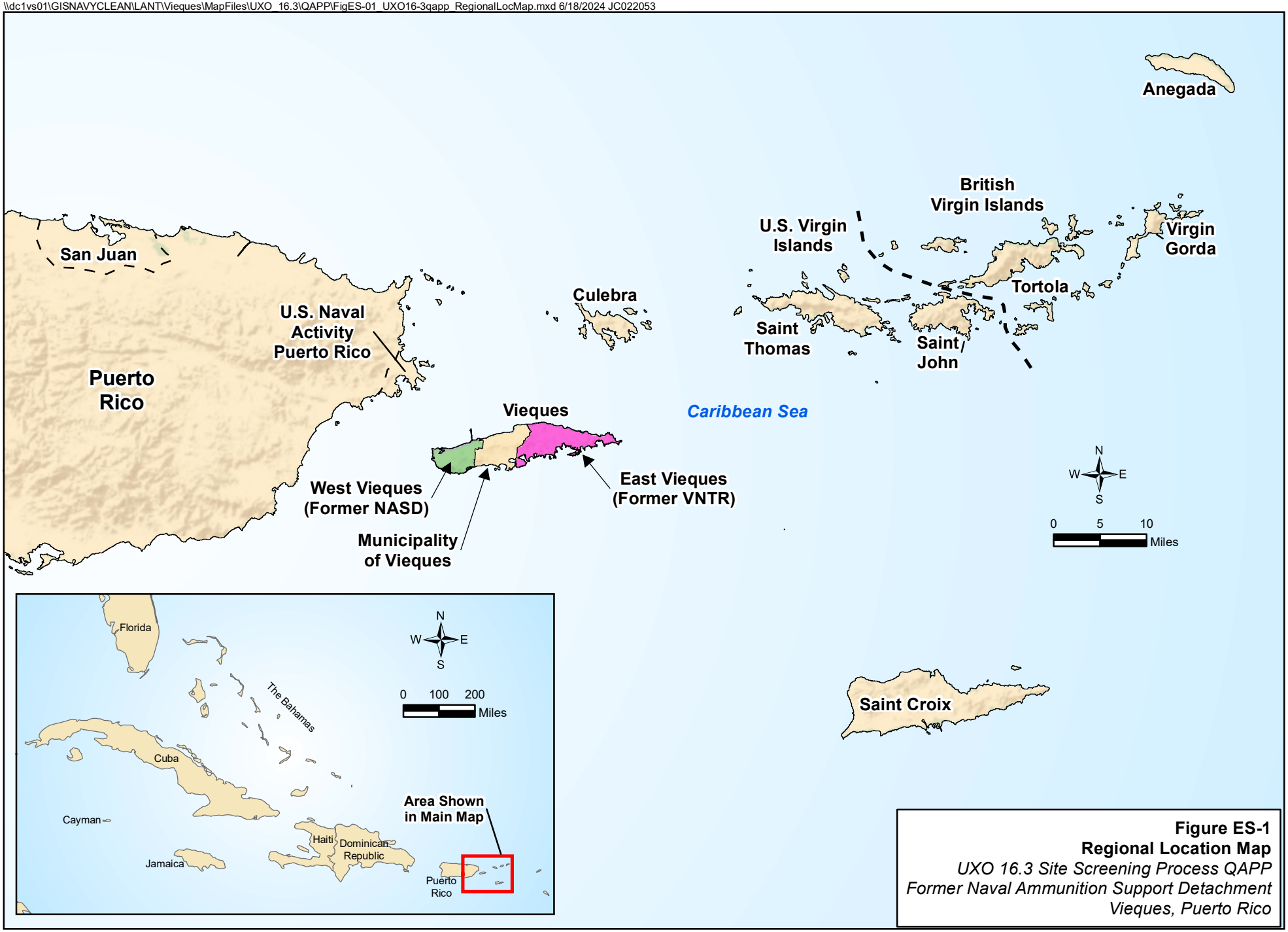

Figure ES-1
Regional Location Map
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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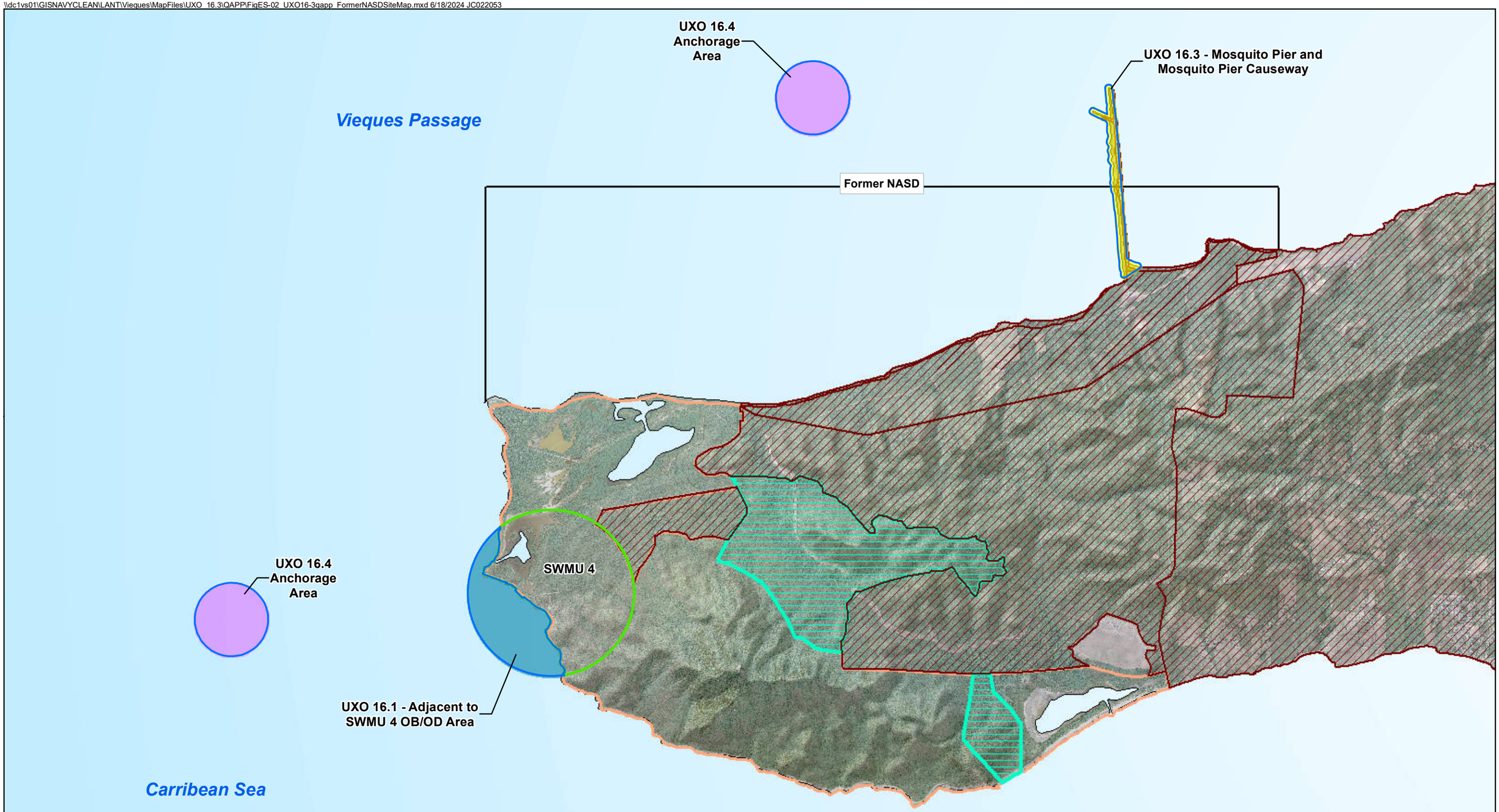

Legend

- UXO 16
- SWMU 4 LUC Boundary
- Municipality of Vieques
- PR Conservation Trust
- Department of Interior

UXO 16 Focus Areas:

- UXO 16.1 - Adjacent to SWMU 4 OB/OD Area
- UXO 16.3 - Mosquito Pier and Mosquito Pier Causeway
- UXO 16.4 - Anchorage Areas

N W E S

0 1,700 3,400 5,100 Feet

Figure ES-2
Former NASD Location and UXO 16 Focus Areas
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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Legend

UXO 16 Boundary

UXO 16.3 Decision Units:

- Decision Unit 1: Mosquito Pier - Surface and Sub-seafloor Characterization (includes area under Mosquito Pier) (5 acres)
- Decision Unit 2 - Western Mosquito Pier Causeway -Surface and Sub-seafloor Characterization (14 acres)
- Decision Unit 3 - Northern and Eastern Mosquito Pier Causeway - Surface Characterization (18 acres)

N
W E
S

0 250 500
Feet

Figure ES-3
UXO 16.3 Site Screening Process Approach
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

Contents

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Tables

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Acronyms and Abbreviations

3Rs	(Recognize, Retreat, Report) Munitions Awareness Training
AAUS	American Academy of Underwater Scientists
AED	Automated External Defibrillation
AFWTA	Atlantic Fleet Weapons Training Area
AM	Activity Manager
BDI	Beach Dynamics Investigation
CA	Corrective Action
CAP	Corrective Action Plan
CAR	Corrective Action Request
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CH2M	CH2M HILL, Inc.
CLEAN	Comprehensive Long-term Environmental Action, Navy
CONUS	Continental United Status
CPR	cardiopulmonary resuscitation
CSM	Conceptual Site Model
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DFW	definable feature of work
DMM	Discarded Military Munitions
DoD	Department of Defense
DOI	Department of the Interior
DQO	Data Quality Objective
DU	Decision Unit
DUA	Data Usability Assessment
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ERPM	Environmental Restoration Program Manual
ESS	Explosives Safety Submission
FCR	Field Change Request
FFA	Federal Facility Agreement
FS	Feasibility Study
FTL	Field Team Leader
GIS	geographic information system
GPS	global positioning system
H&S	Health and Safety
HAZWOPER	Hazardous Waste Operations and Emergency Response
ISO	industry standard object
ITS	instrument test strip
kg/m3	kilogram(s) per cubic meter

MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter(s)
MOV	Municipality of Vieques
MPC	Measurement Performance Criteria
MPPEH	material potentially presenting an explosive hazard
MQO	Measurement Quality Objective
MR	munitions response
MRP	Munitions Response Program
N/A	not applicable
NAD83	North American Datum of 1983
NASD	Naval Ammunition Support Detachment
NAVFAC	Naval Facilities Engineering Systems Command Atlantic
NAVSEA	Naval Sea Systems Command
Navy	Department of the Navy
NFA	no further action
NMRD	non-munitions related debris
NOSSA	Naval Ordnance Safety and Security Activity
NPL	National Priorities List
O2	oxygen
OP	Ordnance Pamphlet
OSHA	Occupational Safety and Health Administration
PADI	Professional Association of Diving Instructors
PM	Project Manager
POC	point of contact
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PRITA	Puerto Rico Integrated Transportation Authority
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
RAO	Remedial Action Objective
RCA	Root Cause Analysis
RI	Remedial Investigation
RPM	Remedial Project Manager
RRD	range-related debris
RTK-GPS	real-time kinematic global positioning system
SCUBA	self contained underwater breathing apparatus
SI	Site Inspection
SOP	Standard Operating Procedure
SSP	Site Screening Process
SUXOS	Senior Unexploded Ordnance Supervisor
TP	Technical Paper
USFWS	United States Fish and Wildlife Service
UTM	Universal Transverse Mercator

UU/UE	Unlimited Use/Unrestricted Exposure
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
VNTR	Vieques Naval Training Range

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Worksheet #1 & 2: Title and Approval Page

1. Project Identifying Information
   a. Regulatory Program/Site Name/Project Name: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/UXO 16.3, Atlantic Fleet Weapons Training Area (AFWTA) – Vieques, Former Naval Ammunition Support Detachment (NASD)/UXO 16.3 Site Screening Process (SSP)at Mosquito Pier and Mosquito Pier Causeway
   b. Site Location/Number: UXO 16.3, Former NASD, Vieques, Puerto Rico
   c. Lead Organization: Department of the Navy (Navy), Naval Facilities Engineering Systems Command Atlantic (NAVFAC)
   d. Site Screening Process Contractor: CH2M HILL, Inc. (CH2M)
   e. Contract Number: N62470-21-D-0007, Contract Task Order N62470-21-F4140 (CH2M)
2. Lead Organization (NAVFAC)
   a. NAVFAC Remedial Project Manager (RPM)
      Kevin Cloe _____
      (Signature/Date)
   b. NAVFAC Munitions Response (MR) Quality Assurance Officer (QAO)
      Mike Green _____
      (Signature/Date)
3. SSP Contractor (CH2M)
   a. CH2M Activity Manager (AM)
      Bill Hannah _____
      (Signature/Date)
   b. CH2M Project Manager (PM)
      Dennis Ballam _____
      (Signature/Date)
   c. CH2M MR Safety and QAO
      Jeff McCauley _____
      (Signature/Date)
   d. CH2M Vieques Program Project Delivery and Quality Manager
      Brett Doerr _____
      (Signature/Date)
   e. CH2M Health and Safety (H&S) Manager
      Stephen Brand _____
      (Signature/Date)

Worksheet #1 & 2: Title and Approval Page (continued)

4. Federal Regulatory Agency (Environmental Protection Agency [EPA] Region 2)

EPA RPM
Jessica Mollin _____
(Signature/Date)

EPA QAO
Lynn Arabia, CHMM _____
(Signature/Date)

5. Commonwealth Regulatory Agency (Puerto Rico Department of Natural and Environmental Resources [PRDNER])

PRDNER RPM
Juan Baba Peebles _____
(Signature/Date)

6. List of plans and reports from previous investigations relevant to this project

- Munitions and Explosives of Concern (MEC) Master Work Plan, Former Vieques Naval Training Range (VNTR), Vieques, Puerto Rico (CH2M, 2006)
  - Proper MEC handing and MEC/material potentially presenting an explosive hazard (MPPEH) disposal procedures should MEC/MPPEH be found during the UXO 16.3 SSP
- Environmental Baseline Survey, Naval Ammunition Support Detachment Vieques, Vieques Island, Puerto Rico (PMC, 2000)
  - Historical and relevant information regarding the UXO 16.3 SSP area based on record reviews
- Beach Dynamics Investigation Report, Atlantic Fleet Weapons Training Area – Vieques, Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range, Vieques, Puerto Rico (CH2M. 2018b)
  - Coastal dynamic/munitions mobility study conducted to develop an understanding of beach and nearshore changes and their relationship to the burial and mobility of MEC in underwater environments such as that within or potentially affecting UXO 16.3
- UXO 16.2 Remedial Investigation Quality Assurance Project Plan, Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range, Vieques, Puerto Rico (CH2M. 2021)
  - Investigation protocol for the UXO 16.2 focus area, elements of which may be applicable to the UXO 16.3 investigation approach

Worksheet #1 & 2: Title and Approval Page (continued)

7. The undersigned concur that the use of analog technology is justified within UXO 16.3

Signature(s) not applicable. Analog technology (i.e., underwater all-metals detection instrument) will be used to help evaluate the presence/absence of MEC within UXO 16.3. This analog technology is appropriate for use because digital technologies will not necessarily provide enhanced or even as good information as analog technology, especially in areas immediately adjacent to the causeway and under the pier where, if there was a release of munitions, they are most likely to be located. In these areas, known overhead and/or bottom obstructions may hinder the ability to achieve the digital sensor location/height necessary to collect useful information upon which to draw conclusions regarding release. Conversely, hand-held instruments are likely better suited to aid in detecting bottom/sub-bottom metallic anomalies in and around the rock/debris under and around the pier and along the causeway. Further, coupled with the planned visual observations and intrusive investigations, the technology sufficiently facilitates meeting the SSP objective.

Note:

As standard protocol for Vieques documents, the QAPP is loaded to the Vieques document repository once finalized and an email announcing its availability is sent to all RPMs. It is then the RPM's responsibility to communicate the availability within his/her stakeholder agency at his/her discretion. This protocol is consistent with green and sustainable practices by reducing the amount of paper and associated resources consumed for document preparation and distribution. It also reduces the burden on space allocation for document hard copies. However, hard copies can be provided to particular individuals at the RPM's request.

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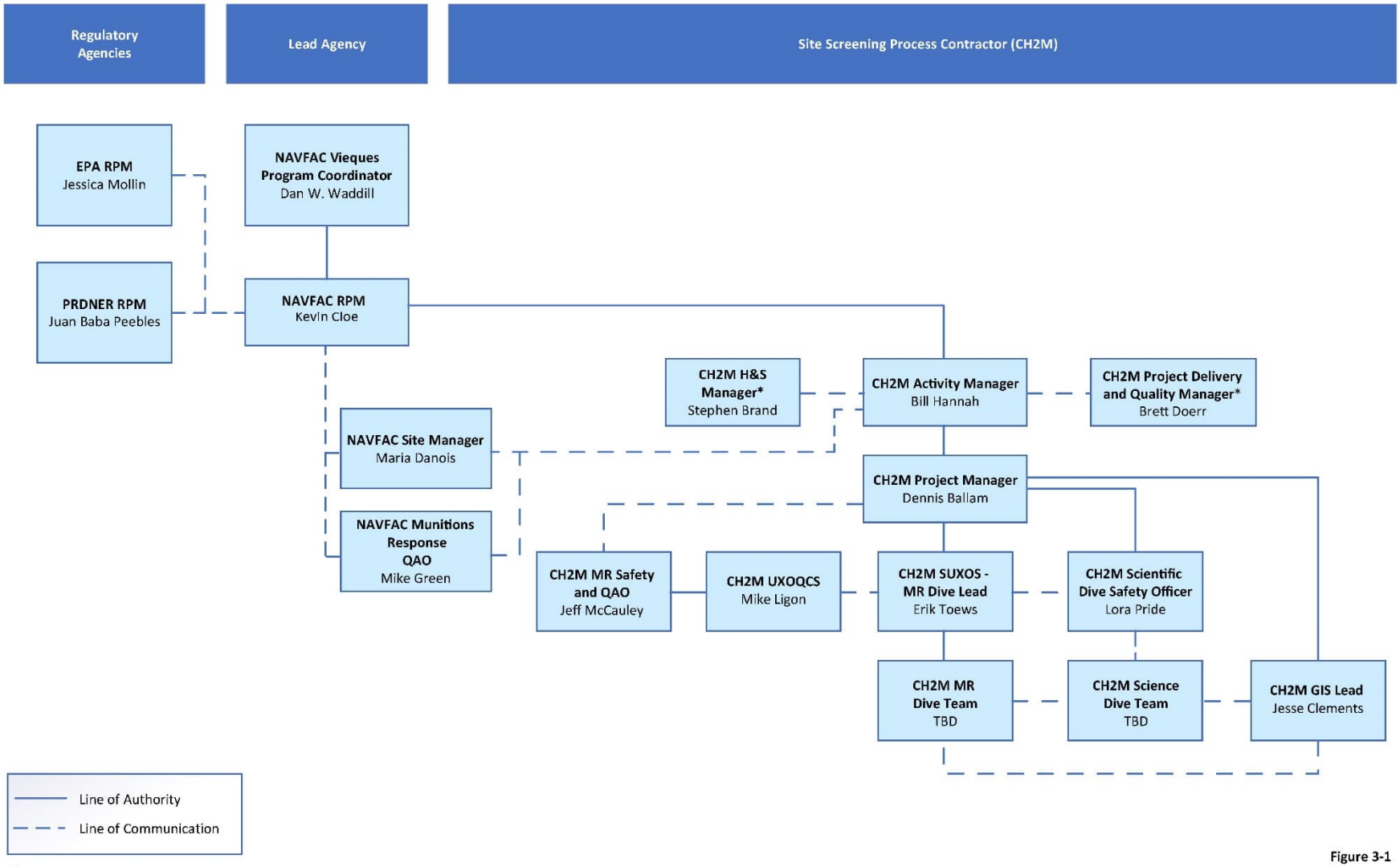
Worksheet #3 & 5: Project Organization and QAPP



Notes:
Names reflected in this figure are for QAPP preparation, but any individuals qualified to perform or otherwise appropriate for the roles may be substituted prior to or during project implementation. The QAPP will not be modified to update personnel changes. As warranted, those changes will be communicated to project team members.
* Denotes line of communication throughout project team, as applicable to specific role.

Figure 3-1
Project Organizational Structure
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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Worksheet #4, 7 & 8: Personnel Qualifications and Sign-off Sheet

Table 4-1. NAVFAC Personnel Qualifications

Name	Project Title	Education/Experience	Required Licenses/ Certifications/ Authorizations	Signature/Date[a]
Kevin Cloe	NAVFAC RPM	• 30 years of environmental remediation and munitions response experience	Not applicable (N/A)	
Mike Green	NAVFAC QAO	• 30 years of environmental remediation and munitions response experience	N/A	

[a] Signatures indicate personnel have read and agree to implement this QAPP.

Worksheet #4, 7 & 8: Personnel Qualifications and Sign-off Sheet (continued)

Table 4-2. Site Screening Process Contractor Personnel Qualifications

Name	Project Title	Education/Experience	Specialized Training	Required Licenses/ Certifications/ Authorizations	Signature/ Date[a]
Bill Hannah	CH2M AM	• 25 years of environmental remediation and munitions response experience	• 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) with current 8-hour refresher • Cardiopulmonary resuscitation (CPR) and First Aid Training	N/A	
Dennis Ballam	CH2M PM	• 18 years of environmental remediation and munitions response experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • Unmanned aircraft systems – Part 107 Pilot's License	N/A	
Jeff McCauley	CH2M MR Safety and QAO	• 30 years of US Navy explosive ordnance disposal (EOD) and diving and salvage • 3 years of munitions response experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • Automated external defibrillator (AED), and Oxygen (O2) Administrator • Former US Navy Diver (Deep Sea/Air/Mixed Gas/Self Contained Underwater Breathing Apparatus [SCUBA]), Naval Diving and Salvage Training Center (1990) • US Navy EOD Technician, Naval School Explosive Ordnance Disposal (1995)	N/A	
Brett Doerr	CH2M Vieques Program Project Delivery and Quality Manager	• 31 years of environmental remediation and munitions response experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • Professional Geologist (Virginia)	N/A	

Worksheet #4, 7 & 8: Personnel Qualifications and Sign-off Sheet (continued)

Table 4-2. Site Screening Process Contractor Personnel Qualifications

Name	Project Title	Education/Experience	Specialized Training	Required Licenses/ Certifications/ Authorizations	Signature/ Date[a]
Stephen Brand	CH2M Health and Safety Manager	• 31 years of environmental remediation and munitions response experience	• Professional Geologist (Virginia) • Certified Safety Professional • Occupational Health and Safety Technician • 40-Hour HAZWOPER with current 8-hour refresher • 30-Hour Occupational Safety and Health Administration (OSHA) Construction Certification • CPR and First Aid Training	N/A	
Erik Toews	CH2M Senior Unexploded Ordnance Supervisor (SUXOS) MR Dive Lead	• 17 years of munitions response experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • Qualified SUXOS in accordance with Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP)-18 • MPPEH Training in accordance with Attachment D-3p of Naval Sea Systems Command (NAVSEA) Ordnance Pamphlet (OP) 5[b]	N/A	
Mike Ligon	CH2M UXOQCS	• 30 years of munitions response experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • Qualified SUXOS in accordance with Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP)-18 • MPPEH Training in accordance with Attachment D-3p of NAVSEA OP 5[b]	N/A	

Worksheet #4, 7 & 8: Personnel Qualifications and Sign-off Sheet (continued)

Table 4-2. Site Screening Process Contractor Personnel Qualifications

Name	Project Title	Education/Experience	Specialized Training	Required Licenses/ Certifications/ Authorizations	Signature/ Date[a]
Lora Pride	CH2M Scientific Dive Safety Officer	• 21 years of scientific diving experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • American Academy of Underwater Scientists (AAUS) Scientific Diver • Professional Association of Diving Instructors (PADI) Open Water Dive Instructor	N/A	
		•	•		
Jesse Clements	CH2M Geographic Information System (GIS) Lead	• 15 years of GIS experience	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training	N/A	
TBD	CH2M Field Team Leader (FTL)	• TBD	• 40-Hour HAZWOPER with current 8-hour refresher • CPR and First Aid Training • 3Rs (Recognize Retreat, Report) Munitions Awareness Training	N/A	

Note: The names (including "TBD") reflected in this table are current (or not known) at the time of the QAPP development, but any individual or contractor/subcontractor qualified to perform the roles may perform them during project implementation. For all personnel, the QAPP review/endorsement requirements associated with any role listed as "TBD" or provided by personnel other than those listed will be required of them once identified.

[a] Signatures indicate personnel have read and agree to implement this QAPP.

[b] Personnel who inspect and document the explosive safety status of MPPEH will have the training required per NAVSEA OP 5 (NAVSEA, 2023) Appendix D.

Worksheet #6: Communication Pathways and Procedures

Communication Driver	Initiator (Name, Project Title)	Recipient (Name, Project Title)	Procedure (Timing, Pathway, Documentation)
Regulatory agency interface	Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	Jessica Mollin EPA RPM mollin.jessica@epa.gov Juan Baba Peebles PRDNER RPM juanbaba@jca.pr.gov	Navy RPM provides project updates to regulatory stakeholders via email, telephone, or meetings, as necessary; can delegate communication to other internal or external points of contact (POCs).
Daily field progress reports (Daily Report)	Erik Toews CH2M SUXOS MR Dive Lead erik.toews@jacobs.com	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	At end of each day of fieldwork, CH2M SUXOS MR Dive Lead (or designee) provides daily report to CH2M PM. CH2M PM will then inform NAVFAC Site Manager and/or NAVFAC RPM via email, telephone, hard copy, or in-person, as applicable.
Field progress communications to/from Navy from Vieques onsite contractor	CH2M FTL (TBD) Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil	Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	In general, the CH2M FTL communicates updates to the NAVFAC Site Manager, who then provides updates to NAVFAC RPM via email, telephone, hard copy, or in-person, as warranted; can delegate communication to other internal and external POCs.
Navy munitions quality/safety inputs	Mike Green NAVFAC MR QAO michael.d.green18.civ@us.navy.mil	Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil Dennis Ballam CH2M PM dennis.ballam@jacobs.com	Provides review comments to Navy contractor on munitions aspects of the preliminary draft QAPP via email through NAVFAC RPM. Provides periodic (as necessary) Navy policy or guidance regarding munitions-related aspects via direct communication with Navy contractor, as delegated.

Worksheet #6: Communication Pathways and Procedures (continued)

Communication Driver	Initiator (Name, Project Title)	Recipient (Name, Project Title)	Procedure (Timing, Pathway, Documentation)
Contractor administrative communication to/from Navy (e.g., submission of QAPP for review; response to comments, updates on project progress, etc.)	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil	CH2M PM provides documents and project updates to the NAVFAC RPM and NAVFAC Site Manager via hard copy, email, telephone, or meetings, as necessary.
Contractor internal project administration and logistics communication	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	Various project implementation staff	Direct communication (via email, telephone, hard copy, or in-person, as needed) to/from project staff to ensure appropriate project implementation.
Stop work due to safety issues	Erik Toews CH2M SUXOS MR Dive Lead erik.toews@jacobs.com Note: Any field personnel are empowered to stop work due to safety concern. In general, field staff will report the situation to the CH2M PM and H&S Manager; CH2M PM reports situation to NAVFAC Site Manager and RPMs.	Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil Dennis Ballam CH2M PM dennis.ballam@jacobs.com Note: CH2M H&S Manager is integral in the stop work communications, including development and implementation of corrective measures.	As soon as possible following discovery, the CH2M SUXOS MR Dive Lead informs the CH2M PM of critical safety issues and generates a follow-up Stop Work Memorandum. The CH2M PM will then inform the NAVFAC Site Manager and NAVFAC RPM. CH2M PM will also notify NAVFAC Site Manager and NAVFAC RPM when safety issue has been addressed (including Root Cause Analysis [RCA], if necessary). Of note, CH2M field staff will also observe for potentially unsafe conditions and stop work if conditions/activities deemed to be immediately dangerous to life or health are observed.
Quality Control (QC) stand-down	Brett Doerr (for QC stand-downs) CH2M Vieques Program Project Delivery and Quality Manager brett.doerr@jacobs.com	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	If an issue is identified that may warrant a QC stand-down, the CH2M Vieques Program Project Delivery and Quality Manager will communicate and discuss the issue with the CH2M PM.

Worksheet #6: Communication Pathways and Procedures (continued)

Communication Driver	Initiator (Name, Project Title)	Recipient (Name, Project Title)	Procedure (Timing, Pathway, Documentation)
		Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	The CH2M PM will notify the NAVFAC RPM who will engage the NAVFAC Munitions Response QAO, as warranted.CH2M PM will also notify the NAVFAC Site Manager and NAVFAC RPM when a QC stand-down issue has been resolved.
Resume work following a stop work or QC stand-down	Brett Doerr (for QC stand-downs) CH2M Vieques Program Project Delivery and Quality Manager brett.doerr@jacobs.com Kevin Cloe (for stop work stand-downs) NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	CH2M Vieques Program Project Delivery and Quality Manager will provide the CH2M PM (as applicable) written notice of approval to resume work in the event of a QC stand-down. NAVFAC RPM will provide the CH2M PM (as applicable) written notice of approval to resume work in the event of a stop work stand-down with input from the NAVFAC MR QAO.
Minor QAPP changes (i.e., those that are unlikely to impact meeting the Data Quality Objectives [DQOs]) during project execution[a]	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	CH2M PM ensures minor QAPP changes are recorded and documented in the associated report with an assessment of any potential impacts on data usability. NAVFAC Site Manager and NAVFAC RPM provide review and approval. The NAVFAC RPM will notify stakeholders, as necessary.

Worksheet #6: Communication Pathways and Procedures (continued)

Communication Driver	Initiator (Name, Project Title)	Recipient (Name, Project Title)	Procedure (Timing, Pathway, Documentation)
Substantive QAPP changes (i.e., those that may impact meeting the Remedial Action Objectives [RAOs]) during project execution[b]	Dennis Ballam CH2M PM dennis.ballam@jacobs.com	Maria Danois NAVFAC Site Manager maria.m.danois.civ@us.navy.mil Kevin Cloe NAVFAC RPM kevin.r.cloe.civ@us.navy.mil	CH2M PM submits a Field Change Request (FCR) and, as applicable, a Corrective Action Request (CAR) and a Corrective Action Plan (CAP) to the NAVFAC Site Manager and NAVFAC RPM. The NAVFAC Site Manager and NAVFAC RPM provide review and approval. Following approval, the NAVFAC RPM will notify stakeholders within 24 hours or as soon as possible via email of any significant changes to the QAPP and/or Corrective Actions (CAs). Navy review, consideration, and incorporation of any resulting regulatory comments will be done to the extent practicable given the constraints commonly associated with a project undergoing implementation, especially in the field (e.g., equipment and other resource availability, staffing, weather, schedule, contract stipulations, etc.). Further, regulatory agencies have the opportunity to review the various elements of data collection, analysis, evaluation, and QC in the associated report(s).
Technical and quality support and reporting	Brett Doerr CH2M Vieques Program Project Delivery and Quality Manager brett.doerr@jacobs.com	Various CH2M staff	Project delivery and quality support, including scope development, guidance, and technical/quality review.

Note: The names in this table are current at the time of the QAPP development, but any individual qualified to perform the role may be added/substituted prior to or during project implementation. Therefore, those changes will be communicated to project team members as warranted, but the QAPP will not be updated with personnel changes. All personnel, including those added/substituted at a later date, will be subject to the review/endorsement requirements associated with the associated project role(s).

[a] Minor QAPP changes include changes to key CH2M personnel assuming the change is to an individual with equivalent experience who meets the minimum requirements for the position set forth in the Department of Defense (DoD) Quality System Requirements (if applicable). They also include minor changes such as collecting data along submerged survey transect markers versus using a global positioning system (GPS) enabled underwater navigation device that do not alter the overall minimum coverage requirement or project objectives.

[b] Major QAPP changes include changes to any minimum stated requirement including Measurement Quality Objectives (MQOs) and Measurement Performance Criteria (MPC) not related to a any significant change in technical design approach.

Worksheet #9: Project Planning Session Summary

Project Name: UXO 16.3 SSP QAPP

Site Name: UXO 16.3

Projected Date(s) of Field Activities: Spring 2024

Site Location: Vieques, Puerto Rico

Project Manager: Dennis Ballam

Date of Session: August 8, 2023

Scoping Session Purpose: Discuss and concur upon key elements of UXO 16.3 Site Inspection at Mosquito Pier and Mosquito Pier causeway to be included in QAPP

Name	Title	Affiliation	Email Address	Project Role
Doug Pocze	EPA Section Chief	EPA	pocze.doug@epa.gov	EPA Leadership
Angela Carpenter	EPA Branch Chief	EPA	carpenter.angela@epa.gov	EPA Leadership
Jessica Mollin	EPA RPM	EPA	mollin.jessica@epa.gov	EPA RPM
Karyn Treinen	EPA RPM	EPA	treinen.karyn@epa.gov	EPA RPM
Zolymar Luna	EPA RPM	EPA	luna.zolymar@epa.gov	EPA Representative
Abbey States	EPA Risk Assessor	EPA	debofsky.abigail@epa.gov	EPA Risk Assessor
Rachel Griffiths	EPA Geologist	EPA	griffiths.rachel@epa.gov	EPA Geologist
Abby DeBrofsky	EPA Technical Support	EPA	states.abbey@epa.gov	EPA Technical Support
Juan Baba Peebles	PRDNER RPM	PRDNER	juanbaba@jca.pr.gov	Federal Facilities Coordinator
Tom Bourque	Technical Support	UXOPro (technical support contractor to PRDNER)	tbourque@uxopro.com	PRDNER technical support contractor
Mike Barandiaran	Refuge Manager	United States Fish and Wildlife Service (USFWS)	mike_barandiaran@fws.gov	No project-specific role
Mitsuka Bermudez	Refuge Staff Member	USFWS	mitsuka_bermudez@fws.gov	No project-specific role
Dan Waddill	NAVFAC Vieques Program Coordinator	NAVFAC	dan.w.waddill.civ@us.navy.mil	Navy Vieques Program Coordinator
Kevin Cloe	NAVFAC RPM	NAVFAC	kevin.r.cloe.civ@us.navy.mil	NAVFAC RPM
Daniel Hood	NAVFAC RPM	NAVFAC	daniel.r.hood.civ@us.navy.mil	NAVFAC RPM

Worksheet #9: Project Planning Session Summary (continued)

Name	Title	Affiliation	Email Address	Project Role
Maria Danois	NAVFAC Site Manager	NAVFAC	maria.m.danois.civ@us.navy.mil	NAVFAC Site Manager
Bill Hannah	CH2M AM	CH2M (contractor to Navy)	bill.hannah@jacobs.com	CH2M AM
Brett Doerr	CH2M Project Delivery and Quality Manager	CH2M (contractor to Navy)	brett.doerr@jacobs.com	Project Delivery and Quality Management; including, scope development and technical review
Dennis Ballam	CH2M PM	CH2M (contractor to Navy)	dennis.ballam@jacobs.com	CH2M PM
Jesse Clements	CH2M GIS Lead	CH2M (contractor to Navy)	jesse.clements@jacobs.com	CH2M GIS Lead

Key Discussion Points

The Subcommittee discussed the history of Mosquito Pier and associated causeway, current and potential future use of the pier and causeway based on the Municipality of Vieques' (MOV's) plan to develop the pier and causeway for both recreational and commercial use, including improving/constructing docks for passenger and cargo ferry use, and exposure scenarios based on current and future plans. While the pier has been opened to the public for numerous years, during which recreational activities such as snorkeling and SCUBA diving have been done and no munitions have been reported by the public or MOV during that time. Therefore, the Navy proposed implementing a site inspection (SI) to collect sufficient data to determine if an MEC release has occurred, make determinations regarding the potential presence of explosive hazards, and identify the appropriate path forward for the area. D. Pocze (EPA) and A. Carpenter (EPA) commented that an SI may not be possible as the area is listed in the NPL, stating that EPA policy is that once a site (i.e., AFWTA-Vieques in this case) is listed on the National Priorities List (NPL), SIs can no longer be performed. J. Baba (PRDNER) commented that there were no concerns from PRDNER for implementing an SI.

Follow up: The topic was again discussed during the April 2024 Technical Subcommittee meeting where it was concurred that a release assessment is the appropriate type of investigation and that the Vieques Federal Facility Agreement provides for this type of investigation under the Site Screening Process (SSP) rather than SI. Therefore, the Subcommittee concurred that the document title and all references to "SI" in the QAPP will be revised to utilize "SSP" terminology.

Worksheet #10: Conceptual Site Model

Facility Profile – Former Naval Ammunition Support Detachment

Location, Size, Facility History, and Ownership

The former NASD is located in Vieques, Puerto Rico, in the Caribbean Sea, approximately 7 miles southeast across the Vieques Passage from the eastern tip of the main island of Puerto Rico (Figure 10-1). The former NASD consists of approximately 8,100 acres and is located on the western third of Vieques. The former NASD is bounded by the Vieques Passage to the north, the Caribbean Sea to the west and south, and MOV land to the east (Figure 10-2).

The Navy purchased large portions of Vieques in the early 1940s to conduct activities related to military training. The AFWTA was historically divided into two portions – the NASD at the west end of Vieques and the VNTR at the east end. Site operations at the former NASD consisted mainly of ammunition loading and storage; vehicle and facility maintenance; destruction of retrograde and surplus munitions, fuels, and propellants via open burn/open detonation (OB/OD); and some training.

On April 30, 2001, the former NASD was apportioned and transferred to the Department of the Interior (DOI), the MOV, and Puerto Rico Conservation Trust as required by the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398) and amended by Section 1049 of the National Defense Authorization Act for Fiscal Year 2002 (Public Law 107-107). Regardless of ownership, including the DOI-owned property that is managed by USFWS as part of the Vieques National Wildlife Refuge, the Navy retains the responsibility for conducting investigation and cleanup of the property, as warranted, potentially contaminated as a result of past military training. On February 11, 2005, EPA placed the AFWTA - Vieques on the NPL. On September 7, 2007, the Navy, DOI, EPA, and the Commonwealth of Puerto Rico finalized a Federal Facility Agreement (FFA) that established the procedural framework and schedule for implementing the CERCLA activities for Vieques. NAVFAC, EPA, PRDNER, and, for terrestrial sites, USFWS work as a team to implement the Vieques CERCLA Environmental Restoration Program (ERP).

Site Profile – UXO 16.3

Location

Following cessation of military operations, the Navy subdivided the former operational areas into smaller parcels, referred to as UXO sites, to make them more manageable for the purposes of prioritization, munitions removal, site characterization, and decision making. One of these UXO sites is UXO 16 which represents the offshore areas of the former NASD and former VNTR where munitions may have been inadvertently fired into the water, ejected from military activities (i.e., OB/OD), or lost from ships while conducting ordnance handling activities at Mosquito Pier or anchorages offshore. Due to its large size (approximately 11,500 acres, comprising offshore areas adjacent to the east and west ends of Vieques, former anchorage areas, and the area around Mosquito Pier and causeway), UXO 16 has been subdivided into multiple focus areas.

This QAPP addresses the UXO 16.3 focus area (approximately 37 acres) which comprises the underwater area beneath Mosquito Pier and an approximate 100-foot perimeter around Mosquito Pier and associated causeway (Figure 10-3). This area is bounded by the shoreline along the causeway and a water depth along the UXO 16.3 perimeter that varies between a few feet near the southern causeway end to 30 feet near the northern causeway end and 45 feet near the northwestern end of the pier. Mosquito Pier and the causeway are owned and maintained by the MOV, while the waters surrounding Mosquito Pier and the causeway are under PRDNER jurisdiction.

Worksheet #10: Conceptual Site Model (continued)

Site History

Initiated in 1941 (PMC, 2000), the Mosquito Pier causeway construction began as part of a planned 14-mile-long breakwater system between Roosevelt Roads in eastern Puerto Rico and western Vieques, designed to provide a sheltered anchorage for the Navy fleet. However, the construction project was deferred in 1943 with a pier and approximately 7,000 feet of the breakwater (or causeway) completed on Vieques.

In 1943, the Vieques complex was commissioned as the Vieques Naval Ammunition Depot and from 1943 to 1948 the pier and causeway were used to support ship transfers of munitions and supplies associated with former military operations. By 1948 all ammunition was removed from magazines associated with the Vieques Naval Ammunition Depot and the Depot was closed.

In 1962, the Vieques magazine complex was re-opened. In 1967, the 625-foot ammunition handling pier (now designated Mosquito Pier) was completed and began to be utilized by ships offloading ammunition. It is estimated that between 1973 and 1978, three or four ships docked at Mosquito Pier between 3 and 10 days a year to deliver ammunition (Tippetts et al., 1980). The Mosquito Pier and causeway were used by the military up to 2001 when the pier and causeway were transferred to the MOV. Since 2001, the Mosquito Pier and causeway have been used by the MOV for commercial purposes and by the public for recreational activities (e.g., fishing, swimming, snorkeling, SCUBA diving, and boat loading/offloading activities). A large ferry dock is located on the western side of the causeway and south of the pier and is used daily by the MOV and various subcontractors for vehicle and personnel transport to and from Vieques. Additionally, the area along the west side of the causeway and directly under Mosquito Pier is a popular diving location used by outfitters for organized SCUBA instruction and tours, largely because of ready shoreline access and typically calm water conditions due to the causeway sheltering the west side from the energy of the prevailing easterly waves.

Physical, Coastal, Biological, and Cultural Characteristics

The Mosquito Pier causeway is a 1.3-mile-long earthen breakwater with riprap along the eastern and western sides and elevated approximately 15 feet above sea level. The paved causeway road is connected to PR-200 at its south end and terminates at its north end in a parking area adjacent to Mosquito Pier. The pier itself is about 40-feet wide, extends northwest approximately 700 feet into the Vieques Passage, is constructed of concrete and steel, and is supported by concrete pilings. A large ferry dock, two concrete boat ramps, and a wooden boat dock are the primary structures used by the public and are located along the western side of the Mosquito Pier causeway; there are no structures along the eastern side of the causeway (Figure 10-3).

The longshore currents on the north side of Vieques flow in an east/northeast to west/southwest direction, driven primarily by the easterly trade winds. As noted previously, the Mosquito Pier causeway blocks most of the wind-driven waves coming from the east, creating relatively calm sea conditions along the western side, resulting in typically favorable conditions for in-water recreational activities and boat launching/docking on that side. Conversely, the oftentimes rough and turbid water conditions along the east side of the causeway discourage or substantially limit these activities. Turbid water conditions also frequently occur on the west side of the causeway, likely due to suspended particles generated along the east side and an eddy current that is sometimes evident on the west side that can sustain and/or create turbidity.

The bottom-type within UXO 16.3 is non-hardbottom, consisting of sand with partial seagrass cover except along the southeastern side (Figure 10-4). It is assumed that the sediment grain size is approximately 0.24 millimeter (mm) or larger (comparable to Beach 24 in the Beach Dynamics Investigation Report [BDI Report, CH2M, 2018b]). Directly under and slightly adjacent to the pier, various underwater debris has been observed on the seafloor, consisting of fallen pier pilings, large chunks of concrete, tires, fishing gear (tackle, weights, hooks, fishing line, etc.), and general trash.

Worksheet #10: Conceptual Site Model (continued)

Based on coastal dynamics, wave diffraction would occur for easterly/north-easterly waves (which is the primary wave/wind direction) around the Mosquito Pier causeway. Diffraction, in this case the change in the direction and intensity of waves upon encountering the Mosquito Pier causeway, results in the reduced intensity of wave action and sheer stresses for the western side of the causeway and the direction of waves is southward toward land, approximately parallel to the causeway. Based on reduced wave intensity and sheer stress, the bottom conditions under the pier and on the western side of the causeway are relatively stable.

A diverse community of marine life occurs in the nearshore waters of the causeway and pier and contributes to the recreational attractiveness of the area. The pier pilings and the steeply sloped rocky riprap of the causeway support a variety of reef fish and corals. Most of the observed fish include angelfish, damselfish, tangs, parrotfish, wrasses, surgeonfish, grunts, gobies, jacks, rays, and tarpon. The more commonly observed coral species include brain corals, lettuce corals, finger corals, star corals, starlet corals, golf ball coral, and gorgonians. Federally threatened coral species observed include elkhorn coral, lobed star coral, boulder star coral, and mountainous star coral. However, in recent years, stony coral tissue loss disease, a highly lethal disease that affects over 20 coral species, has spread rapidly throughout the Caribbean, and has decimated many of the corals routinely observed along the west side of the causeway. Lobsters are frequently found around various causeway and pier structures. Sea turtles are regularly observed feeding and resting under the pier, and manatees are occasionally seen foraging on seagrasses along the west side of the causeway. The densest seagrass beds in Vieques occur along the northwest corner of the island surrounding Punta Arenas in the Vieques Passage and around Mosquito Pier. Common species include turtle grass, manatee grass, and shoal grass, beds of which are frequently intermixed with calcareous macroalgae such as watercress algae, bristle brush, and mermaid's fans. The invasive seagrass *Halophila stipulacea* (no common name) has also become prevalent amongst the native seagrasses in the area.

Many species of seabirds and shorebirds are known to either forage over open water in the vicinity of Mosquito Pier or along the causeway's rocky shoreline. Common seabirds include gulls, terns, frigatebirds, pelicans, tropicbirds, and booby. Common shorebirds include plovers and sandpipers. Least terns and Caribbean martins have been documented as nesting on Mosquito pier structures.

Summary of Key Conceptual Site Model Characteristics Supporting the SSP Rationale and Approach

Rationale for an SSP

The rationale for performing an SSP at UXO 16.3 is based on the following information:

- Performing an SSP in this area is consistent with regulatory guidance, the Navy Environmental Restoration Program Manual (ERPM; DON, 2018), Defense Environmental Restoration Program (DERP) Manual (DoD, 2012), and the Vieques Federal Facility Agreement (FFA), all of which indicate a release assessment type of investigation is the appropriate mechanism for evaluating sites where there is the possibility of a hazardous substance/pollutant/contaminant release, but a release has not been confirmed. It is the information gathered through the SSP that will be used to confirm a release occurred (warranting a Remedial Investigation (RI)/Feasibility Study (FS) for further characterization and/or removal action) or did not likely occur (warranting no further action [NFA]). There has been no past investigation of the UXO 16.3 area to determine whether a release occurred; therefore, there are currently insufficient data to support a determination of whether RI/FS, removal action, or NFA (i.e., unlimited use/unrestricted exposure [UU/UE]) is appropriate for the area.

Worksheet #10: Conceptual Site Model (continued)

- If the SSP concludes a release did not likely occur and/or there is no explosive hazard likely present, beneficial reuse of Mosquito Pier and surrounding area in accordance with the Mosquito Pier Rehabilitation Project (Agosto pers. comm., 2024) could be accelerated by a minimum of 5 years versus proceeding to an RI/FS without first concluding whether a release occurred that warrants RI/FS.
- The Conceptual Site Model (CSM) associated with munitions transfer at Mosquito Pier indicates there was unlikely a munitions release or a munitions release that was not immediately addressed, based on:
  - Strict protocols associated with offloading munitions from ammunition supply ships.
  - Ships offloading munitions would have had a dive-capable EOD team aboard or an EOD team would have been on call at Roosevelt Roads to respond to such events.
  - The tracking and chain of accountability between loading the munitions at origin and receipt in Vieques for planned training activities.
  - For shipping and transfer from ship to pier, the vast majority of munitions would have been strapped on pallets or otherwise bundled together (i.e., not individual). Therefore, any release during offloading would have been in a bundle or container due to the bulk nature of how they were packaged for transport (Figure 10-5). The munitions brought to the pier would have been for land-based training, not those associated with air-to-ground (e.g., bombs) or ship-to-shore (e.g., 16-inch projectiles).
  - The relatively shallow water, recurrent use of the pier/causeway to support military training, and potential for residents to readily contact munitions during pier and water use.
  - Once loaded on trucks, there is no reasonable release mechanism along the causeway.
  - Once offloaded on Vieques for training, it is unlikely munitions were ever brought back and reloaded onto ships. At the completion of any particular military training exercise, it would not have been common practice to return surplus munitions to the ships. Surplus munitions would likely have been retained in magazines for future training or destroyed on-island.
- There are no known historical records or knowledge of munitions having been released during munitions offloading at Mosquito Pier or munitions transport along the causeway.
- The area around and under Mosquito Pier has been used for decades for recreational snorkeling and SCUBA diving and is a specific destination for local diving outfitters, resulting in hundreds to thousands of divers in the waters around and under the pier during this time. Additionally, fishing from the pier and causeway are common. Throughout the decades of these activities, there have been no reports of observing or recovering munitions.

The information that follows provides a summary of key CSM (Table 10-1) site characteristics supporting the UXO 16.3 SSP approach and rationale. Details associated with the approach and objectives are provided in the applicable worksheets (specifically Worksheet #11 and Worksheet #17) in this QAPP.

Worksheet #10: Conceptual Site Model (continued)

Sources of Potential Explosive Hazards (MEC)

Although a munitions release or unaddressed munitions release was unlikely (as described previously), for the purposes of release assessment, it is assumed the source of potential explosive hazards (i.e., MEC) in UXO 16.3 is any ordnance item(s) lost to the nearshore waters around Mosquito Pier munitions during offloading activities. While there are no known records of the specific type(s) of ordnance items delivered to the pier, Table 10-2 provides a list of potential items based on the types of ordnance known to have been used within the former NASD and VNTR for land-based military training (i.e., not air-to-ground or ship-to-shore) that likely required transport via ship to Mosquito Pier.

Behavior of Potential MEC at and around Mosquito Pier and Causeway

While munitions handling was performed with standard ordnance safety practices in place while the vessel was securely moored to the pier, and considering that most involved handling of bulk munitions in shipping configurations (i.e., offloading of ordnance in large crates, containers or palletized, etc.), it is assumed that any munitions dropped into the water during offloading operations would have been located immediately adjacent to or under Mosquito Pier. Of note, if munitions were dropped into the water, they most likely would have been contained in some type of packaging/bundle/crate based on the nature in which munitions offloading generally would have occurred (Figure 10-5). As such, underwater munitions transport would have been unlikely. However, as a conservative measure for SSP CSM purposes, transport and burial of individual munitions item type in Table 10-2 was considered (i.e., container ruptured, releasing individual munitions), as described below:

- As discussed in the BDI Report (CH2M, 2018b), bottom changes (i.e., sediment transport) are controlled by waves, and therefore, munitions burial is controlled by the wave-bottom/sediment/munitions interaction. At Mosquito Pier, the location where munitions would have fallen during offloading, the water depths are approximately 40 feet. As noted previously, the west side of the breakwater (causeway), which includes Mosquito Pier, has typically calm water conditions due to the breakwater sheltering the west side from the high energy of the prevailing easterly waves. Therefore, if munitions with densities higher than sand (all except rockets and flares in Table 10-2) fell into the water, the relatively calm water conditions, coupled with the water depths at Mosquito Pier, would result in the munitions self-burying to approximately one diameter (in the absence of bottom debris) and remaining buried. Once the munition was buried, the wave-bottom-interaction mechanism no longer applies, and the munition would cease to bury itself deeper unless storm events with sufficient energy to scour sand at the base of Mosquito Pier (i.e., approximately 40 feet) occurred.

  While bottom liquefaction[1] may result in the potential for munitions to self-bury deeper than the munition's diameter, this requires much denser munitions (i.e., densities greater than about 3,000 kilograms per cubic meter [$kg/m^{3]}$) than would have been part of the inventory offloaded at Mosquito Pier (Table 10-2). The highest-density munition in Table 10-2 is approximately 2,520 kg/m^3. As such, the anticipated burial depth of any munition would be approximately the diameter of the munition. In areas where the seafloor is rocky or seagrass is present, munitions burial is retarded such that the munitions tend to remain on the bottom or only partially bury.

[1] Bottom Liquefaction– process in which wave actions liquify the bottom of the seafloor which facilitates deeper burial of relatively high-density items.

Worksheet #10: Conceptual Site Model (continued)

- For munitions with lower densities than the sand comprising the seafloor (i.e., the rockets and the flares in Table 10-2), wave conditions within UXO 16.3 could have facilitated movement along the seafloor. Based on observations from the BDI, these types of munitions tend to drift along the seafloor until they encounter an obstacle that prevents or inhibits movement (e.g., rocks, reef, seagrass), at which time they remain on the seafloor surface or partially self-bury. As noted previously, the direction of flow along the western part of the breakwater is southward toward land, parallel to the causeway.

Receptors and Exposure Scenarios

For decades Mosquito Pier and the causeway have been used by the public and MOV for recreational and commercial uses. Recreational activities along the causeway and beneath the pier are primarily fishing, snorkeling, and SCUBA diving, including guided snorkeling and diving excursions provided by local outfitters. Both recreational and commercial boat launching/docking along the causeway also occur, including docking of a cargo/passenger ferry boat at the approximate mid-point of the western side of the causeway. Additionally, the Puerto Rico government, through joint efforts by the Puerto Rico Integrated Transportation Authority (PRITA) and MOV, is supporting a Mosquito Pier Rehabilitation Project that will include infrastructure improvements associated with passenger and cargo ferry docking in this area.

Based on this, the following receptor groups and exposure scenarios are considered at UXO 16.3:

- Current Recreational and Commercial Users
  - Recreational activities that may result in seafloor contact include wading, swimming, snorkeling, SCUBA diving, paddling sports (kayak, canoe, paddle board), boating (including anchoring), and fishing (both from the pier/causeway and spearfishing). Because lobsters have been observed under the pier, seafloor contact may also occur by any individual attempting to catch lobsters. Commercial users with potential seafloor contact include guided SCUBA/snorkeling tours, boating and fishing charters, and ferry docking for vehicle and personnel transport. For these uses, munitions encounter types can comprise the following:
    - Touched by hand or other part of the body
    - Stepped on
    - Picked up and dropped back in the water or brought out of the water
    - Hit with a boat hull, propeller, anchor, or paddle
    - Hit with a spear (during spear fishing)

    These potential explosive hazard exposure scenarios are anticipated to be limited to the seafloor surface or shallow sub-bottom (i.e., anticipated maximum depth of 12 inches below seafloor surface, which conservatively accounts for the burial mechanisms described in the previous section)
- Future Construction Workers
  - Future potential construction work along the causeway or at Mosquito Pier that may result in seafloor contact include maintenance or repair of existing structures (e.g., concrete ramps, docks and pilings) or construction of new structures (e.g., ramps, docks and pilings, nearshore permanent moorings). For these uses, munitions encounter types may comprise the following:
    - Hit with a construction boat hull, propeller, or spud/anchor
    - Hit with construction equipment such as an excavator
    - Hit during piling installation
    - Stepped on or picked up by workers in shallow water

Worksheet #10: Conceptual Site Model (continued)

These potential explosive hazard exposure scenarios are anticipated to occur at the seafloor surface or in the shallow sub-bottom (i.e., anticipated maximum depth of 12 inches below seafloor surface, which conservatively accounts for the burial mechanisms described in the previous section)

TABLE 10-1
UXO 16.3 Conceptual Site Model
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

UXO 16.3 Conceptual Site Model - Description and Potential Munition Items Summary			
Description and Historical Site Use	UXO 16.3 comprises the underwater area beneath Mosquito Pier and an approximate 100-foot perimeter around the Mosquito Pier and associated causeway. This area is bounded by the shoreline along the causeway and a water depth along the UXO 16.3 perimeter that varies between a few feet near the southern causeway end to 30 feet near the northern end and 45 feet near the northwestern end of the pier. The seafloor structure is predominantly sand with partial macroalgae or seagrass cover except along the southeastern side. The riprap along the causeway, as well as pier pilings and other concrete and metal debris, support a variety of invertebrates and corals. Mosquito Pier was built in 1941 and used for offloading of ordnance from Navy ships to support former military training. For decades Mosquito Pier and the causeway have been used for both commercial and recreational activities. Additionally, the Puerto Rico government, through joint efforts by the Puerto Rico Integrated Transportation Authority and Municipality of Vieques, is supporting a Mosquito Pier Rehabilitation Project that will include infrastructure improvements associated with passenger and cargo ferry docking in this area. Throughout use of the area, no munitions have been reported and no underwater munitions investigations have been conducted, so whether there was a release of munitions into UXO 16.3 from past offloading activities at the pier is unknown.		
Munitions Items Summary	Encountered and Known MEC Items	Potential MEC Items (Based on Possible Transport off of Navy Ships)	
	None	Flares (illumination), Grenades, Mortars, Projectiles, and Rockets	
Receptors and Exposure Pathways	Current and Future Anticipated Receptors	Anticipated Exposure Pathways	Anticipated Exposure Medium (Sediment)
	Public Recreational Users (fishing, boating, wading, swimming, snorkeling, SCUBA diving, paddling sports)	Potential MEC encounter during recreational activities	Surface and shallow sub-bottom (maximum sub-bottom depth of 12 inches based on munitions burial mechanisms)
	Construction Workers	Pier, dock, and boat ramp construction, maintenance, and repairs	Surface and, in some areas, shallow sub-bottom (maximum sub-bottom depth of 12 inches based on munitions burial mechanisms)

Table 10-2
UXO 16.3 Potential Munitions Types
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

UXO 16.3 Potential Munition Types		
Class	Types	Diameter (inches)
Grenades	40 mm Projected Grenade	1.6
	Hand Grenade (various / Mk 2)	2.3
Projectiles	60 mm Mortar	2.4
	81 mm Mortar	3.2
	4.2 in Mortar	4.2
	107 mm Mortar	4.2
	27 mm Projectile	1.1
	30 mm Projectile	1.2
	37 mm Projectile	1.5
	40 mm Projectile	1.6
	75 mm Projectile	3
	76 mm Projectile	3
	90 mm Projectile	3.5
	105 mm Projectile	4.1
	106 mm Projectile	4.2
	120 mm Projectile	4.7
	155 mm Projectile	6.1
	175 mm Projectile	6.9
Rockets	2.36 in Rocket/66 mm Projectile (LAW (M72))	2.6
	2.75 in Rocket	2.75
	3.5 in Rocket	3.5
	83 mm Rocket (SMAW)	3.3
	84 mm Rocket (AT4)	3.3
SAA	5.56 mm	0.2
	7.62 mm	0.3
	.50 caliber	0.5
Flares	Illumination Flare	5.4
	Mk 25 Flare (Marine Marker)	3

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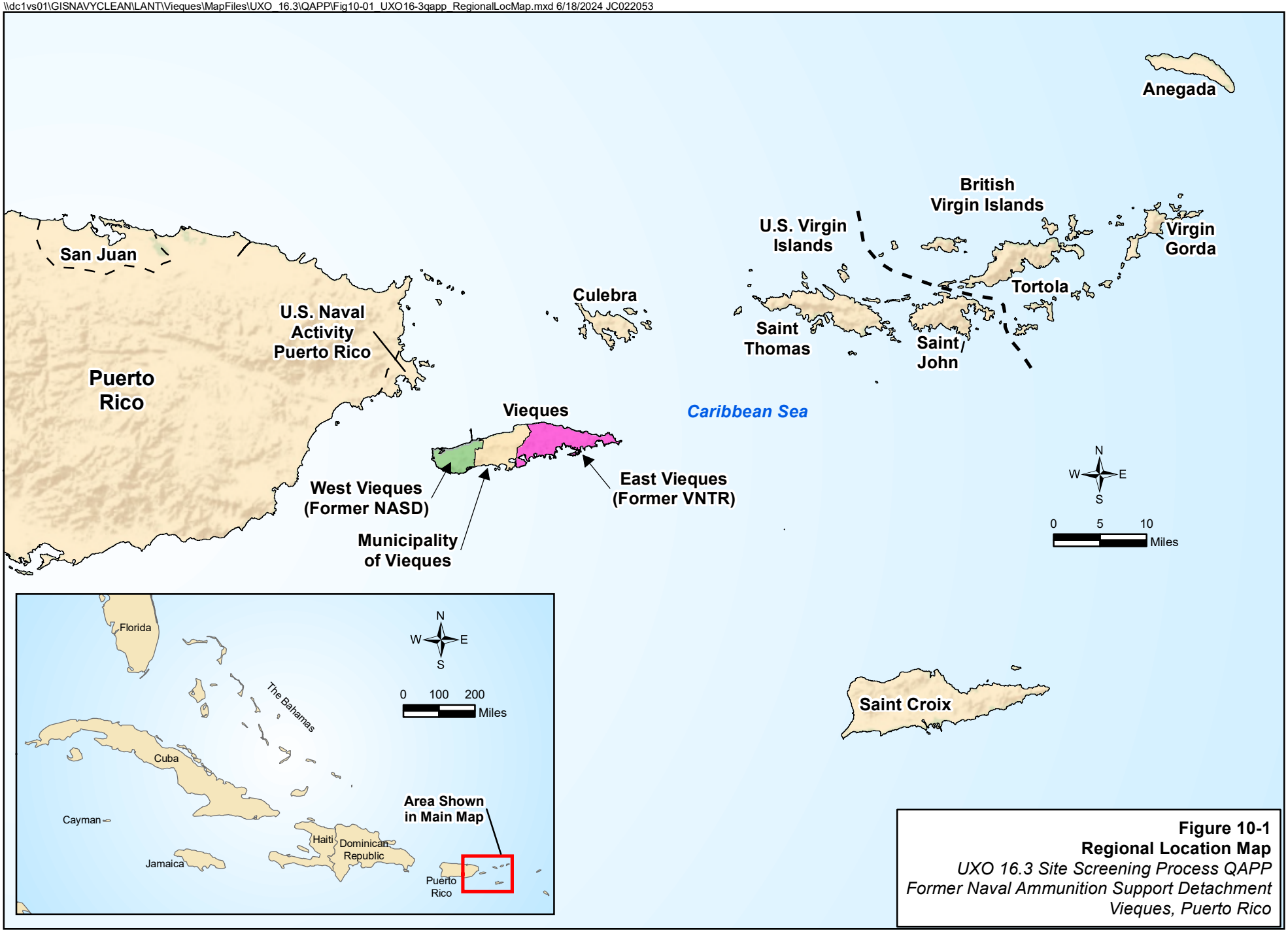

Figure 10-1
Regional Location Map
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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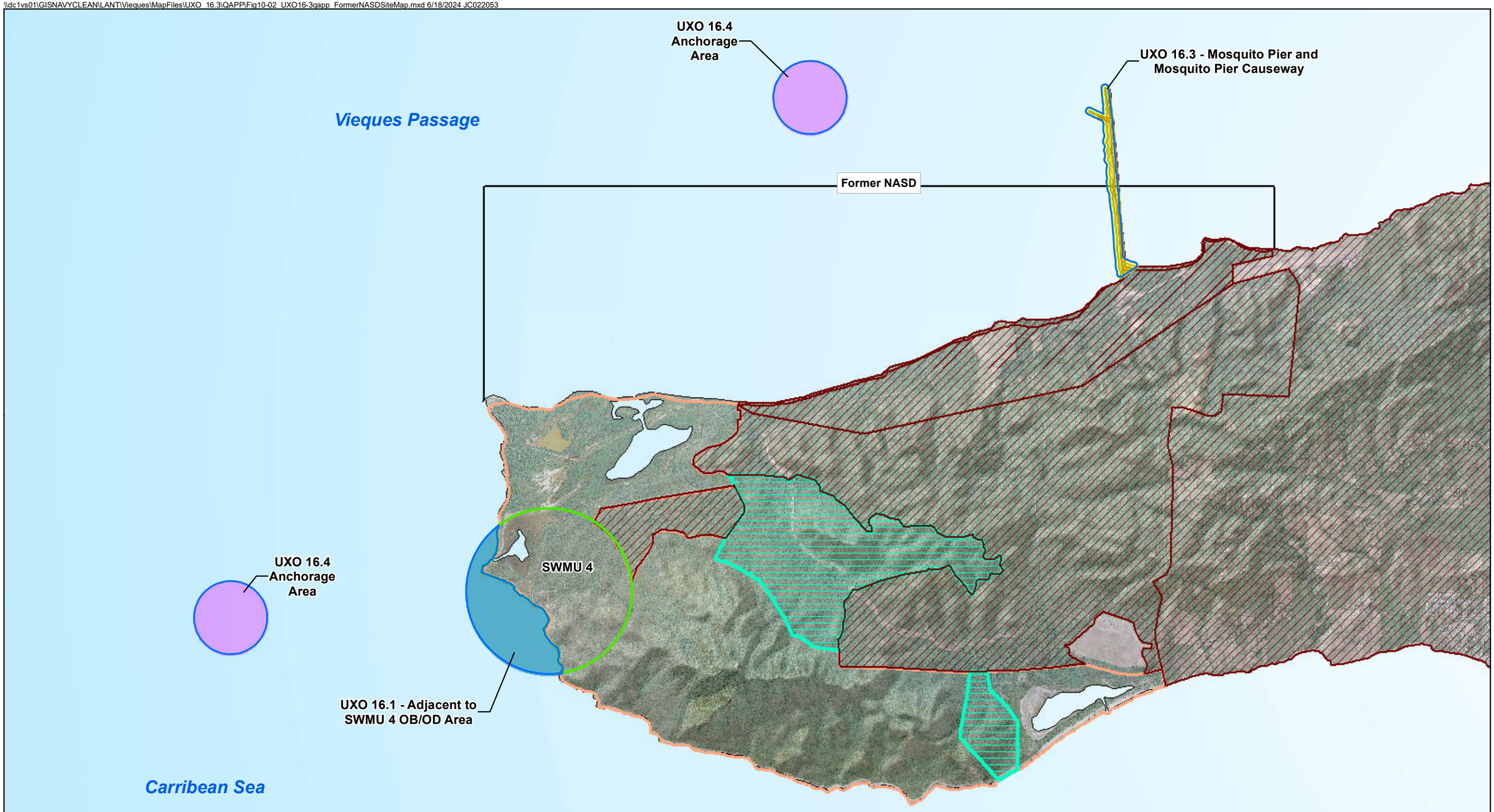

Legend

- UXO 16
- SWMU 4 LUC Boundary
- Municipality of Vieques
- PR Conservation Trust
- Department of Interior

UXO 16 Focus Areas:

- UXO 16.1 - Adjacent to SWMU 4 OB/OD Area
- UXO 16.3 - Mosquito Pier and Mosquito Pier Causeway
- UXO 16.4 - Anchorage Areas

N
W E
S

0 1,700 3,400 5,100
Feet

Figure 10-2
Former NASD Location and UXO 16 Focus Areas
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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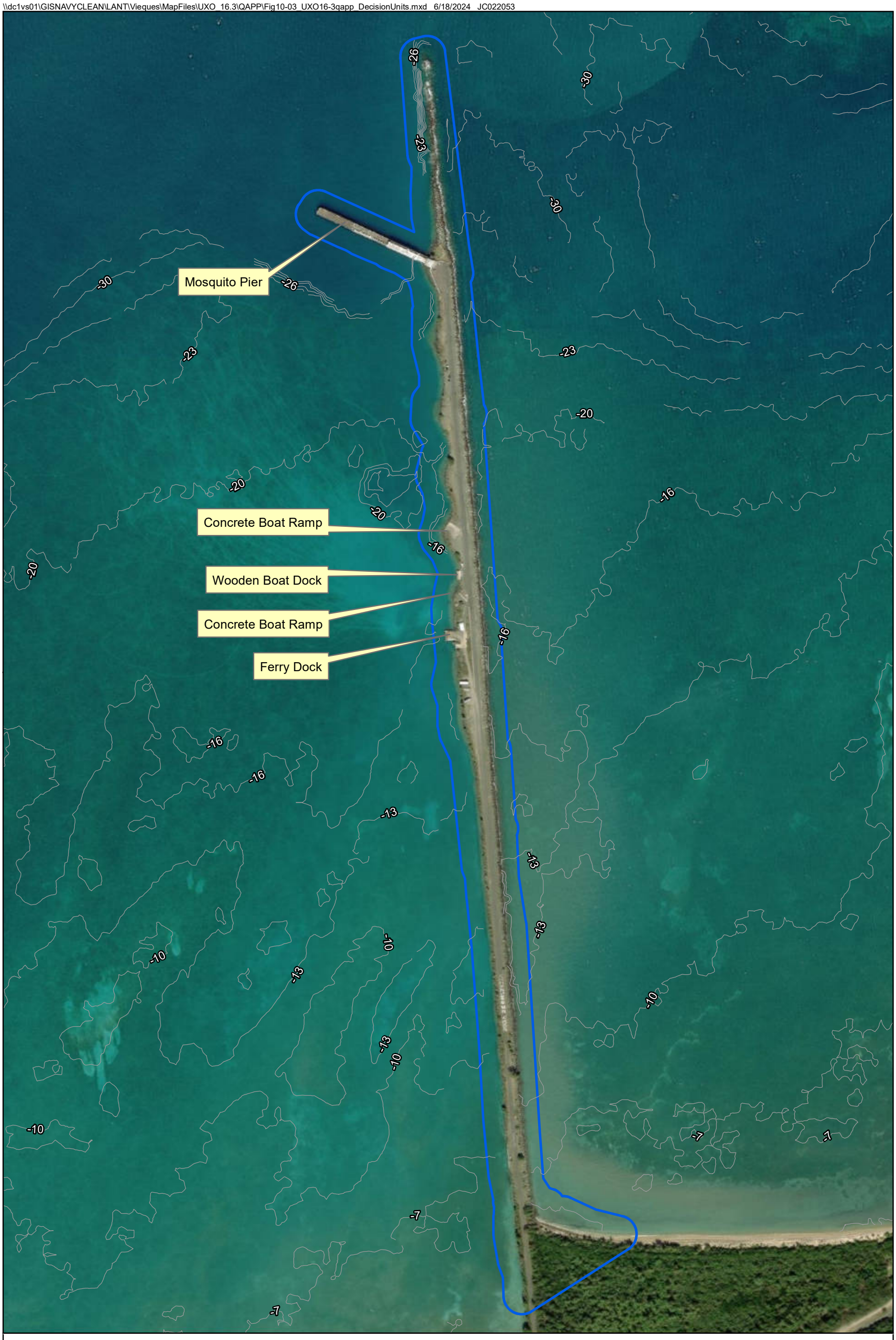

Legend

Bathymetry Contour (feet)

UXO 16 Boundary

N
W E
S

0 250 500

Feet

Figure 10-3
UXO 16.3 Site Features
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

\\dc1vs01\GISNAVYCLEAN\LANT\Vieques\MapFiles\UXO_16.3\QAPP\Fig10-04_UXO16-3qapp_DetectedBottomStructure.mxd 6/18/2024 JC022053

Legend

- UXO 16 Boundary
- Non-Hard Bottom – Sand with No Cover
- Non-Hard Bottom – Sand with Seagrass Cover

N
W E
S

0 250 500
Feet

Source – Geospatial data from NOAA's Ocean Service, National Centers for Coastal Ocean Science (NCCOS) at http://ccma.nos.noaa.gov/ecosystems/coralreef/vieques/data.aspx, and documented in Bauer, L.J., M.S. Kendall, A.G. Zitello, and T. Battista. 2010. Benthic Habitats of Vieques, Puerto Rico

Figure 10-4
Bottom Structures
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

\\dc1vs01\GISNAVYCLEAN\LANT\Vieques\MapFiles\UXO_16.3\QAPP\Fig10-05_UXO16-3qapp_MosquitoPierPhotos.mxd 6/18/2024 JC022053

Legend

UXO 16 Boundary

Figure 10-5
Mosquito Pier Historical and Representative Photos
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

N
W E
S

0 105 210
Feet

Worksheet #11: Data Quality Objectives

This worksheet documents the DQOs following the EPA seven-step Data Quality Objective Process (EPA, 2006). Similar to other munitions sites in the VNTR and NASD, UXO 16.3 will be addressed as described in this QAPP; however, based on the findings, it is possible addressing sub-areas of UXO 16.3 independently may be warranted, which would then be discussed in the UXO 16.3 SSP Report.

The UXO 16.3 SSP areas to be addressed are presented in Figure 11-1.

DQO Step	Description
Step 1 State the Problem	Mosquito Pier and associated causeway were used during historical offloading and transport of munitions. Although a munitions release or an unaddressed munitions release as a result of historical offloading activities is unlikely and there are no known records of munitions findings over decades of both commercial and public use in the UXO 16.3 area, there have been no investigations to verify whether a release(s) occurred that has resulted in the potential presence of an explosive hazard.
Step 2 Identify the Goal	Goal: The goal of the UXO 16.3 SSP is to collect sufficient data to make determinations of: (1) whether there has been a release of MEC, specifically discarded military munitions (DMM), via falling into the water during offloading at Mosquito Pier and associated causeway, resulting in potential explosive hazard(s) within UXO 16.3 that warrants further investigation (i.e., RI) or action, and (2) whether NFA (i.e., UU/UE) is appropriate for the area if it is concluded a release did not likely occur and/or there is no explosive hazard likely present. It is noted here that given the primary SSP objective is to determine the presence or suggested absence of explosive hazard, the approach focuses on identifying MEC. However, all MPPEH found will be recorded and, to the extent possible, identified, because MPPEH will be included in the evaluation of potential explosive hazard presence/suggested absence. However, simply the presence of MPPEH will not necessarily be interpreted to mean there is an explosive hazard. For example, an empty ammunition can would be considered MPPEH upon initial discovery but would ultimately be determined to be range-related debris (RRD), which poses no explosive hazard. For this reason, a lines-of-evidence evaluation will be performed for the collective MPPEH findings, if any, to determine whether their occurrence is suggestive of a potential explosive hazard presence. It is also noted here that formal MEC identification requires personnel qualified and authorized for recognizing, assessing, and documenting the explosives safety status of all items suspected of being MEC in accordance with the requirements of OP 5, Volume 1, Section 13-15 (NAVSEA, 2023). Therefore, text herein regarding identifying "MEC" during the instrument-aided visual survey or intrusive investigation of sub-seafloor metallic anomalies is referring to the final determination, not the identification upon initial discovery. Further, text regarding "other MPPEH" is referring to MPPEH that is ultimately determined not to be MEC. Principle Study Questions: Is MEC present within UXO 16.3 (Figure 11-1)? Have data of sufficient quantity and quality been collected to determine the appropriate path forward for UXO 16.3? Alternative Outcomes: Based on the Principal Study Questions, the potential outcomes are: • MEC and other MPPEH are not found on the seafloor surface or within the sub-bottom and the data are determined to be of sufficient quantity and quality to make a determination of whether NFA (i.e., UU/UE) is appropriate for the area. • MEC and other MPPEH are not found on the seafloor surface or within the sub-bottom but the data are determined to be of insufficient quantity and/or quality to make a determination of whether NFA (i.e., UU/UE) is appropriate for the area.

Worksheet #11: Data Quality Objectives (continued)

DQO Step	Description
	• MEC is found on the seafloor surface or within the sub-bottom, indicating RI and/or action is warranted. In the absence of finding MEC, whether finding MPPEH indicates RI and/or action is warranted will depend on a lines-of-evidence evaluation (see Type of Inference and Decision Rules in Step 5) and the quantity and quality of the data. How Data will be Used in Solving the Problem: Instrument-aided visual data regarding the presence/absence of MEC/MPPEH on the seafloor surface and data from intrusive investigation of sub-bottom metallic anomalies will be collected, as summarized in Step 5, to achieve the SSP Goal, including answering the Principal Study Questions and determining the appropriate path forward for UXO 16.3.
Step 3 Identify Information Inputs	The information inputs for the UXO 16.3 SSP are: • Current CSM (Worksheet #10), including the types of munitions anticipated to have been offloaded based on munitions used for land-based training previously identified within the former NASD and VNTR (Table 10-2). • Mapped areas of seafloor structure (e.g., sand, coral, seagrass, etc.) within UXO 16.3 as reported by NOAAs Biomapper (Bauer and Kendall, 2010). • The horizontal and vertical boundaries for each DU investigated as part of the SSP. • Data collected by instrument-aided visual survey of the seafloor surface, including locations of audible signals detected by an underwater all-metals detection instrument. • Seafloor surface observations and intrusive investigation results (to a maximum depth of 12 inches), including (for any MPPEH identified): – MPPEH determinations (i.e., MEC or munitions debris [MD] and types, if possible) – Photographs – Other notable observations
Step 4 Define Spatial and Temporal Boundaries	Target Population: The target population includes the types of ordnance anticipated to have been offloaded at Mosquito Pier (Table 10-2). Spatial Boundaries: Spatial boundaries include both the horizontal (lateral) seafloor area and vertical (sub-bottom) depth established for each Decision Unit (DU) within UXO 16.3 (Figure 11-1). Establishing the spatial boundary for UXO 16.3 considers: (1) The horizontal extent of MEC potentially present, which is within the boundary shown in Figure 11-1 based on the CSM. (2) The predicted depth of current and future subseafloor exposure to potential MEC based on current and anticipated future use and munitions mobility and burial mechanisms. (3) Areas that are inaccessible to investigation for any reason (including the presence of structures [i.e., pilings] and other non-munitions related debris on the seafloor that is impractical to move). Inaccessible areas will be identified and, if present, their extents defined. Any data gaps or data usability implications related to inaccessible areas will be discussed in the UXO 16.3 SSP Report. Horizontal Boundary: The conceptualized horizontal boundary of the UXO 16.3 investigation area is shown on Figure 11-1; however, the boundary is approximate and the final boundary will be established based on field conditions at the time of the SSP and documented in the UXO 16.3 SSP Report. The horizonal boundary comprises the underwater areas beneath Mosquito Pier and an approximate 100-foot

Worksheet #11: Data Quality Objectives (continued)

DQO Step	Description
	perimeter around Mosquito Pier and associated causeway. Based on the site history and the potential to modify the site boundary based on the SSP findings, UXO 16.3 is divided into three DUs (see Figure 11-1) as follows: • DU 1 – Mosquito Pier (approximately 5 acres): DU 1 comprises the underwater area directly under the Mosquito Pier, within a 100-foot perimeter around Mosquito Pier, and approximately 75 feet north and south along the causeway. This area conservatively accounts for any location where munitions may have fallen into the water during offloading from ammunition ships onto the pier. This area is defined as a separate DU because although unlikely, if there was a munitions release, it represents the area in which it would have occurred and the area in which any munitions present would most likely be located. • DU 2 – Western Mosquito Pier Causeway (approximately 14 acres): This DU comprises the underwater area on the western side of the Mosquito Pier causeway extending from the shoreline to 100 feet offshore starting at the southern boundary of DU 1. For the purposes of DU designation and investigation, the western side of the causeway (i.e., DU 2) is distinguished from the northern and eastern side of the causeway (i.e., DU 3) because it is on the same side of the causeway as the pier (i.e., where munitions offloading occurred) and accounts for the potential for, albeit unlikely, munitions transport from around the pier southward, parallel to the causeway in response to coastal dynamics in this area, as described in Worksheet #10. • DU 3 – Northern and Eastern Mosquito Pier Causeway (approximately 18 acres): This DU comprises the underwater area on the eastern side of the Mosquito Pier causeway extending from the shoreline to 100 feet offshore starting at the northern boundary of DU 1 and extending around the northern point of the causeway and down the eastern side. Based on the conceptual release mechanism and the coastal dynamics in the area, the potential presence of munitions within DU 3 as a result of historical munitions offloading at the pier is infinitesimal. <u>Vertical Boundary</u>: The maximum depth of intrusive investigation for the UXO 16.3 SSP activities within DU 1 and DU 2 is 12 inches below the seafloor (Table 11-1). The intrusive vertical boundary for the SSP was established considering the munitions potentially present with in UXO 16.3, the anticipated burial depths of munitions based on the CSM (see Worksheet #10), which indicates any MEC present within UXO 16.3 (Table 10-2) would be on the seafloor surface, partially buried, or fully buried to a maximum depth of its diameter (i.e., less than about 12 inches), and depth of reliable detection the geophysical technology to be utilized in support of the SSP. As shown in Table 10-2, the diameters of munitions potentially present in UXO 16.3 range from ¼ inch to 7 inches. Based on this, the analog detection instruments to be used for the SSP should be capable of reliably detecting the munitions in Table 10-2, even accounting for potential storm events that may have fostered burial deeper than approximately one diameter. As indicated previously, the potential for munitions associated with historical offloading operations at Mosquito Pier to be present in DU 3 is infinitesimal. Docking and offloading took place on the west side of the causeway and, in the unlikely scenario where an individual munition may have been ultimately left and was subject to transport rather than burial, coastal dynamics would have moved it in a southern direction toward land, not north into DU 3. Therefore, identifying and intrusively investigating sub-bottom anomalies in DU 3 is not warranted as it would result in considerable resources being devoted to excavating anomalies that would be non-munitions-related debris (NMRD).

Worksheet #11: Data Quality Objectives (continued)

DQO Step	Description
	While the bottom type within UXO 16.3 is predominantly sand with no cover and sand with seagrass (Figure 10-4), it is possible hardbottom may be encountered within the first 12 inches below seafloor. If hardbottom is encountered during any intrusive activities of a subseafloor anomaly prior to maximum removal depth, the removal objective at this location will be satisfied as munitions dropped into the water during offloading are unlikely to have penetrated hardbottom nor will foreseeable construction activities extend into the hardbottom. Temporal Boundaries: There are no substantial temporal boundaries anticipated that would likely impact the ability to collect the intended data collection. Planned data collection activities can be readily coordinated to account for factors such as the Atlantic hurricane season, recreational and commercial fishing and ferrying activities, and the potential presence of listed species within the Endangered Species Act.
Step 5 Develop the Project Data Collection and Analysis Approach	To achieve the project objectives, the following activities will be performed: Underwater Instrument-aided Visual Survey of the Seafloor Surface and Intrusive Investigation of Sub-bottom Metallic Anomalies: An underwater instrument-aided visual survey will be performed throughout the accessible areas within the UXO 16.3 boundary to locate MEC and other MPPEH (if present) on the surface or partially buried and identify sub-bottom metallic anomalies for potential intrusive investigation, as described below. Worksheet #17 Provides additional details. Seafloor Surface Instrument-aided Visual Survey Approach and Rationale Based on site history, it is anticipated that DU 1 (Figure 11-1) has the highest potential for MEC presence, as described in Step 4. While no known historical munitions operations occurred within DU 2 and DU 3, they are included in the SSP based on the original boundary designation and because they bound the causeway along which munitions were transported via vehicle(s) after being offloaded from the ships. For diving logistical purposes, each DU will be divided into approximately 100-foot by 100-foot survey grids. Munitions divers will swim along transects spaced to provide coverage throughout the accessible areas within each investigation grid. Two munitions divers will perform surveying along each transect. Each diver will sweep an underwater all-metals detection instrument back and forth across an approximate 4-foot swath (i.e., the lateral coverage by each munitions diver). Divers performing the surveys will be staggered on each transect in such a manner as to avoid instrument interference and together producing a transect width of 8 feet. Adjacent transects will be placed such that they border the previous transects, thereby helping to ensure coverage throughout the accessible area of each grid. Within DU 1 and DU 2, the location of any sub-bottom metallic anomaly detected will be recorded and potentially intrusively investigated immediately or marked with a pin flag or other temporary marking device for re-acquisition and intrusive investigation. A separate diver with an underwater tablet with GPS capabilities (e.g., Shark Technologies Dive Tablet 2 [hereafter referred to as Dive Tablet]) will be utilized for data collection and geo-spatial tracking. Intrusive Investigation of Sub-bottom Metallic Anomalies Approach and Rationale For planning purposes, approximately 25 percent of metallic anomalies identified in DU 1 and 10 percent of metallic anomalies identified in DU 2 during the instrument-aided visual survey will be intrusively investigated. This approach assumes the actual number and density of sub-bottom

Worksheet #11: Data Quality Objectives (continued)

DQO Step	Description
	anomalies represented by 25 percent and 10 percent, respectively, can be intrusively investigated with the available resources in a reasonable time. Because this threshold number/density of anomalies is not an exact, nor are target percentages synonymous with achieving the SSP objective, ultimately, the determination of the number of anomalies intrusively investigated will be made using professional judgment as the data are being gathered. Regardless of the percentage/number of anomalies actually intrusively investigated, those quantities will be discussed in the SSP Report, together with any impact the number and locations of anomalies selected for intrusive investigation have on making the determinations identified in DQO Step 2. The approach for selecting sub-bottom anomalies for intrusive investigation will be such that intrusive investigations will be spatially distributed throughout each DU, as was done during the UXO 16.2 RI. The rationale for where intrusive investigations of sub-bottom metallic anomalies will be conducted is as follows: • DU 1 – Mosquito Pier: Highest probability of potential munitions present due to proximity of historical munitions offloading activities and likelihood of self-burial as the dominant mobility mechanism at this location. Also, this is the area of the anticipated highest frequency human contact with the bottom based on the current and likely future recreational activities conducted there. • DU 2 – Western Mosquito Pier Causeway: Buried munitions are unlikely in this area (see DQO Step 4), but sub-bottom anomalies will be intrusively investigated as a conservative measure because any munitions transport from the pier would have likely been southward into DU 2. • DU 3 – As indicated previously, munitions offloading took place at Mosquito Pier, which is on the western side of the causeway/breakwater and approximately 1,000 feet south of the seaward end of the causeway/breakwater. Further, based on coastal dynamics in this area, any munitions dropped into the water at the pier during offloading would not have migrated north around the end of the causeway/breakwater. Therefore, the potential presence of munitions within DU 3 as a result of historical munitions offloading at the pier is infinitesimal. <u>Parameters of Interest</u>: (1) MEC and other MPPEH identified on the seafloor surface or partially buried but visible above the seafloor surface. (2) Locations that produce an audible output, metal deflection, and or numeric output indicating the presence of a sub-bottom metallic object. (3) MEC and other MPPEH in the sub-bottom identified via intrusive investigation. <u>Assumptions</u>: The UXO 16.3 horizontal and vertical boundaries conservatively represent the extent to which MEC and other MPPEH are present based on proximity to historical operations, munitions characteristics, and mobility and burial influence by coastal dynamic mechanisms. If present, munitions would most likely be located within DU 1 and much less likely in DU 2. The potential presence of munitions in DU 3 is infinitesimal. <u>Type of Inference</u>: Identification of MEC on or protruding from the seafloor or identified via intrusive investigation will indicate the presence of an explosive hazard warranting further investigation or action. As indicated in DQO Step 2, finding other MPPEH may ultimately indicate the potential presence of an explosive hazard (warranting further investigation or action), but this determination will be

Worksheet #11: Data Quality Objectives (continued)

DQO Step	Description
	based on a lines-of-evidence evaluation, including the type (source) and quantity of MPPEH, etc. For example, if the only MPPEH found is a single, empty ammunition can, it may be concluded an explosive hazard is not likely present. Absence of MEC and other MPPEH will indicate an explosive hazard is unlikely present on the seafloor surface and in the sub-bottom. Decision Rules: (1) IF the DUA indicates the data are of sufficient quality and quantity to make a determination of a release (i.e., presence/absence of explosive hazards) and whether RI, action, or NFA (i.e., UU/UE) is warranted, THEN Decision Rules 3 through 5 will be considered and the applicable determination will be recommended in the SSP Report, together with the supporting lines of evidence. (2) IF the DUA indicates the data are of insufficient quality or quantity to make a determination of a release (i.e., presence/absence of explosive hazards) and whether RI, action, or NFA (i.e., UU/UE) is warranted, THEN the Navy and regulatory agencies will jointly consider what additional data would be necessary to achieve a sufficient data set. (3) IF MEC and other MPPEH are not found on the seafloor surface or within the sub-bottom, THEN a munitions release associated with past offloading did not likely occur (or was immediately addressed) and an explosive hazard is not likely present. Therefore, in the absence of any other information to the contrary, the area warrants consideration for NFA (i.e., UU/UE). (4) IF MEC is found on the seafloor surface or within the sub-bottom, THEN a release will have been confirmed and the Navy and regulatory agencies will jointly consider whether an RI and/or action is warranted. (5) IF MEC is not found but MPPEH is found, THEN the lines of evidence associated with the MPPEH will be jointly evaluated by the Navy and regulatory agencies to determine whether RI, action, or NFA (i.e., UU/UE) is warranted. Of note, any MEC or MPPEH identified on the seafloor surface or in the sub-bottom will be properly documented, removed, and disposed of in accordance with protocols in place for the munitions remedial/removal actions currently occurring at Vieques.
Step 6 Specify Project-specific Measurement Performance Criteria	Worksheet #12 presents the project specific MPC for the UXO 16.3 SSP. Project specific MPC are the criteria that collected data must meet to satisfy the DQOs. Failure to achieve the MPC may have an impact on end uses of the data, which will be discussed in the DUA, as documented in Worksheet #37.
Step 7 Survey Design and Project Workflow	The MPC established during Step 6 of the DQO process (documented in Worksheet #12) were used to develop the SSP approach, which is described in Worksheet #17. The SSP approach is broken down into a series of specific processes and data collection steps, termed definable feature of work (DFW). Figure 17-1 provides the decision tree that will be used in the execution of SSP activities to evaluate the conformance of the specific DFWs to established MPCs.

TABLE 11-1
UXO 16.3 Site Screening Process Summary Table
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

UXO 16.3 Decision Units	Approximate Area	Buried Anomaly Approach	Maximum Investigation Depth (inches below ground surface)
Decision Unit 1 - Mosquito Pier	5	Approximately 25 percent of buried anomalies will be intrusively investigated	12
Decision Unit 2 - Western Causeway	14	Approximately 10 percent of buried anomalies will be intrusively investigated	12
Decision Unit 3 - Northern and Eastern Causeway	18	No buried anomalies will be intrusively investigated	Surface only
Total:	37		

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Legend

UXO 16 Boundary

UXO 16.3 Decision Units:

- Decision Unit 1: Mosquito Pier - Surface and Sub-seafloor Characterization (includes area under Mosquito Pier) (5 acres)
- Decision Unit 2 - Western Mosquito Pier Causeway -Surface and Sub-seafloor Characterization (14 acres)
- Decision Unit 3 - Northern and Eastern Mosquito Pier Causeway - Surface Characterization (18 acres)

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Figure 11-1
UXO 16.3 Site Screening Process Approach
UXO 16.3 Site Screening Process QAPP
Former Naval Ammunition Support Detachment
Vieques, Puerto Rico

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Worksheet #12: Measurement Performance Criteria

This worksheet documents the project-specific MPC in terms of data quality indicators (that is, accuracy, sensitivity, representativeness, completeness, and comparability) for the UXO 16.3 SSP. Accuracy, sensitivity, and completeness can be measured quantitatively. Representativeness and comparability can only be evaluated qualitatively. These MPC establish the minimum performance specifications that the UXO 16.3 SSP must meet to ensure collected data will satisfy the DQOs documented in Steps 1-5 in Worksheet #11. They are the criteria against which the Data Usability Assessment (DUA) will be conducted as documented on Worksheet #37. The DUA must evaluate and document the data quality and decision-making impacts of any failures to meet these criteria (Worksheet #37). The MPCs for the UXO 16.3 SSP activities are established in Table 12-1. While an SSP and not an RI is being performed at UXO 16.3, these MPCs were developed from the guidance provided in Uniform Federal Policy for Quality Assurance Project Plan Munitions Response QAPP Toolkit Module 1: Remedial Investigation (RI)/Feasibility Study (FS) (IDQTF, 2020) and tailored to be specific to the SSP approach.

Table 12-1. Measurement Performance Criteria – Site Screening Process Activities

Measurement Performance Activity	Data Quality Indicator	Specification	Activity Used to Assess Performance
Site Preparation			
1. Accessibility	Completeness	All areas inaccessible to the SSP within the established UXO 16.3 boundary (including areas where debris is on the seafloor that is impractical to move) are delineated in GIS. Inaccessible areas also include areas where diving is deemed unsafe (e.g., potentially high sea or current conditions).	Record/document inaccessible areas identified prior to and during SSP fieldwork and review the GIS.
Survey Design			
1. Planned survey coverage	Representativeness/ Completeness	Conceptualized transect spacing will be sufficient to cover the accessible areas within UXO 16.3. Actual transect course is recorded and evaluated. Transects may be realigned due to site conditions (i.e., sea conditions, underwater obstacles/debris, etc.). If transects are realigned, the goal will remain coverage throughout accessible areas and documentation of areas deemed inaccessible.	Actual coverage is recorded and evaluated against plan by the Unexploded Ordnance (UXO) Quality Control Specialist (UXOQCS). If data are not recorded for a transect or portion of a transect (e.g., instrument failure, particular under-pier transect segment not recorded) that transect or portion of the transect will be resurveyed.

Worksheet #12: Measurement Performance Criteria (continued)

Measurement Performance Activity	Data Quality Indicator	Specification	Activity Used to Assess Performance
2. Detection threshold (analog instrument function test)	Sensitivity	Underwater analog all-metals detection instruments used by munitions divers will have a positive response to all industry standard objects (ISOs) during in-water and out-of-water testing. Analog instruments will be checked once at the beginning of the day at a temporary Instrument Test Strip (ITS) prior to the day's diving activities to ensure the equipment is functioning properly. See Worksheet #17 for additional details. Analog instruments will be tested out of the water (hereafter referred to as an air test) using one small ISO prior to each dive, after battery changes, and end of each day (i.e., following last dive).	Analog all-metals detection instruments will be in-water tested at a temporary underwater ITS consisting of two small[a] ISOs with one placed horizontally at approximately 7 inches beneath the sand and the other ISO placed vertically at approximately 12 inches below the sand. The instrument will detect all ISOs or it will be repaired or removed from service and replaced.[b] While the ITS is intended to test functionality, because the ISOs will be buried at and deeper than the maximum expected depth of any item in Table 10-2, the test will also serve to confirm the instrument will detect the items to the expected maximum burial depth, as described in Worksheet 11 Step 4. Analog all-metal detection instruments will detect (i.e., have an audible response) to the small ISO air test or it will be repaired or removed from service and replaced. Analog detection instrument functionality tests will be observed and documented by the UXOQCS (or designee) in the Daily Report.
Data Acquisition			
1. Positioning requirement (GPS instrument function test)	Completeness/ Accuracy/ Precision	Benchmarks and/or control points will be verified or established for underwater survey equipment (i.e., Diver Tablet). Measured positions of benchmark(s)/control point(s) must be within 2-meters (78 inches). Survey boundaries (e.g., grid corners) tied to the Universal Transverse Mercator (UTM) Zone 20 north, projection North	GPS instrument function tests will be collected and compared against established benchmarks/control point(s) at the beginning of each day prior to data collection.

Worksheet #12: Measurement Performance Criteria (continued)

Measurement Performance Activity	Data Quality Indicator	Specification	Activity Used to Assess Performance
		American Datum of 1983 (NAD83) horizontal datum project coordinate system, units in meters.	UXOQCS verifies site survey controls are completed/repeated within tolerances in Daily Report.
2. Survey coverage (transects)	Accuracy/ Completeness	Accessible areas are surveyed (see Worksheet #17 for additional details).	Actual transect course is recorded and evaluated for each DU.
3. Survey coverage: maximum speed on transect (analog)	Accuracy/ Completeness	Diver swim speed is appropriate to allow a continuous 4-foot lateral coverage by the underwater instrument per munitions diver.	UXOQCS provides oversight of a minimum of 10 percent of daily activities. UXOQCS will provide verification in Daily Report.
Sub-seafloor Anomaly Resolution and Excavation			
1. Anomaly resolution (analog)	Accuracy/ Completeness	Specific to DU 1 and DU 2, buried anomalies identified for intrusive investigation for characterization are completed. Excavation must continue vertically until anomaly is: (1) encountered and characterized, (2) determined to be below the 12-inch maximum investigation depth, (3) hardbottom (or other obstruction) is encountered.	UXOQCS oversight and verification in Daily Report.
2. Intrusive investigation	Completeness	Complete project-specific database with all intrusive records.	Review of project database by UXOQCS.

[a] 1-inch diameter, 4-inches long

[b] The rationale for the size and depth placements of the ISOs in the instrument test strip (ITS) are based on the following: (1) small ISOs are used as they represent smaller and varied munitions items, (2) small ISOs will produce a large enough detection response for the function test, (3) small ISOs are readily available, industry accepted, and able to be easily placed and removed (as needed), (4) the maximum investigation depth (i.e., approximately 12 inches below the seafloor), at which depth a small ISO is placed in the vertical orientation (most favorable), and (5), the investigation range (i.e., 0 to 12 inches) whereby a small ISO is placed in a horizontal orientation (least favorable) at approximately 7 inches to produce a varied detection response from the instrument to test functionality.

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Worksheet #13: Secondary Data Uses and Limitations

Data Type	Source	Data Uses Relative to Current Project	Factors Affecting the Reliability of Data and Limitations on Data Use
Ecological characterization	An Ecological Characterization of the Marine Resources of Vieques, Puerto Rico, Part II: Field Studies of Habitats, Nutrients, Contaminants, Fish, and Benthic Communities (Bauer and Kendall, 2010)	Report provides detailed descriptions of underwater geomorphological structures and biological cover, as well as associated online GIS layers, all of which support project planning and survey transect design.	None noted.
Bathymetry	Lidar derived contours from NOAA 2008 An Ecological Characterization of the Marine Resources of Vieques, Puerto Rico, Part I: Historical Data Synthesis (Bauer et al., 2008)	Approximate water depths within and surrounding the UXO 16.3 boundary.	None noted.
Information on potential munition types historically encountered in underwater and terrestrial areas[a]	Expanded Range Assessment/Site Inspection Report, Former Vieques Naval Training Range (VNTR), Vieques, Puerto Rico (CH2M, 2010) UXO 16 Underwater Wide Area Assessment Report, Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range (CH2M, 2018a) Beach Dynamics Investigation Report, Former Naval Ammunition Support Detachment and Former Vieques Naval Training Range (CH2M, 2018b) Munitions Response Program Database (Munitions Database for the former VNTR, NASD, and UXO 16)	Historical geophysical anomaly data. Historical munitions-related items encountered on land and underwater.	There are no known reliability issues or limitations on the use of the data as presented in the historical data; however, as with all data collected as part of an MEC investigation, the DUAs will be reviewed to determine any limitations on data use.
Mosquito Pier Rehabilitation Project plans	RITA letter regarding the Mosquito Pier Rehabilitation Project (Agosto pers. comm., 2024)	Anticipated construction activities, locations, and timeframes (anticipated November 2024)	None noted.

[a] The munitions from these sources that are applicable to UXO 16.3 are provided in Table 10-2.

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Worksheet #14 & 16: Project Tasks & Schedule

DFW	Activity	Responsible Party	Planned Start Date	Planned Completion Date	Deliverable(s)[a]	Deliverable Due Date
1	Pre-mobilization Activities	SSP Contractor	Estimated 2024[b]	TBD[b]	Explosive Safety Submission (ESS) QAPP (interagency decision point) Notification to interagency team denoting anticipated start date	Documents accepted/approved prior to field mobilization
2	Mobilization	SSP Contractor	Estimated 2024	TBD	Daily Report(s)	Daily
3	Site Preparation	SSP Contractor	Estimated 2024	TBD	Daily Report(s)	Daily
4	MEC/MPPEH Transect Survey	SSP Contractor	Estimated 2024	TBD	Daily Report(s)	Daily
5	Quality Control	SSP Contractor	Estimated 2024	TBD	Daily Report(s)	Daily
6	MEC/MPPEH Handling and Disposal	SSP Contractor	Estimated 2024	TBD	Daily Report (including Disposal Records [in accordance with ESS])	Within 30 days of completing intrusive investigations
7	Final DUA	SSP Contractor	Estimated 2024	TBD	Final DUA (see DFW 9)	See DFW 9
8	Demobilization	SSP Contractor	Estimated 2024	TBD	Daily Report	Daily
9	UXO 16.3 SSP Report Preparation	SSP Contractor	Estimated 2025	TBD	UXO 16.3 SSP Report, including DUA and updated CSM (interagency decision point)	Draft UXO 16.3 SSP Report delivered to Navy within 90 days of project completion

[a] The QAPP and the UXO 16.3 SSP Report will be provided for regulatory review and represent decision points for the UXO 16.3 SSP QAPP (i.e., mobilization and completion). All other various deliverables, such as daily reports, generated during the UXO 16.3 SSP are interim and will not be provided separately, but instead pertinent information from them will be included in the UXO 16.3 SSP Report.

[b] The general start and completion dates are estimated at the time of QAPP preparation. More specific planned and actual dates will be communicated once determined via the Site Management Plan, Vieques Document/Field Schedule Reminder, and/or monthly Vieques ERP Team calls.

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Worksheet #17: Survey Design and Project Workflow

This worksheet provides descriptions for each DFW associated with the UXO 16.3 SSP. It highlights the investigation methodologies, QC components, decision points, and key deliverables, as identified in Worksheet #14 & 16. Figure 17-1 provides the decision tree associated with these tasks.

DFW 1: Pre-mobilization Activities

Pre-mobilization activities include preparation of various plans (including this QAPP) and establishing data collection protocol in advance of mobilization.

Planning Documents: In addition to this QAPP, the following relevant planning documents for implementation of the UXO 16.3 SSP will be completed prior to mobilization:

- ESS – An ESS that addresses explosives safety requirements for the SSP will be submitted to the Naval Ordnance Safety and Security Activity (NOSSA) and the DDESB that provides the protocol for addressing explosive safety during SSP implementation.

Standard Operating Procedures (SOPs): SSP activities will be performed per the SSP Contractor's SOPs (where applicable). In the event there is a conflict between a particular element(s) of specific SOPs and this QAPP, the applicable element(s) of this QAPP take precedence.

- Attachment A includes the SSP Contractor SOPs. Note: CH2M is a wholly owned subsidiary of Jacobs. As such, SOPs displaying the Jacobs designation are applicable to CH2M.

GIS: A sitewide GIS database has been previously established for the former NASD, and relevant geospatial-related data will be managed in the GIS database. The database can use and export Environmental Systems Research Institute, Inc. compliant formats (shape files, coverages, or geodatabases) to present GIS data during the project, with supporting tabular data provided in Microsoft Excel and/or Microsoft Access. In addition, each GIS dataset is accompanied by metadata conforming to the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata and will be provided in a geodatabase compliant with the Spatial Data Standards for Facilities, Infrastructure, and Environment (Version 4.0).

This GIS database, along with GIS software platforms (e.g., ArcGIS), were used to establish the conceptualized transects and will be used to plot the actual and tracked coverage of transects in addition to discrete waypoints and associated geo-referenced photographs (i.e., munitions items).

Control Points*:* The location, identification, coordinates, and elevations of control points that are recovered and/or established at the site will be plotted on one or more site maps. Each control point will be identified on the map by its name and number and the final adjusted coordinates. Control points include reference benchmarks as well as quality control check points to verify GPS function tests.

Digital Data*:* Geospatial data will be provided in metric units. Location information will be collected via the GPS receiver on the underwater data collection device (i.e., Dive Tablet) for all SSP activities so the position of each munitions item(s) (if present) and buried anomalies can be included in the GIS environment.

Data Management Systems

Survey123 (Geophysical Data Management Collector): Survey123 is a field data gathering solution that is part of the ArcGIS platform. Survey123 will be utilized for daily data management. Within Survey123, forms (or surveys) are completed by the field team using an application on a tablet or computer in pre-authored forms that utilize various drop-down menus. Once completed, forms are submitted directly to ArcGIS online, where they can be viewed and analyzed. The uploaded information will be verified by QC personnel.

Worksheet #17: Survey Design and Project Workflow (continued)

Munitions Response Program Enterprise (MEC Database): The Navy Comprehensive Long-term Environmental Action, Navy (CLEAN) Vieques Munitions Response Program (MRP) Enterprise system for recording field notes and other pertinent information collected/noted during field operations (i.e., seafloor surface items and intrusive investigation results) will be utilized for this SSP. Information is entered in a forms-based operating system by field personnel and uploaded/verified by QC personnel.

Documentation: QAPP, ESS, notification to ERP team denoting anticipated start date

Decision Points: The key decision point in the pre-mobilization process is the interagency consensus on the SSP rationale, approach, and decision process that culminates in the final QAPP. Upon approval, an anticipated start date will be determined and communicated to the ERP Team.

DFW 2: Mobilization

Prior to the commencement of the fieldwork, the key project staff will meet to ensure all necessary equipment, tools, and safety items have been collected and are ready for shipment. Additionally, key project staff will meet to ensure understanding of the objectives and scope for the SSP and any necessary training to complete the fieldwork in accordance with this QAPP. The following general activities will be performed as part of mobilization:

1. Identify/procure, package, ship, and inventory project field equipment
2. Verify emergency communication protocols and procedures
3. Determine field operations schedule and coordinate any logistical support (e.g., MOV, PRDNER, etc.)
4. Assemble and transport the work force
5. Ensure project documentation is in order, and that field project personnel understand their responsibilities regarding data collection and documentation requirements

As part of the mobilization efforts, a kick-off and site safety meeting will be conducted. This meeting will include a review of the field-related elements of this QAPP and any related instructions. Additional project and safety meetings will occur as needed, and as new personnel or visitors arrive at the site.

Documentation: Daily Report

Decision Points: N/A

DFW 3: Site Preparation

Site Control

After mobilization but prior to the start of the SSP activities, a review of the established benchmarks and site control points will be performed. GPS data and coordinates will be referenced to UTM Zone 20N, NAD83 Continental United States (CONUS) (i.e., no local datum transform applied). GPS function tests (i.e., daily position tests) on established benchmark(s) or control point(s) will be performed at the start of each day of utilization to ensure GPS accuracy and adherence to the MQOs (see Worksheet #22) for data usability.

A transect approach that achieves coverage throughout the accessible areas will be utilized for this SSP. As such, underwater geospatial positioning equipment (e.g., Dive Tablet) will be utilized to both guide underwater investigations along transects as well as record GPS coordinates for MEC, other MPPEH, sub-bottom metallic anomalies, and other potentially notable features observed while conducting the SSP. The Dive Tablet is an underwater computer with an interactive software platform that allows operators to map underwater features, take georeferenced photos and videos, and accurately navigate underwater. Geolocation is enabled via a floating GPS receiver tethered to the tablet. This GPS receives real-time corrections via satellite positioning.

Worksheet #17: Survey Design and Project Workflow (continued)

As needed (e.g., Dive Tablet GPS malfunction), a real-time kinematic global positioning system (RTK-GPS) (e.g., Trimble R2 or R10 unit) will be utilized as a back-up/contingency for investigation positioning activities and site control establishment. Regardless of the methodology utilized, transects will be geo-referenced with the exception of the area directly under Mosquito Pier.

A GPS signal is not anticipated to be received in the investigation area directly under Mosquito Pier and therefore, geo-spatial data may not be achievable within this area. As such, underwater markers (i.e., pelican floats) will be utilized as visual guides for the investigation team. In other words, the conceptualized transects within the area directly under Mosquito Pier will run across the width of the pier (i.e., northeast/southwest angle). The investigation team will swim along the conceptualized transect and stop just before the GPS receiver would be directly under the pier. The team will set a visible underwater marker where they stop and another underwater marker will be placed on the opposite side of the pier (i.e., across the width) where the conceptualized transect continues and is not located directly under the pier. The team will then use these markers as geo-reference guides to conduct the investigation directly under the pier. All data entries will be entered as normal; however, as no geo-spatial data will be available, additional notes will be added the describes the location along the transect (e.g., "buried anomaly is 15 feet along transect [X] from the north side of pier swimming south").

All geo-spatial data will be maintained in the established GIS database (see DFW 1). All geo-spatial data will be downloaded from the collection device (e.g., Dive Tablet) and either uploaded directly to the GIS database by field personnel or sent to the GIS Lead for upload into the GIS database on a daily basis. The GIS Lead will be responsible for maintaining the GIS database and ensuring all geo-spatial data are uploaded correctly. All geo-spatial data, including actual transect coverage, waypoints, and geo-referenced photographs, will be managed in the GIS Database similar to how geo-spatial data are managed as part of the various remedial/ removal actions completed or currently underway at Vieques. In other words, although predominately applicable to the geo-spatial data obtained via the Dive Tablet, geo-spatial data management will be in general accordance with the *Vieques Electronic Data Entry* SOP (Attachment A).

Additionally, all equipment will be tested in accordance with the MPCs (Worksheet #12) and/or MQOs (Worksheet #22), which includes the frequency of testing. Any malfunctioning equipment will be repaired or replaced prior to or during the fieldwork (based on testing frequency).

Coordination with MOV, ferry services operators, and other subcontractors*:* Prior to SSP activities, the Navy will provide formal notification, as warranted and applicable, to the MOV, ferry service operators, dive outfitters, the public, and other entities of the UXO 16.3 planned activities.

Documentation: Daily Report(s)

Decision Points: GPS function tests will be performed at the beginning of each day when GPS equipment is utilized. Measurements will be taken from an established benchmark(s) or control point(s). If the measured point does not meet the required accuracy (see Worksheet #22), then the instrument will be adjusted (e.g., to provide better satellite coverage) and the point will be remeasured. Any malfunctioning equipment will be repaired or replaced.

DFW 4: MEC/MPPEH Transect Survey

The UXO 16.3 SSP will include a visual survey of the seafloor surface using underwater all-metals analog detection instruments (e.g., Minelab Excalibur II) with a subset of identified buried anomalies intrusively investigated for characterization (applicable to DU 1 and DU 2 only, as described in Worksheet #11). The seafloor surface survey will utilize both munitions and scientific divers. Munitions divers will conduct the instrument-aided visual survey, identify subsurface metallic anomalies, perform intrusive investigations, and identify potential MEC/MPPEH.

Worksheet #17: Survey Design and Project Workflow (continued)

Scientific divers will identify protected species or sensitive habitats that could be affected by the survey activities, support any necessary avoidance or restoration measures, and operate the Dive Tablet. Munitions divers may also operate the Dive Tablet.

Underwater survey team(s) will swim along conceptualized transects (solely as a general guide) displayed on the Dive Tablet while recording actual transects via the GPS receiver on the Dive Tablet. Actual survey transects may (and likely will) vary from the conceptualized transects, but this has no effect on MPC achievement. The spacing of both conceptual and, ultimately, actual transects will help ensure coverage throughout the accessible areas.

Seafloor Surface Instrument-aided Visual Survey

Prior the beginning of each day, conceptualized transects to be collected will be uploaded to the Dive Tablet and verified by the UXOQCS. A GPS function test (see DFW 3) will be conducted and verified by the UXOQCS prior to any data collection to confirm GPS accuracy.

Underwater all-metals analog detection instruments (hereafter referred to as analog detection instrument) will be tested prior to any data collection. At the beginning of the day, prior to any data collection, analog detection instruments will be tested at an ITS to ensure the equipment is functioning properly. The ITS will consist of placing a small ISO in a horizontal orientation at approximately 7 inches beneath the seafloor and placing a second small ISO in a vertical orientation at approximately 12 inches beneath the seafloor. Analog detection instruments will provide a positive response in the form a frequency change in the headphone component of the equipment that corresponds to the intensity of the object's induced field registered by the instrument's sensor(s). If an instrument fails to detect an ISO during ITS testing, then the instrument will be repaired or removed from service and replaced.

Following the successful analog detection instrument function test at the ITS, all analog detection instruments will be tested out of the water (hereafter referred to as an air test) prior to each dive. The air test will consist of placing a small ISO near the analog detection instrument and verifying a positive response, as described previously. If an instrument fails to detect an ISO during the air test, then the instrument will be repaired or removed from service and replaced.

Both GPS and analog function tests will be verified and documented by the UXOQCS in the Daily Report.

A scientific diver will use the Dive Tablet to navigate along the conceptualized transect(s) while munitions divers follow the scientific diver while sweeping their analog detection instrument back and forth along their route. The swath width for each munitions diver is conservatively defined as 4 feet (i.e., 2 feet on each side of the diver's center point), although the actual swath will likely be wider. Designing the transect spacing around a swath width of 4 feet per diver will likely result in survey overlap, which helps ensure coverage throughout the accessible areas. Similar to the UXO 16.2 RI QAPP (CH2M, 2021), this design considers the length of the analog detection instrument, general arm length while holding the detection instrument, general underwater swimming speed, and speed in which the munitions diver is able to swing the analog detection instrument back and forth underwater. It is presumed a minimum of two munitions divers will conduct the survey along a single transect simultaneously, such that each transect will then cover 8 feet laterally.

To assist with coverage tracking and geo-spatial awareness during the underwater survey, each decision unit will be subdivided into approximately 100-foot by 100-foot grids. The conceptualized transects will be spaced accordingly within these grids to not only assist the dive team as previously mentioned but will also assist in the sub-bottom anomaly intrusive investigation (see Sub-bottom Intrusive Investigation).

Worksheet #17: Survey Design and Project Workflow (continued)

While conducting the survey, munitions divers will look for MEC/MPPEH while moving the analog detection instruments back and forth across their respective swath to aid in the visual search as well as to identify sub-seafloor metallic anomalies. Any surface (or partially buried) MEC/MPPEH found will be visually inspected, identified (with a unique identification number), described (to the extent possible), photographed, and its location recorded using the Dive Tablet. DFW 6 details how MEC/MPPEH will be handled if encountered.

Considering the approximately 20 years of recreational use at the pier, it is assumed that certain areas (i.e., areas directly under the perimeter of the pier, area around docks) will likely have higher densities of NMRD (i.e., various types of cultural debris including fishing hooks/weights, general trash, various boat components, etc.). As such, and in line with objective of identifying munitions items related to historical military use, NMRD will not be documented in the dive tablet or removed as part of this SSP; however, NMRD observations will be described in general by the dive team in their daily reports and representative photographs will be taken. In addition, any area not accessible to surveying will be documented together with the reason it is not accessible. All of this information will be included in the SSP Report, including the updating the CSM, as applicable.

Sub-bottom Intrusive Investigation

While conducting the seafloor surface investigation within DU 1 and DU 2, the locations of all sub-bottom metallic anomalies will be recorded, with a subset of the buried anomalies intrusively investigated. For DU 1, one out of every four buried anomalies for intrusive investigation will be the goal. Because the potential presence of sub-seafloor munitions is significantly lower within DU 2 (and it is already low within DU 1), one out of every ten buried anomalies for intrusive investigation will be the goal within DU 2. The buried anomalies intrusively investigated for characterization will be documented in the Dive Tablet, which will include the GPS location, approximate sub-bottom depth of the buried anomaly source, and determination of the source.

As noted in Worksheet #11 DQO Step 5, the plan for intrusive investigation of sub-bottom anomalies assumes the actual number and density of sub-bottom anomalies represented by 25 percent and 10 percent, respectively, can be intrusively investigated with the available resources in a reasonable time. The actual number of anomalies intrusively investigated will be based on the number and density detected with the ultimate objective of intrusively investigating enough sub-bottom anomalies to enable determinations made based on the date with an appropriate level of confidence, which is ultimately a subjective determination. Regardless of the percentage/number of anomalies actually intrusively investigated, those quantities will be discussed in the SSP Report, together with any impact they have on making the determinations identified in Worksheet #11 DQO Step 2.

As detailed in Worksheet #11, the maximum intrusive investigation depth will be 12 inches below the seafloor. Once a buried anomaly location has been determined for intrusive investigation, the munitions divers will not dig directly down on the anomaly but will instead dig to the side to avoid striking, moving, or otherwise disturbing the anomaly (or adjacent anomalies if present) with hands or digging implements until it can be sufficiently assessed.

In general, if the intrusive investigation ultimately removes the source of the sub-bottom anomaly, the exact location will be re-screened with an all-metals detection instrument to evaluate the potential for multiple anomalies at different depths in the same location until no additional anomaly source is confirmed to the maximum depth of 12 inches.

Any MEC/MPPEH encountered will be handled in accordance with the ESS and DFW 6.

Documentation: Daily Report(s)

Worksheet #17: Survey Design and Project Workflow (continued)

Decision Points: If an instrument fails to detect the ISOs during ITS testing, the instrument will be repaired or removed from service and replaced. If coverage of accessible areas is not initially achieved, additional surveying will be conducted to meet the goal or the reason for not achieving the target coverage will be documented and discussed in the SSP Report, including the potential effects on meeting the SSP objectives.

DFW 5: Quality Control

Quality control elements are included in multiple components of the SSP to provide additional confidence in the performance and execution of both equipment and field methodologies.

As part of the daily GPS function test and analog detection instrument(s) function test and air test, the UXOQCS will observe and document if all field team members are performing the daily tests in accordance with the QAPP. Additionally, the UXOQCS will conduct periodic "in-water" QC observations of team members performance and adherence to the QAPP, including dive tablet operations, speed and transect coverage, documentation of buried anomalies, and excavation of applicable buried anomalies.

Documentation: Daily Report(s)

Decision Points: If UXOQCS observations identify a QC failure in the observed activities, those activities will be re-performed or the reason for not re-performing the activities will be documented and discussed in the SSP Report, including the potential effects on meeting the SSP objectives.

DFW 6: MEC/MPPEH Handling and Disposal

Should an MEC/MPPEH item(s) be encountered, the Navy's munitions response contractor (USA Environmental, Inc.) will handle and dispose of the item(s) under the ESS and in accordance with their respective SOPs and guidance documents. Although the handling and disposal of any MEC/MPPEH will be completed outside of this QAPP, the handling and disposal information will be included in the UXO 16.3 SSP Report.

Documentation: Daily Report(s) (including Disposal Records [in accordance with ESS])

Decision Points: N/A

DFW 7: Final DUA

The project team will perform a final DUA per Worksheet #37 for the data streams generated during the SSP.

Documentation: Final DUA (see DFW 9)

Decision Points: See Decision Rules 1 and 2 in Worksheet #11 Step 5.

DFW 8: Demobilization

Prior to demobilization, the SSP and QC Contractor will perform an evaluation to verify all work has been completed, verify that the project objectives have been met (to the extent possible), and ensure that any MEC/MPPEH found was disposed of properly.

Documentation: Daily Report

Decision Points: N/A

Worksheet #17: Survey Design and Project Workflow (continued)

DFW 9: UXO 16.3 SSP Report Preparation

The UXO 16.3 SSP Report will be prepared following completion of the SSP activities to summarize the activities, findings, conclusions, and recommendations. The results of the DUA (as discussed in Worksheet #37) will be included in the UXO 16.3 SSP Report, which will contain sufficient documentation to support conclusions and recommendations of the SSP Report.

Documentation: UXO 16.3 SSP Report

Decision Points: N/A

It is noted here that if the DUA determines data are of insufficient quality or quantity to make a determination of a release (i.e., presence/absence of explosive hazards) and whether RI, action, or UU/UE is warranted, preparation of the SSP Report may be deferred until the Navy and regulatory agencies jointly consider what additional data would be necessary to achieve a sufficient data set, if the data could be collected as part of the SSP, and the data are collected (if concurred upon).

UXO 16.3 Site Screening Process Decision Tree

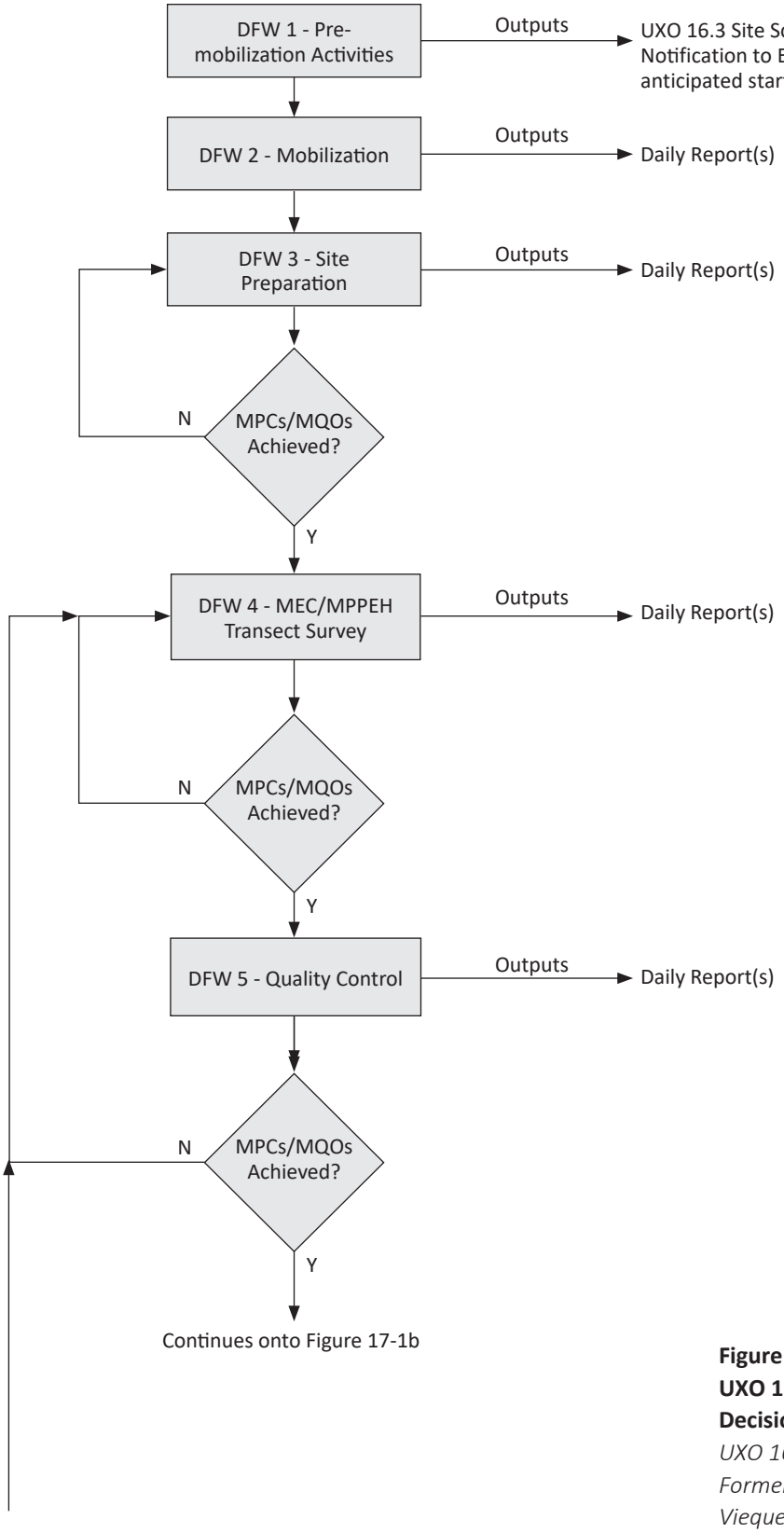

Figure 17-1a.
UXO 16.3 Site Screening Process Decision Tree
UXO 16.3 Site Screening Process QAPP
Former Vieques Naval Training Range
Vieques, Puerto Rico

Continued from Figure 17-1a

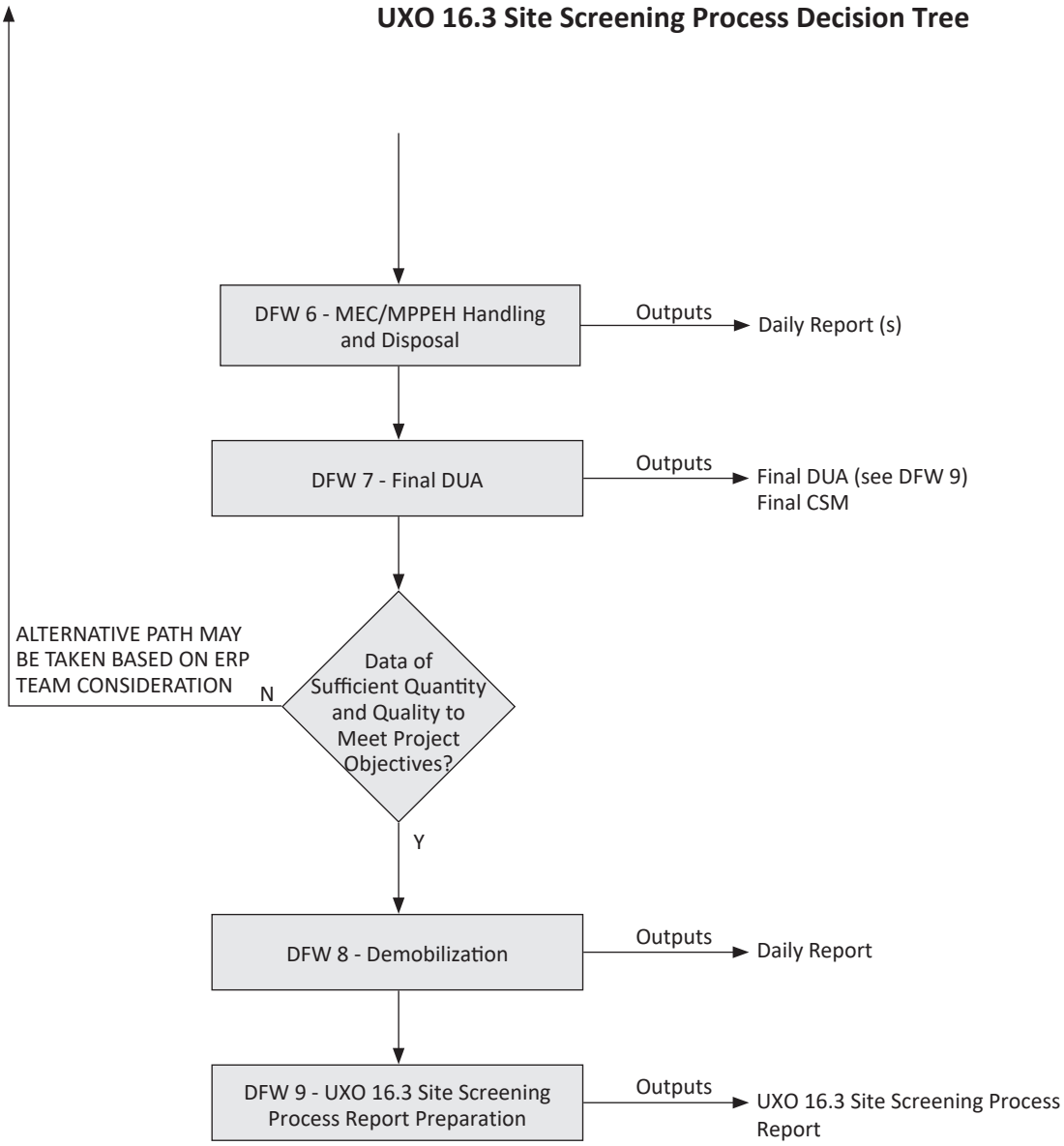

Figure 17-1b.
UXO 16.3 Site Screening Process Decision Tree
UXO 16.3 Site Screening Process QAPP
Former Vieques Naval Training Range
Vieques, Puerto Rico

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Worksheet #22: Equipment Testing, Inspection, and Quality Control

This worksheet documents the MQOs and their respective acceptance criteria for the UXO 16.3 SSP.

Table 22-1. Equipment Testing, Inspection, and Site Preparation

Measurement Quality Objective	MQO#	Frequency	Responsible Person/ Report Method/ Verified By	Acceptance Criteria	Failure Response[a]
Verify Correct Assembly (Dive Tablet and analog sensors)	SP1	Once following assembly and after any changes to deployment assembly.	SUXOS MR Dive Lead/Daily Report/UXOQCS	As specified in instrument assembly checklist and/or User's Manual.	CA: Make necessary adjustments and re-verify.
Geodetic Equipment Function Test	SP2	Daily at the beginning of the day prior to data collection.	Scientific Diver/GIS data recorded in Dive Tablet and Daily Report/UXOQCS	Measured position of function test within 2 meters of ground truth/control point.	Make adjustment and re-verify. If failure continues: Root Cause Analysis (RCA)/CA; document questionable information in database.
ITS Set Up	SP3	Daily at the beginning of the day prior to data collection.	SUXOS MR Dive Lead/Daily Report/UXOQCS	Seeds emplaced in accordance with DFW 4.	CA: SUXOS re-performs seed emplacement if UXOQCS observes seeds are not emplaced in accordance with DFW 4.

[a] An RCA/CA is an internal investigation and assessment to identify the source of the nonconformance(s) or issue(s) resulting in the failure response as well as the corrective action to address this moving forward. Additionally, the RCA/CA process also addresses any data usability issues associated with the nonconformance. Rows in which an RCA/CA is listed with no additional actions are associated with MQOs in which the ultimate corrective actions are unknown until the RCAs are performed. Where specific corrective actions are provided in certain rows, it is because those corrective actions can be more easily determined (or assumed) based on the type of MQO.

Worksheet #22: Equipment Testing, Inspection, and Quality Control (continued)

Table 22-2. Surface and Subsurface Characterization Survey (Analog)

Measurement Quality Objective	MQO#	Frequency	Responsible Person/ Report Method/ Verified By	Acceptance Criteria	Failure Response
Geodetic Function Test	SC1	Daily at the beginning of the day prior to data collection.	Scientific Diver/GIS data recorded in Dive Tablet and Daily Report/UXOQCS	Measured position of function test within 2 meters of ground truth/control point	Make adjustment and re-verify. If failure continues: RCA/CA; document questionable information in database.
ITS Function Test (analog)	SC2	Daily at the beginning of the day prior to data collection.	SUXOS MR Dive Lead/Daily Report/UXOQCS	Audible response consistent with expected change in tone in presence of small ISOs within ITS..	CA: If an instrument fails to detect the ISOs during function test, the instrument will be repaired or removed from service and replaced.
Air Test Function Test (analog)	SC3	Daily prior to each dive, after battery changes, and end of each day (i.e., following last dive).	SUXOS MR Dive Lead/Daily Report/UXOQCS	Audible response consistent with expected change in tone in presence of small ISO.	CA: If an instrument fails to detect the ISO during function test, the instrument will be repaired or removed from service and replaced.
Transect Spacing (munitions divers are spaced to allow overlap and able to cover required swath) and Intrusive Investigation Oversight (QC check)	SC4	Daily (when applicable).	UXOQCS /Daily Report/MR Safety and QAO	Minimum of 10 percent oversight by UXOQCS to verify and document transect land spacing requirements and intrusive investigation protocols.	RCA/CA; recollect transects or reconduct intrusive investigation.
Coverage	SC5	Verified for each defined DU.	Scientific Diver/Daily Report/UXOQCS	GPS tracked locations to demonstrate that transects were appropriately covered.	RCA/CA

Worksheet #29: Data Management, Project Documents, and Records

Part 1: Data Management Specifications

Computer Files and Digital Data: All final document files, including reports, figures, and tables, will be submitted in electronic format as specified by this QAPP and NAVFAC. Data management and backup will be performed in accordance with SSP documented quality system.

Worksheet #29: Data Management, Project Documents, and Records (continued)

Part 2: Control of Documents, Records, and Databases

Table 29-1. Minimum Required Documents and Records

Document/Record	Purpose	Completion/Update Frequency	Format/Storage Location/Archive Requirements
UXO 16.3 SSP QAPP	Integrates all technical and quality aspects for the lifecycle of the project, including planning, implementation, and assessment. Documents how QC is applied to data collection operations to ensure that the results obtained will satisfy the stated performance objectives.	Will be completed prior to mobilization.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
ESS	Addresses potential hazards associated with potential MEC.	Will be completed prior to mobilization.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
Daily Report(s)	Document field activities to track the progress, activities, and any key observations, milestones, and interim decision points.	Completed daily/end of day.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
Photographic Documentation, as warranted	Highlights and visually documents important site features and field observations, to be considered for the photographic log for reporting.	Uploaded to network daily when photographic documentation is collected.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
DUA	Provides assessment of data usability.	Completed after completion of all SSP data collection activities. To be included as part of the UXO 16.3 SSP Report.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
MRP Enterprise Database Update Forms (for all MEC/MPPEH items)	Documents the findings of each surface MEC/MPPEH finding and intrusive investigation where MEC/MPPEH is identified to describe the depth, size, orientation (as applicable), description of item, and other pertinent data related to characterization.	Completed daily and uploaded to the database at end of day as part of Daily Report.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server

Worksheet #29: Data Management, Project Documents, and Records (continued)

Table 29-1. Minimum Required Documents and Records

Document/Record	Purpose	Completion/Update Frequency	Format/Storage Location/Archive Requirements
Field Audit Checklists (if performed)	Provides documentation that field audits have been completed.	Competed during field audits.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
Final Data Archives	All project files will be maintained on the SSP Contractor computer server as archives and stored for 3 years.	Pertinent data and documents will be transported to the final archives at the completion of the project.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
Field Change Request Forms	Provides information on any changes to QAPP-documented approach for approval and documentation.	Completed on an as-needed basis.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
Nonconformance, RCAs, and CARs	Documents any nonconformance and provides the root cause(s) of the nonconformance and any corrective actions required. Should also identify any data usability issues associated with the nonconformance.	Completed on an as-needed basis.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server
UXO 16.3 SSP Report	Provides documentation of the SSP completion and achievement of objectives as defined in the QAPP.	Completed after completion of all SSP activities.	Digital/SSP Contractor network and secure SharePoint library/Project file and computer server

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Worksheet #31, 32 & 33: Assessments and Corrective Action

Three Phases of Control

The UXOQCS is responsible for verifying compliance with the QAPP through implementation of a three-phase control process (preparatory phase, initial phase, follow-up phase), which ensures that project activities comply with the approved plans and procedures. The specific QC monitoring requirements for each DFW are discussed in the sections that follow. This section specifies the minimum requirements that must be met and to what extent QC monitoring must be conducted and documented by the UXOQCS. The UXOQCS will ensure the three-phase control process is implemented for each DFW listed in Table 31-1. Each phase is considered relevant for obtaining necessary product quality. However, the preparatory and initial inspections are particularly invaluable in preventing problems. Work will not be performed on a DFW until the preparatory and initial phase inspections have been completed and any nonconformance issues are resolved.

Preparatory Phase Inspection

The Preparatory Phase comprises the planning and design process leading up to the actual field activities. The UXOQCS will perform a Preparatory Phase inspection before beginning each DFW. The purpose of this inspection is to review applicable specifications and plans to verify that the necessary resources, conditions, and controls are in place and compliant before work activities start. The UXOQCS or designee will review the QAPP and related operating procedures. The UXOQCS will verify that required plans and procedures have been approved and are available to and reviewed by the field staff; field equipment is appropriate, available, functional, and properly calibrated for its intended/stated use; staff responsibilities have been assigned and communicated; the staff members have the necessary knowledge, expertise, and information to perform their jobs; arrangements for support services have been made; training in accordance with the requirements of this QAPP has occurred; and the prerequisite mobilization tasks have been completed. The UXOQCS will verify that lessons learned during previous similar work have been incorporated, as appropriate, into the project procedures to prevent recurrence of past challenges. Project personnel must correct or resolve discrepancies between existing conditions and the approved plan/procedures identified by the UXOQCS during the Preparatory Phase inspection. The UXOQCS or designee will verify that unsatisfactory and/or nonconforming conditions have been corrected before beginning work.

Initial Phase Inspection

The Initial Phase occurs at the startup of activities associated with a specific DFW. At the onset of a particular DFW, the UXOQCS will perform an Initial Phase inspection. The main objectives of the inspection are to check preliminary work for compliance with procedures and specifications, establish an acceptable level of workmanship, check for omissions, and resolve differences of interpretation. The Initial Phase inspection will also verify that the Site Safety and Health Plan adequately identifies all hazards associated with actual field conditions and promulgates the appropriate safe work practices. The inspection results will be documented by the UXOQCS in the QC logbook and summarized in the Daily Report. Should results of the inspection be unsatisfactory, the Initial Phase will be rescheduled and performed again.

Follow-up Phase Inspection

Completion of the Initial Phase of QC activity leads directly into the Follow-up Phase, which covers the routine day-to-day activities at the site. The UXOQCS will perform a Follow-up Phase inspection at regular intervals while a particular DFW is performed. This inspection ensures continuous compliance and verifies an acceptable level of workmanship. The UXOQCS will monitor onsite practices and operations taking place and verify continued compliance with the specifications and requirements of this QAPP. Discrepancies between site practices and approved plan/procedures will be resolved, and corrective actions for unsatisfactory and nonconforming conditions or practices will be resolved by the UXOQCS or designee before continuing work.

Worksheet #31, 32 & 33: Assessments and Corrective Action (continued)

Additional Inspections

Additional inspections performed on a particular DFW may be required at the discretion of the Navy, the PM, the SUXOS, the UXOQCS, or other supervisory personnel as appropriate. Additional preparatory and initial inspections may be warranted under the following conditions: unsatisfactory work, as determined by SSP Contractor or Navy; changes in key personnel; resumption of work after a substantial period of inactivity (2 weeks or more); or changes to the project scope of work. These additional inspections will be documented on the appropriate inspection checklist forms and in the QC logbook.

Final Phase Inspection

The Final Phase inspection is performed upon conclusion of the DFW and before closeout to verify that project requirements relevant to the particular DFW have been satisfied. Outstanding and nonconforming items will be identified and documented.

Worksheet #31, 32 & 33: Assessments and Corrective Action (continued)

Table 31-1 – Assessment Schedule

Assessment Type	Three Phases of Control	Schedule/Frequency	Responsible Party	Assessment Deliverable	Deliverable Due Date	Responsible for Responding to Assessment Findings	Assessment Response Documentation and Timeframe
Planning Documents – UXO 16.3 SSP QAPP and ESS	Preparatory	Finalized prior to SSP implementation/once	CH2M PM	Final documentation approval from interagency team	Prior to mobilization	CH2M PM	Email or other written communication prior to mobilization
GIS and Data Management Systems Establishment	Preparatory	Finalized prior to SSP implementation/once	CH2M GIS Lead	GIS Database with specific project folders Electronic forms and platform establishment for Data Management System	Prior to mobilization	CH2M PM	Email or other written communication prior to mobilization
Geodetic Equipment Function Test	Initial/Follow-up	Daily/when used	CH2M UXOQCS	Daily Report	Daily	CH2M PM	Email or other written communication within approximately 3 days
Analog Function Test (ITS and Air Test)	Initial/Follow-up	Daily/when used	CH2M UXOQCS	Daily Report	Daily	CH2M PM	Email or other written communication within approximately 3 days
Transect Survey and Intrusive Investigation Oversight (QC check)	Initial/Follow-up	Daily for a minimum of 10% of data collection	CH2M UXOQCS	Daily Report	Daily	CH2M PM	Email or other written communication within approximately 3 days

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Worksheet #34: Data Verification, Validation, and Usability Inputs

Requirements/Specifications

Contract:	N62470-21-D0007, CTO N6247021F4140 (CH2M)
Quality Assurance Project Plan:	UXO 16.3 SSP QAPP
Quality Assurance Surveillance Plan:	Not applicable
SOPs are contained in Attachment:	A

Table 34-1. Data Verification, Validation, and Usability Inputs

Description	Verification (completeness)	Validation (conformance to specifications)	Usability (achievement of DQOs and MPCs)
Daily Report (including any MEC/MPPEH identified)	X	X	X
Instrument Function Tests (Geodetic and Analog)	X	X	X
GIS Data	X	X	X
Nonconformance/RCA/CA Reports	X	X	X
Revised CSM	X	X	X

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Worksheet #35: Data Verification and Validation Procedures

Table 35-1: Data Verification and Validation Procedures

Activity and Records Reviewed	Requirements/ Specifications	Process Description/Frequency	Responsible Person	Documentation
Daily Report	QAPP, SOPs	All information is complete for each day of field activities. Any changes/exceptions are documented and reported in accordance with requirements. Required signatures are present.	UXOQCS	Daily Report/Digital Forms
Underwater Investigation Surveys for MEC/MPPEH and sub-bottom metallic anomaly counts/locations	QAPP/SOPs	Transect survey within UXO 16.3 boundary is completed according to QAPP specifications/applicable SOPs. QC observations are conducted as required.	UXOQCS	Daily Report/Digital Forms For seafloor surface findings: MRP Enterprise, UXO 16.3 SSP Report
ITS Construction and Testing	QAPP/SOPs	ITS constructed per QAPP specifications/applicable SOPs. Analog sensors tested at frequency required for activities being supported.	UXOQCS	Daily Report/Digital Forms
Intrusive Investigation	QAPP/ SOPs	Intrusive investigation has been conducted according to the QAPP, applicable SOPs, and ESS. All specifications have been achieved, or exceptions noted. If appropriate, corrective actions have been completed. Signatures and dates are present.	SUXOS MR Dive Lead	For intrusive investigation findings: MRP Enterprise, UXO 16.3 SSP Report

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Worksheet #37: Data Usability Assessment

This worksheet documents procedures to be used to perform a DUA, which will be completed at the end of SSP activities. The DUA involves a qualitative and quantitative evaluation of the collected data to determine if the project data are of the right type, quality, and quantity to support the decisions that need to be made. It involves a retrospective review of the systematic planning process to evaluate whether underlying assumptions are supported, sources of uncertainty have been managed appropriately, data are representative of the population of interest, and the results can be used as intended, with the acceptable level of confidence.

Personnel (Organization and Position/Title) Responsible for Participating in the DUA[2]

- SSP Contractor, Dennis Ballam, Project Manager
- SSP Contractor, Jeff McCauley, MR Safety and QAO
- SSP Contractor, Brett Doerr, Vieques Program Project Delivery and Quality Manager

Identify Documents and Records Required as DUA Inputs

- Contract Specifications
- QAPP
- Daily Reports
- SOPs
- Nonconformance/RCA/CA Reports
- Transect survey and intrusive investigation results

How will the DUA be documented?

The final DUA report will be included as an appendix to the UXO 16.3 SSP Report and the key findings of the DUA will be included in the findings, conclusions, and recommendations.

Data usability will be discussed in the DUA Report, which will contain sufficient documentation to support conclusions of the DUA. The following steps describe the documentation and processes to be used during the DUA and notes how DUA results will be presented so they identify trends, relationships (correlations), and anomalies. As applicable, copies of original paper forms, if any, will be maintained onsite for reference, and the originals will be forwarded to the data coordinator for review, inclusion in the project database, and final storage in the central project files. The minimum documents used as inputs to the DUAs are listed above.

Step 1	Review the project's objectives. Are underlying assumptions in the initial CSM valid? Review the DQOs. Were the project boundaries appropriate? Review the instrument-aided visual survey and intrusive investigation as implemented for consistency with stated objectives. Were sources of uncertainty accounted for and appropriately managed? Summarize any deviations from the planned design that may have impacted the data usability and describe their impacts on the data quality objectives.

[2] As of preparation of this QAPP; any individual may be substituted with another qualified individual during implementation of this QAPP.

Worksheet #37: Data Usability Assessment (continued)

Step 2	Review the data verification/validation outputs and evaluate conformance to MPCs documented on Worksheet #12. Review Daily Reports Evaluate the implications of unacceptable QC results. For any non-conformances, was the RCA/CA effective? Evaluate conformance to MPCs documented on Worksheet #12. Summarize the impacts of non-conformances on data usability. Evaluate data completeness. Identify data gaps (i.e., data inputs that have not been satisfied) and summarize their impact on the DQOs.
Step 3	Document data usability, update the CSM, apply decision rules, and draw conclusions. Determine if the data can be used as intended, considering implications of deviations and corrective actions. Assess the performance of the sampling design and identify any limitations on data use. Determine whether the data are suitable. Update the CSM, apply decision rules, and draw conclusions.
Step 4	Document lessons learned and make recommendations. Summarize lessons learned and make recommendations for changes to DQOs or the sampling design for the next phase of investigation or future investigations. Prepare the DUA report.

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Attachment A
CH2M Standard Operating Procedures

Standard Operating Procedure
Data Collection - Underwater

Document No: JE-SOP-01-U

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	Original issue	George DeMetropolis
002	12.31.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for the collection of munitions-related data in an underwater environment.

2.0 Equipment

- Grease pen and whiteboard, writing slate and pencil, magnetic writing board or other writing media capable of use underwater
- Underwater digital camera
- Global positioning system (GPS) point collection equipment
- MineLab Excalibur II underwater all-metals detector (or similar)

- Logbook
- Permanent marking pen

1.0 Procedures and Guidelines

1.1 Underwater Data Collection

1. Data collected may be used to assist future investigations and help make removal/remedial action determinations; therefore, the data will be collected in the following manner outlined in this SOP.
2. Any of the following positioning equipment can be used provided it is designed to provide sub-meter accuracy:
   a. A GPS device with acoustic positioning to a surface antennae(s), such as Navimate or Pilot Multipurpose and Tracking System
   b. A GPS device with a surface-tethered antenna such as Shark Marine Navigator, or Sound Oceans Systems, Inc. Sea Guide
   c. A buoy floated from the river bottom to the surface with the location marked at the surface using GPS

   Note: Systems using a surface tether to either buoy or as an antenna will need to be submeter accurate at the water body bottom location not at the surface location, therefore accounting for the antenna offset.
3. Underwater all-metals detection instruments will be used to augment and support the visual survey and to identify any anomalies on and below the surface of the seabed. The instrument will be tested at least once daily in accordance with (IAW) manufacturer specifications and procedures, to ensure that it is functional. Since metal detectors vary from manufacturer to manufacturer, the owner's manual specific to the make and model used will serve as the functionality test SOP.
4. Data will be collected along the approximate transects and anomaly waypoints as specified in the site-specific project documents (Work Plan, Explosives Safety Submission [ESS], ESS-Determination Request, and/or Quality Assurance Project Plan).
5. Observations relevant to the project objectives will be noted, including, but not limited to:
   a. Positional data (GPS coordinates) of visually observed or instrument detected anomalies, including munitions and explosives of concern (MEC) and/or material potentially presenting an explosive hazard (MPPEH).
   b. If an anomaly cannot be investigated due to the presence of obstructions, fouling, marine growth / encrustation or depth of burial into the bed of the body of water, the reason for not investigating the anomaly will be recorded.
   c. Photograph(s) of any observed/excavated item whenever possible.
   d. Verbally communicate a description of the observed item via primary topside to diver communications system for recording / logging by the Dive Supervisor/tender topside.
   e. Written description of the observed/excavated item (specifics described below). As a backup to the primary communications above, the description can be written using a grease pen and board, writing slate and pencil, magnetic writing board, or other writing media capable of use underwater and photographed next to the item (if visibility permits).
   f. Whether the item is confirmed or suspected to be MEC/MPPEH. All documentation/classifications of MEC/MPPEH must be done by unexploded ordnance (UXO)-qualified personnel.
   g. Underwater obstructions or obstacles that could impede or impact the current or future investigation/removal actions.

6. If MEC/MPPEH located during this investigation may be recovered and/or removed from the site, it will be performed IAW the site-specific documents and the following procedures and documented appropriately:
    a. Only items that can be identified as acceptable or safe-to-move as determined by the Senior UXO Supervisor (SUXOS) and UXO Safety Officer (UXOSO) will be moved.
    b. All MEC/MPPEH determined acceptable or safe-to-move items requiring explosive treatment will be moved to a designated area for treatment.
    c. If an MEC/MPPEH item is found and is deemed unacceptable or unsafe to move, and presents an imminent explosive hazard to persons in the area or potential trespassers, the project manager (PM) will be immediately notified and the site will be secured until underwater disposal is completed by the munitions response (MR) team.
    d. Items may be marked for disposal/treatment and completed in groups.

2.0 Data Collection

The basic requirements for field logbook entries are detailed herein.

2.1 Underwater Data Collection

1. Field notes will be kept in bound, hardcover logbooks. Pages will be water-resistant and notes will be taken with waterproof, nonerasable permanent ink.
2. On the inside cover of the logbook, the following information will be included:
    a. Project name
    b. Activity location and address
    c. PM's name
    d. Phone numbers for Installation points of contact and emergency response
3. To the extent practical, all lines of all pages will be used to prevent later additions of text. Line(s) not used should be marked through with a line and initialed and dated. Any pages not used should be marked through with a line, the author's signature, the date, and the note "Intentionally Left Blank."
4. If errors are made in the logbook, cross a single line through the error and enter the correct information. All corrections will be initialed and dated by the personnel performing the correction. If possible, all corrections will be made by the individual who made the error.
5. Daily entries will be made chronologically.
6. Information will be recorded directly in the field logbook during the work activity. Information will not be written on a separate sheet and then later transcribed into the logbook.
7. Each page of the logbook will have the date of the work and the note takers initials.
8. The final page of each day's notes will include the note-takers signature as well as the date.
9. Only information relevant to the subject project will be added to the logbook.

2.2 Information to be included in the Field Logbooks

Entries into the logbook will be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. Entries must be legible and complete. General project information will be recorded at the beginning of each field project. This will include the project title, the project number, and project staff. Specific detail includes but is not limited to:

1. Project Scope and Technical Information: Describe the general scope of work to be performed and accomplished each day.
2. Weather: Record the weather conditions and any significant changes in the weather during the day.

3. Daily Site-specific Tailgate Safety Briefing: Record time and location of meeting, who was present, topics discussed, and issues/problems/concerns identified, and corrective actions or adjustments made to address concerns/ problems, and other pertinent information.
4. Standard Health and Safety Procedures: Record level of personal protection being used (for example, level D personal protective equipment) and personnel monitoring information. Also, record other required health and safety procedures as specified in the project-specific health and safety plan.
5. Instrument Calibration: As applicable, record calibration/functionality information for each piece of health and safety and field equipment.
6. Personnel: Record names of all personnel present during field activities and list their roles and their affiliation. Record when personnel and visitors enter and leave a project site and their level of personal protection.
7. Communications: Record communications with project manager, subcontractors, regulators, facility personnel, and others that impact performance of the project.
8. Time: Maintain a chronological record of field activities as they occur throughout the day.
9. Deviations from the Work Plan: Record any deviations from the work plan and document why these were required and any communications authorizing these deviations.
10. Health and Safety Incidents: Record any health and safety incidents and immediately report any incidents to the PM.
11. Subcontractor Information: Record name of company, record names and roles of subcontractor personnel, list type of equipment being used and general scope of work. List times of starting and stopping work and quantities of consumable equipment used if it is to be billed to the project.
12. Problems and Corrective Actions: Clearly describe any problems encountered during the field work and the corrective actions recommended, requested or already taken to address these problems. Also include any observed conditions that might adversely affect the work or any data obtained (weather, water visibility, etc.).

2.3 Data Review

1. All data entered into the MR database will be reviewed to ensure that:
    a. All relevant information about the item has been recorded (as applicable and available) and accurate (based on the field notes, pictures, and discussions with the data collection team).
    b. There is appropriate agreement between the various elements of the item description.
    c. The descriptions of the action taken for the item are accurate.
2. Field logbooks will allow the reviewer to verify:
    a. Equipment functional tests are conducted in accordance with manufacturer's recommendations.
    b. The rationale for adjusting/terminating transects is recorded.
    c. Pictures are being taken and logged.
    d. Relevant details pertaining to the investigation have been/are being recorded.

3.0 Supervisor’s or Process Supervisor’s statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful. and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature
Worker Name:

Date:

4.0 Worker's or Operator's Statement

I have read this SOP and I have received adequate training to perform the process according to the SOP. I will follow the SOP unless I identify a hazard not addressed in it or encounter an operation I cannot perform according to the SOP. If that occurs, I will stop the process and notify my immediate supervisor of the problem.

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Standard Operating Procedure
Protection of Federally Listed Species and Sensitive Habitat Underwater

Document No: JE-SOP-02-U

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	Original issue	George DeMetropolis
002	12.14.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for the protection of federally listed threatened and endangered (T&E) species of marine life and sensitive habitat associated with underwater munitions response (MR) areas and sites.

2.0 Equipment

- Support boats
- List of contacts as listed in the site-specific documents (Work Plan, Explosives Safety Submissions [ESS], ESS-Determination Request, and/or Quality Assurance Project Plan)
- Local reference list of T&E species and sensitive habitat locations

3.0 Procedures and Guidelines

3.1 Vessel Operations

- All vessels will preferentially follow deep water routes whenever possible.
- Vessel operators will review nautical charts and use onboard depth sounders to prevent unintentional vessel contact with the seabed, riverbed, etc., including coral colonies that may extend toward the sea surface.
- Vessel anchors will be removed from their position in a manner that minimizes disturbance to the environment. Whenever feasible, a secondary anchor line may be attached to the crown of any plow-type anchor (for example, Danforth and Bruce) and pulling the anchor free from the river bed before lifting to the surface.

3.2 Protection of Federally Listed Species

- All work personnel will be familiar with the identification of federally listed T&E species that have the potential to occur in the work areas; United States Environmental Protection Agency policy and associated civil/criminal penalties for violations; and the procedures to be followed to prevent impacts during work activities.
- All sightings of federally listed species will be documented provided to the installation and the United States Fish and Wildlife Service at the end of the project. The following information will be collected and recorded in the log for all federally listed species sightings:
  - Sighted species
  - Date and time of sighting
  - Global positioning system (GPS) coordinates of sighting location
  - One or more photographs if possible
  - Any action taken to minimize potential impacts to species (see the following sections)

3.3 Diving and Anomaly Removal Operations

- Field Team personnel will be familiar with the identification of federally listed species, hard bottom habitat, and vegetated bottom habitat that have the potential to occur in the work areas during work activities.
- The following general “best diving practices” will be followed:
  - The Diving Supervisor will make sure that underwater conditions (for example, visibility and current speeds) and weather are suitable for diving to ensure safety of divers and for ability to avoid damaging sensitive underwater habitats.
  - The point of entry and exit will be carefully selected to avoid damaging sensitive underwater areas.
- All equipment will be used in a manner to avoid physical contact or harassment of any protected species.
- Divers will limit physical contact with the environment (marine life, seabed, etc.) to the minimum extent needed to effectively conduct the work identified in the site-specific documents.
- Anomalies determined safe to remove will be removed manually by hand and/or using hand-held tools.
- All removed anomalies will be transported to agency-approved detonation and disposal areas.
- Excavations to inspect and remove subsurface anomalies will be in accordance with required scope of work.
- The disturbance footprint surrounding subsurface anomaly excavations will be limited to approximately 2 square feet whenever possible.
- If an underwater item is encountered that may have historic or archaeological significance, the item will not be disturbed in any way. The item will be photographed, position recorded by GPS coordinates of the location, and notification made to the PM and Installation POC. The appropriate installation representatives will coordinate the collected information and any subsequent recovery with the State Historic Preservation Office in compliance with the National Historic Preservation Act.

4.0 Supervisor’s or Process Supervisor’s statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature
Worker Name:

Date:

5.0 Worker's or Operator's Statement

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Standard Operating Procedure
Deployment of Anomaly Waypoints and Transect Search Patterns - Underwater

Document No: JE-SOP-03-U

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	original issue	George DeMetropolis
002	12.14.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for the deployment of anomaly waypoints and transect search patterns. Anomaly waypoints and search line transects will be laid as pre-plotted by boat in different areas and densities as outlined in the site-specific documents (Work Plan [WP], Explosives Safety Submissions [ESS], ESS-Determination Request [ESS-DR], and/or Quality Assurance Project Plan [QAPP]).

2.0 Equipment

- Search line transect buoys with clumps (two sets)
- Marked search pattern transect lines (100 feet or 300 feet) (two each)
- Global positioning system (GPS) point collection equipment (minimum of three each)
- MineLab Excalibur II underwater all-metals detectors (or comparable) (minimum of two each)
- Support boats (minimum of two)

- Anomaly marker floats/Pelican floats with clumps (as required)
- Polyvinyl chloride (PVC) reference markers (0.5 inch at 4 feet)
- Anomaly/waypoint/transect logbook
- Chart with transects marked
- Instrument verification strip (IVS) seeds (two each)

3.0 Procedures and Guidelines

3.1 Deployment of Anomaly Waypoints and Search Line Patterns (Transects)

General Procedures for Laying Transect Search Line Pattern

Search line transect pattern will be used as a reference and record of actual area searched in the site characterization investigation to assist future investigations, and removal and remedial action determinations. The laying of the search line patterns will be conducted as follows:

1. The positioning equipment to be used is designed to provide submeter accuracy:
    a. A buoy floated from the river bed to the surface with the location marked at the surface using a GPS unit
2. Marker buoy(s) will be set prior to commencing operations to visually mark the exclusion zone (EZ) boundary for the munition with the greatest fragment distance based on a hazardous fragment distance of feet and a blast over-pressure distance of feet for a swimmer in the water. The munitions response (MR) team will establish and set the EZ by deploying two buoys at designated points. These buoys will be removed at the conclusion of operations.
3. Personnel involved in the deployment of anomaly waypoints and underwater transects patterns will use munitions and explosives of concern (MEC) avoidance procedures at all times.
4. All diving operations will be from a vessel appropriate to support diving or from shore with appropriate support / safety vessels as required to ensure safety of the divers and dive team. All nonessential personnel will be outside the established EZ when anomaly excavation procedures are being conducted.
5. Anomaly waypoints and transect deployment will be completed by support boats and the MR team members.
6. To avoid anomalies during the setting of clumps/anchors for transect lines and to locate subsurface anomalies for the Investigation, the MR team will offset marks by 3 feet.
7. A MineLab Excalibur II all-metals detection instruments (or comparable) will be used to support the survey and to identify sub-seabed anomalies. The metal detection instruments will be tested at least once daily to ensure that it is functional. The functionality test will follow the procedures defined by the manufacturer. Since metal detectors vary from manufacturer to manufacturer, the owner's manual specific to the make and model used will serve as the functionality test SOP.
8. The MineLab Excalibur II is capable of detecting ferrous and nonferrous items. Audio output from the device will be observed by an unexploded ordnance (UXO) qualified diver to detect, in real time, ferrous and nonferrous items on and beneath the surface of seafloor sediments. The sound frequency is relative to the amplitude of the response of the system. The diver will listen to the audible sound output by the system to identify anomaly locations. Once an anomaly is identified, the UXO Diver will intrusively investigate the anomaly using the methods described in JE-SOP-01-U Data Collection.
9. The MineLab Excalibur II detection instruments will be tested daily on the beach adjacent to the work site for the day in accordance with the work plan. Two industry standard objects will be buried – a horizontal one at 4 inches and a vertical one at 9 inches to provide an instrument verification strip (IVS). Instrument functionality checks at the IVS will be performed prior to and at the completion of daily operations, following battery changes and the results recorded in daily log book records.
10. Non-essential personnel will be directed by the Senior Unexploded Ordnance Supervisor (SUXOS)/Diving Supervisor to position themselves outside the established EZ and provide a secure perimeter when any intrusive investigation operations are being conducted by a UXO Diver.

11. The boat team will mark anomaly waypoints and transect entrance and exit buoy locations from the surface using GPS and a list of predetermined waypoints. The boat will position itself over the location for the clump to be placed.
12. Using the small float as a reference, the boat team will slowly lower marker clumps in a hand-over-hand fashion until it is on the bottom. Clumps placed at depth will have a waypoint reference-numbered buoy attached to them, so they are visible from the surface of the water. ***Note:*** In shallow areas of 2 feet or less, a thin waypoint reference-numbered PVC pipe may be placed for both anomaly and transect endpoint reference.
13. Anomaly waypoints and transect search patterns will be placed at the appropriate distances as outlined in the WP before the underwater MEC investigation phase, unless it is assessed by the MR dive team that another approach or different search pattern is more feasible.

Establishing Transect Endpoints

1. The boat team will slowly lower the clump in a hand-over-hand fashion until it is on the bottom. Clumps placed at depth will have numbered buoys attached to them, so they are visible from the surface of the water. There will be a running line attached to the up-current transect clump; once laid, this will be the transect line that the divers will follow.
2. The process previously described will be repeated to establish the up-current entrance transect endpoint.
3. Once the transect entrance and exit end points have been established, the boat team will extend the transect line between the two buoys and attach them at each end.
4. The MR divers will be deployed to the entrance buoy clump and begin investigation, identification, and remediation procedures as appropriate.

4.0 Supervisor’s or Process Supervisor’s Statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature Date:

Worker Name:

5.0 Worker's or Operator's Statement

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Standard Operating Procedure
Safe to Move and Unsafe to Move Procedures - Underwater

Document No: JE-SOP-04-U

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	original issue	George DeMetropolis
002	12.14.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	01.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for determining "Safe to Move" procedures during underwater munitions response operations. The determination that munitions and explosives of concern (MEC)/munitions potentially presenting an explosive hazard (MPPEH) that is "Safe to Move" will follow the process outlined below.

2.0 Equipment

- Individual Dive Gear
- Diver through water communications system
- Global positioning system (GPS) point collection equipment
- MineLab Excaliber II underwater all-metals detectors (or equivalent)
- Support boats

- Logbook
- Chart with plotted transects and anomaly waypoints marked
- Prepositioned transects
- Prepositioned waypoints
- Approved hand tools for excavation

3.0 Procedures and Guidelines

3.1 Laying of Waypoints and Search Line Patterns (Transects)

1. Diver/divers will enter water at the up-current buoy and descend to the up current end of the anomaly waypoint or transect.

   Note: This procedure can be accomplished using either a single diver or diver pair search method.

2. Diver/divers will ensure ordnance locator is on and begin an all-metals locator assisted sweep toward the down current end of the anomaly waypoint or transect.

   a. For a single diver search the search pattern will consist of a minimum 4-foot arc (2 feet on each side of anomaly waypoint or transect).

   b. For a diver pair search the search pattern will be a minimum 4-foot arc (4 feet on each side of anomaly waypoint or transect).

      Note: For diver pair sweeping operations, a through-water communication system should be considered to augment tending line or buddy-line communications.

3. Upon identification of potential MEC/MPPEH or sub-surface anomaly detection, UXO Diver will notify the Diving Supervisor of contact type, (either surface or sub-surface), position and distance on anomaly waypoint or transect line. Diver will also deploy a marker buoy to identify the location for a surface GPS mark, indicating the detection to the Diving Supervisor.

4. If MEC/MPPEH requires intrusive investigation, UXO Diver will request permission from the Diving Supervisor to excavate sediment to expose enough of the item to determine if MEC/MPPEH is present.

   a. If item is embedded in any sensitive area and condition of the item cannot be determined, UXO Diver will surface and consult with the Diving Supervisor to discuss further investigation procedures.

5. Upon receipt of permission to excavate, UXO Diver will investigate contact using proper techniques (dig from the side of the item).

   a. Anomaly sources deeper than 1 foot, will be recorded as having a source deeper than 1 foot beneath the seafloor that was not characterized or removed.

6. Once MEC/MPPEH is exposed, the UXO Diver will attempt to identify and obtain the following information:

   - Unique, Sequential Identification Number
   - Item Group
   - Item Class
   - Item Category
   - Type/Filler
   - Description/Fuzing (presence of nose and or base fuse)
   - Quantity
   - Depth of water
   - Depth of Item in Sediment (approximate)
   - Weight (estimate)
   - Frag
   - Demo Required
   - General Comment for Condition of Item (biological growth on item, etc.)
   - General Location (i.e., SWMU 4, Anchor Point, VNTR, etc.)
   - Date Found
   - Action Taken
   - Item moved to (as applicable)
   - GPS coordinates or ‘X-Y’ of local grid system

- Y Geographic Coordinate
- Photograph w/ white board slate if visibility permits

7. Upon obtaining this information, the UXO Diver will be recovered, and a second UXO Diver will be deployed to confirm the information. If a UXO dive pair is used, the second UXO Diver will confirm this information. Upon confirmation by a second UXO Diver, all information will be analyzed by the Diving Supervisor, Senior UXO Supervisors (SUXOS), and UXO Safety Officer (UXOSO).

8. The SUXOS and UXOSO will make the determination whether the MEC/MPPEH item is acceptable or safe-to-move. This agreed upon decision will be documented in the field logbook. Only items that are determined acceptable or safe-to-move by both the SUXOS and UXOSO will be moved in accordance with the approved Explosives Safety Submission (ESS).
9. Movement and/or recovery of MEC/MPPEH will be performed IAW with the approved Explosives Safety Submission (ESS) and site-specific work plans. UXO Divers may move or recover MEC/MPPEH by hand, or with the aid of additional buoyancy devices (lift bags or balloons, etc.). MEC/MPPEHmay be relocated to an underwater collection point, or terrestrial collection points or recovered to a surface vessel.
10. MEC/MPPEH recovered aboard a vessel for transport will be handled IAW standard explosives handling requirements and safety precautions. The following general guidance applies:
    a. Only items which can be manually and safely brought to the surface will be recovered aboard a vessel, unless other procedures involving recovery by approved explosives handling equipment (i.e., a crane) has been reviewed and approved by the MR Safety Lead and coordinated with the Field Team
    b. Once brought to the surface, MEC/MPPEH will be secured in the support boat using sandbags or a closed metal container and be transported to a terrestrial consolidation point (CP) designated by the SUXOS, for processing, treatment and disposal, IAW guidelines as outlined in site-specific documents.
11. If an MEC/MPPEH item found is deemed unacceptable or unsafe-to-move, and presents an imminent explosive hazard to persons in the area or potential trespassers, the client will be immediately notified. The item should be discreetly marked with a buoy below the water and updated GPS mark until a remediation plan is approved.

3.2 If MEC is determined "Unsafe to Move" for any reason or removal of the item will negatively impact the environment the following procedures will apply:

1. Item will be marked with a diver deployed buoy and a GPS mark will be taken.
2. Item will be remediated and blown-in-place when approved by the client and the Installation Range Operations Officer.

4.0 Supervisor’s or Process Supervisor’s Statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature Date:

Worker Name:

5.0 Worker's or Operator's Statement

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Signature Date:

Worker Name:

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Standard Operating Procedure
Emergency Medical Evacuation Procedures (MEDEVAC) Underwater

Document No: **JE-SOP-05-U**

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	original issue	George DeMetropolis
002	12.18.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for actions and procedures to be followed in the event of a medical emergency as outlined in the approved Dive Safety Plan (DSP) while conducting underwater unexploded ordnance (UXO) operations. Medical emergency plans require a great deal of coordination. It is therefore imperative that coordination between all involved entities be completed to include drills before conducting UXO Diving operations. Emergencies will be classified into three categories routine medical, trauma, and diving related injuries. The medevac procedures for each will be implemented as described herein.

2.0 Equipment

- Dive Team Medical Emergency kit
- Oxygen and Airway kit
- Backboard with straps
- Support boats
- Designated pre-positioned response vehicle
- Communications primary (cellular) secondary (radio)

3.0 Procedures and Guidelines

Note: Coordination of MEDEVAC resources, pre-positioning of response vehicle, medical equipment, recompression chamber readiness, availability of aviation MEDEVAC and providing a communications plan with phone and radio info, and a sail plan to the Site Manager and/or Installation as required will be verified by the Diving Supervisor, Dive Team MEDIC and designated personnel before beginning any UXO diving operations.

3.1 General procedures for assessment, treatment, and transport during a medical emergency

1. In the event of a medical emergency the designated Dive Team MEDIC will conduct an initial assessment of the injured person, and determine if additional treatment and/or MEDEVAC is required.

   Note: Initial assessment should primarily address airway, breathing, and circulation issues.

2. If advanced treatment/care is needed, the MEDIC will immediately assign a member of the team to initiate the following notification/Medivac plan in accordance with the approved DSP Emergency Management Plan.

   a. Contact 911/Installation to request an Emergency Medical Service (EMS) intercept or Air Medivac and pass along the following information.

      i. Person Calling
      ii. Nature of Emergency (Mechanical injury, Diving / hyperbaric injury, other trauma)
      iii. Location
      iv. Patient Condition (stabilized, status of breathing, circulation)
      v. Support Required (trauma / loss of blood, recompression treatment)

         - Air MEDEVAC
         - In Route EMS Intercept location

   b. Upon notification, 911/Installation will initiate MEDEVAC plan and request support as applicable.

      i. Qualified personnel and/or Dive Team MEDIC will continue Basic Life Support (BLS).

      ii. Initiate or continue transport of patient to shore and then by designated response vehicle toward a pre-arranged ALS intercept point.

      Note: If EMS Intercept is not available at pre-determined rendezvous point, transport will continue toward chamber or hospital for advanced care or to the landing zone for Air MEDEVAC.

      Note: Patient care provided while in route to intercept with advanced life support care will be limited to BLS measures:

      - Basic First Aid
      - Establishing and maintaining the airway
      - Control of bleeding
      - Administration of CPR
      - Administration of 100% oxygen (O2)
      - Treatment for shock, heat stress, etc.
      - Treatment for secondary injuries (lacerations, fractures, etc.)

3. Once at the local hospital, a determination for follow-on care (treatment at local emergency room, Air MEDEVAC to secondary recompression chamber or to trauma center) will be made based on the nature of the injury.

   Note: Because of the possible extended response time of Air MEDEVAC (specifically for transport to the secondary recompression chamber), requests should be made as soon as possible to ensure availability of aircraft at the hospital upon arrival.

   Note: **For confirmed diving-related injuries and especially arterial gas embolism (AGE), initiation of recompression treatment at the designated recompression chamber must begin as soon as possible. TIME IS CRITICAL.**

4.0 Supervisor’s or Process Supervisor’s Statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature Date:

Worker Name:

5.0 Worker's or Operator's Statement

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Standard Operating Procedure
Quality Control Procedures for Underwater Operations

Document No: JE-SOP-06-U

Effective Date: February 24, 2023

Revision: 005

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	Original issue	George DeMetropolis
002	12.14.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This Quality Control (QC) standard operating procedure (SOP) provides underwater Munitions Response (MR) QC personnel with processes and procedures for conducting QC for MR actions performed during underwater diving operations. This SOP provides guidance for use by Contractor personnel assigned to provide MR support for MR activities.

This supplements guidance provided in the site-specific documents (Work Plan, Explosives Safety Submission [ESS], ESS-Determination Request, and/or Quality Assurance Project Plan) for MR activities. If the information in this SOP conflicts with guidance contained in approved site-specific documents, the approved site-specific documents will take precedence.

The procedures described delineates lines of communication and contains general and specific procedures for conducting routine underwater QC functions during MR operations.

2.0 Objectives

The objectives of this SOP are to provide sufficient guidance to QC personnel to:

- Document, validate, and verify the quality of the MR team's munitions and explosives of concern (MEC) removal activities.
- Document, validate, and verify the quality of the MR team's removal and processing of any munitions debris and range-related debris.
- Evaluate the MR team's efforts for compliance with their site-specific documents as required by the team's Statement of Work (SOW).
- Conduct in-process QC of MR team activities to better evaluate the team's stated confidence in the results.
- Verify the MR team's MEC clearance activities in accordance with requirements stated in the SOW and individual Task Orders by completing acceptance sampling.
- Ensure that quality processes are consistent and repeatable.
- Ensure appropriate and consistent problem reporting and the closure of corrective actions.
- Strive to continually improve the processes related to underwater munitions removal activities.

3.0 Quality Control Program Components

1. For the purposes of this document, quality is defined as "conformance to requirements." To manage quality, requirements must be clearly stated so that they are understood by everyone involved. Measurements and observations are then taken to determine conformance to those requirements.
2. The QC Program consists of three activities:
    a. Preparatory
    b. Initial
    c. Follow-up
3. In the ***Preparatory Phase***, the unexploded ordnance (UXO) QC Specialist with the QC Manager establish the evaluation criteria and identifies the assessment activities that will be required, the data collection methods, and the metrics to be captured. The Planning Phase of the QC activities is based on and derived from the definable features of work (DFW) or the data quality objectives (DQOs) specified in the contract, SOW, and site-specific documents. The QC Manager will select those DWF/DQOs and develop question sets that are considered relevant to the contract task. These question sets will be entered as a form into the data base and are to be used during team/activity observations. The QC Manager will also determine the audit method, team/activity observation, verification sampling, and the audit frequency.
4. During the ***Initial Phase,*** the selected DFW/DQOs and Question Sets will serve as the basis for conducting each assessment, collecting relevant data, and recording and analyzing findings. If a corrective action is required as a result of the Execution Phase a Corrective Action Report will be initiated.
5. The ***Follow-up Phase*** is the monitoring and verification of ongoing site activities and to monitor corrective actions.

4.0 Responsibilities and Interfaces

4.1 Unexploded Ordnance Quality Control Specialist

The primary general responsibility of the Unexploded Ordnance (UXO) Quality Control Specialist (UXOQCS) is to:

- Collect and document assessment findings and report trends.
- Analyze assessment findings.
- Ensure appropriate and consistent problem reporting and the closure of corrective actions.
- Striving to continually improve the MEC clearance processes.
- Ensure quality processes are consistent and repeatable.
- Will be supported at the program level by the MR Quality Manager.
- Specific responsibilities include:
  - Assessment Preparation
    - Maintain effective communication with the UXO Dive Team to insure QC efforts are effective.
    - Alert MR Quality Manager of safety hazards and any major nonconformity.
    - Participate in Contractor and Subcontractor meetings.
    - Continually evaluate safety measures and practices and report findings to MR Quality Manager.
    - Insure UXO Divers are properly trained and equipped.
  - Operational Hazard Analysis
    - Maintain constant communication with the MR Quality Manager to insure QC efforts are safe and effective.
    - Participate in contractor/subcontractor meetings.
    - Determine hazards associated with weekly tasks and measures to prevent incidents.
    - Continually evaluate safety measures and practices and report findings to MR QC Manager.
  - Assessment Execution
    - Maintain constant communication with the MR Quality Manager to insure QC efforts are safe and effective.
    - Monitor the assessment process.
    - Lead and conduct the assessment.
    - Capture the objective data.
    - Monitor the assessment process.
    - Participate in meetings between the Quality Manager and Contractor or Subcontractor.
    - Continually evaluate safety measures and practices within scope of contract.
  - Assessment Follow-ups and Closure
    - Validate data.
    - Contact MR Quality Manager for data validation.
    - Complete QC Report.
    - Report corrective actions to the MR Quality Manager.
    - Participate in meetings held between UXO Dive Team and Contractor and Subcontractor Personnel.

4.2 Lines of Communication

- The Remedial Project Manager (RPM) will be informed weekly by the UXOQCS of all QC activities to ensure compliance with the program objectives
- The UXOQCS will be responsible for evaluating each contractor's weekly accomplishments and designing the QC efforts for the upcoming week
- The RPM will be informed of all day-to-day QC activities and findings by the UXOQCS.

- All QC efforts and findings will be provided to the MR Quality Manager.
- Questions and/or issues regarding implementation of the QC process will be posed to the MR Quality Manager.
- Concurrence from the Client will be required before implementing procedures, which differ from those written in this plan or described in work plans applicable to the work being assessed.

5.0 Quality Control Processes

The QC process consists of team observations, verification sampling, and final acceptance audits of MR contractor actions. The QC Manager is responsible for ensuring that assessments are documented, and trained personnel are available.

6.0 Quality Control Sampling and Verification

Before each diving day, the team will process through the Instrument Verification Strip (IVS) to ensure each detection instrument is working properly and is capable of detecting a buried 2-inch pipe nipple (ISO) at a depth of 5 inches in the horizontal attitude and a depth of 9 inches in the vertical position. In addition, a third item will be buried in the water at a depth of 6 inches to further verify proper instrument and operator operation.

The Contractor and Subcontractor will complete and perform quality control for a minimum of 10 percent of the total waypoints investigated and as specified in their respective SOPs and/or work plans using the same equipment as the dive team.

7.0 Team and Activity Observations

QC evaluations of contractor field operations will be conducted to ensure compliance with work plan processes and SOPs. Additionally, the diving operations will be evaluated by the UXOQCS to determine if the appropriate methods are being implemented and are the most efficient while maintaining a sufficient level of safety.

8.0 Definitions

Definable Features of Work (DFW)—DFW are those products or processes that can be identified as having results that can be measured. For the purposes of QC surveillance activities, only those definable features of work that impact the overall quality or safety of the project should be included.

MEC Clearance—The term “MEC Clearance” as it relates to this document encompasses all activities

Quality Control (QC)—The operational techniques and activities used to fulfill requirements for quality.

9.0 Supervisor’s or Process Supervisor’s Statement

I have read and understand this SOP. To the best of my knowledge, the processing described within this SOP can be done in a safe, healthful, and environmentally sound manner. I have made sure all persons assigned to this process are qualified, have read and understand the requirements of this SOP, and have signed the worker or operator's statement for this process. I will ensure the SOP has current procedures. If a major change to the SOP is necessary, I will ensure that the process is stopped until the SOP is revised and approved. If unexpected safety, health, or environmental hazards are found, I will make sure the process is stopped until the hazards have been eliminated.

Signature Date:

Worker Name:

10.0 Worker's or Operator's Statement

I have read this SOP and I have received adequate training to perform the process according to the SOP. I will follow the SOP unless I identify a hazard not addressed in it or encounter an operation I cannot perform according to the SOP. If that occurs, I will stop the process and notify my immediate supervisor of the problem.

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Standard Operating Procedure
Underwater Subsurface Excavation of MEC

Document No: JE-SOP-07-U

Effective Date: February 24, 2023

Revision: **005**

Contents

Rev No.	Effective Date	Revision Description	Procedure Owner Approval
001	11.21.18	Original issue	George DeMetropolis
002	12.14.18	Senior review complete	George DeMetropolis
003	01.01.21	Senior review complete	George DeMetropolis
004	08.01.22	Annual review	Jeff McCauley
005	02.24.23	Annual review and update	Jeff McCauley

Attachments

None.

1.0 Scope and Application

This standard operating procedure (SOP) provides general guidelines for the underwater subsurface excavation operations, to locate, identify, classify by type and function, fuze, condition, filler, and to remove or reduce explosive hazards resulting from munitions and explosives of concern (MEC) and/or material potential presenting and explosive hazard (MPPEH) from an underwater munitions response (MR) site.

2.0 Equipment

- Dive system(s): SCUBA and/or surface supplied air (SSA)
- Individual dive gear
- Diver through-water communications system
- Global positioning system (GPS) navigation and point collection equipment
- MineLab Excalibur II underwater all-metals detection instruments (or comparable)
- Diving support boats
- Pelican floats (or equivalent)
- Logbook
- Chart with plotted transects and anomaly waypoints marked
- Pre-positioned transects

- Pre-positioned waypoints
- Approved hand tools for excavation

3.0 Procedures and Guidelines

1. Before the start of excavation operations, the Senior Unexploded Ordnance (UXO) Supervisor (SUXOS) or UXO Safety Officer (UXOSO) will establish an exclusion zone (EZ) based upon a determination of the explosive safety quantity distance (ESQD) for the hazardous fragment distance (HFD) requirements. These requirements are associated with the munition with the greatest fragment distance (MGFD), as outlined within the site-specific documents Explosives Safety Submission (ESS) and Work Plan, both of which are required to be onsite.
2. Investigation operations and diving will employ established MEC and anomaly avoidance techniques (JE-SOP-01, Anomaly Avoidance). Anomaly avoidance techniques will be used to determine safe boat anchorage locations, positions for emplacement of markers (sand screw type, etc.), buoy anchors, and other items intended to make contact with the seabed. Anomaly avoidance procedures will also be implemented if the work plan calls for emplacement of quality control (QC) seeds.
3. Personal protective equipment and safety equipment will be readily available and emergency communications established before the commencement of excavation operations. Personnel will be trained on their roles and duties, operator hand signals, and emergency actions.
4. Ensure the area to be excavated is free of nonexplosive buried hazards such as utilities, underwater cables, or hazardous, toxic, or radiological waste (HTRW). If such hazards are present, ensure the crews are aware of the hazards, their locations, and proper avoidance precautions observed. Where underground utilities may be encountered, the Underground Utility Locates SOP will be followed.
5. A subsurface excavation is usually conducted subsequent to the identification of target anomalies derived through the processing of geophysical data collected during the digital geophysical mapping phase of the MR project. Subsurface excavations are conducted to explore the results of geophysical sensors by excavating and identifying the source of selected metallic anomalies and subsequently disposing of those items determined to be MEC, material potentially presenting an explosive hazard (MPPEH) and munitions debris (MD).
6. MEC and MPPEH items that are deemed unacceptable or unsafe-to-move are marked and their positions recorded electronically, and notification made to the PM via the Diving Supervisor, to develop a remediation plan. MEC, MPPEH, and MD items that are acceptable or safe-to-move may be relocated to underwater collection points (CP), a terrestrial CP, or recovered to a surface vessel for transport IAW the approved ESS and following the guidance of MPPEH Management Underwater (JE-SOP-4-U).
7. Reacquisition and investigation of subsurface anomalies should be performed by the minimum number of UXO Divers required to safely perform the task. Routinely, a single, UXO Diver observed by a witness float, may be used during intrusive underwater investigation and excavation procedures.
8. A UXOQCS will independently perform subsurface excavations for QC in accordance with JE-SOP-06-U, Quality Control.
9. Anomaly excavation operations will be executed by UXO-qualified personnel under the direct supervision of a SUXOS. The UXO Diver will not dig directly down to the item but, rather, will dig to the side to avoid striking the item with digging implements. Extreme care will be taken during anomaly excavation to avoid striking, moving, or otherwise disturbing items which are assumed to be MEC or MPPEH.
10. Anomalies will be dug to a depth of 1 foot.

4.0 Supervisor’s or Process Supervisor’s Statement

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STANDARD OPERATING PROCEDURE

Vieques Electronic Data Entry SOP

I. Purpose

This SOP provides general guidelines for entering field data into the hand-held electronic data collection devices utilized on Vieques during the munitions response site investigation and remediation activities; the devices are Apple iPad Minis that are commonly referred to as personal digital assistants (iPads).

II. Scope

This is a general description of the data collection process using the ESRI's Collector, Survey123, and Enterprise portal systems along with the associated forms developed and loaded to the data collection devices. Log books are needed to properly document all field activities in support of data evaluation and possible legal activities.

III. Equipment and Materials

- Apple iPad Mini with the ESRI's Collector and Survey123 projects loaded

IV. Procedures and Guidelines

The procedures for using the iPads will vary by user/team. The processes for each team are outlined below:

All Teams:

- If Collector and Survey123 are not already open on the PDA, go to the Home screen and tap the logos for both.
- Confirm that the maps and forms you need are included as "On Device" in Collector and in "My Surveys" in Survey123 to have them operable in the field.
- All forms can be opened in Survey123 or by taping a 30 meter grid in the Collector map
- **Enter the MEC Daily form**:
    - Tap Vieques Form 3A MEC Daily from the My Surveys list and then "Collect" at the bottom of the 3A details page
    - Enter in information about the team for the day
    - Tap the check mark at the bottom of the form when done; choose "Save this survey in the Outbox"
- **Enter a MEC Operations form for each Grid**:
    - Tap Vieques Form 3B MEC Operations from the My Surveys list and then "Collect" at the bottom of the 3B details page

- If 3B is launched from the Collector map, the Grid Cell will be auto-complete with the name of the grid that was tapped to show the form list
- Select a Grid and enter the Operation type from the drop down list for the work to be performed and enter your Start Time
- When work finishes in that grid, enter End Time and % Change
- Tap the check mark at the bottom of the form when done; choose "Save this survey in the Outbox"

- **Enter an Items Found form to enter items**:
  - Tap Vieques Form 3C Item Found from the My Surveys list and then "Collect" at the bottom of the 3C details page

Attributes collected for items are entered into the pre-loaded form. At the end of each day the data will be loaded into the Vieques MR database. The data attributes identified below are recorded through the forms and will appear in the database:

Surface MEC Data Attributes
Date
Grid
Operation Type
Team Name
Item Group
Item Class
Item Category
Type/Filler
Description/Fuzing
Quantity
Depth
Weight
Inclination
Orientation
Demo Required
Moved To
Treatment
Comments

- The form uses the current GPS location of the iPad to record the coordinates of the item; the location can be adjusted inside the map at the bottom of the form
- A photograph of the item can be saved to the database by tapping the camera icon at the bottom of the form
- Tap the check mark at the bottom of the form when done; choose "Save this survey in the Outbox"

QC/QA :

- **Enter a MEC Operations form for the Grid**:
  - See description above for the 3B MEC Operations form
  - Enter the appropriate QC or QC operation type from the list

- **Enter a QC/QA Grid Form**:
    - Tap Vieques Form 3D QC/QA from the My Surveys list and then “Collect” at the bottom of the 3D details page
    - Enter QC/QA information into the form and choose Pass or Fail at the bottom
    - Tap the check mark at the bottom of the form when done; choose “Save this survey in the Outbox”

To edit data that has been entered:

- Tap on “Outbox” at the bottom of each form’s detail page
- Each form that has been completed since the iPad was last sync’d with the database will be listed
- Tap on a row to re-open a complete survey and edit
- Tap the trash can logo on the right side of the row to delete the completed survey

Attachment B
Responses to Regulator Comments

ATTACHMENT B

Responses to Regulator Comments

Responses to EPA Comments on
Draft UXO 16.3 Site Inspection at Mosquito Pier and Mosquito Pier Causeway
Quality Assurance Project Plan
Atlantic Fleet Weapons Training Area – Vieques
Former Naval Ammunition Support Detachment, Vieques, Puerto Rico
Dated March 2024

1. Please note that a Site Inspection was already performed at Atlantic Fleet Weapons Training Area which included the underwater areas including the Piers at UXO 16.3. Therefore, the discussion within the Executive Summary needs to be revised because EPA does not concur with the full rationale provided. Please make the appropriate changes to the title of the document as well as all references/discussion to a Site Inspection in the document.

   Navy Response: The Draft QAPP utilizing Site Inspection (SI) terminology was submitted for regulatory review in March 2024, prior to discussion of the topic during the April 2024 Technical Subcommittee Meeting. At that meeting, it was concurred upon by the stakeholder agencies that the investigation would be designated a Site Screening Process (SSP) to be consistent with the process defined in the Vieques Federal Facility Agreement, and that the terminology would be revised accordingly in the Draft Final version. Therefore, the title of the QAPP has been revised to "UXO 16.3 Site Screening Process at Mosquito Pier and Mosquito Pier Causeway Quality Assurance Project Plan." Additionally, where SI terminology is present in the text, tables, and figures of the QAPP, it has been replaced with SSP terminology.

2. If it discovered during the investigation that a release of MEC has occurred at 16.3, or if there is any other finding that would call into question the current Conceptual Site Model for UXO 16.3, a Remedial Investigation will be warranted.

   Navy Response: The Navy concurs that if a MEC release is confirmed or suspected based on the SSP findings or other information associated with the conceptual site model, a remedial investigation will be warranted.

Responses to EPA's Additional Comments on
Draft UXO 16.3 Site Inspection at Mosquito Pier and Mosquito Pier Causeway
Quality Assurance Project Plan
Atlantic Fleet Weapons Training Area – Vieques
Former Naval Ammunition Support Detachment, Vieques, Puerto Rico
Dated March 2024

GENERAL COMMENTS

1. Add a Document Control Number (DCN) to the cover page and/or WS1&2 to identify the most current version of the QAPP and to ensure that only that version of the QAPP is used by all project participants.

   Navy Response: The Navy concurs with the substantive content of the comment, but the standard process, which includes the use of "Draft," "Draft Final," and "Final" in the document title to ensure version control, will be continued. That process has been successfully used for documents generated for Vieques and other Navy facilities under the CLEAN program for many years.

PROJECT MANAGEMENT and OBJECTIVES ELEMENTS

1. Worksheet #3 & 5

a) Add the following persons to the project organization chart: CH2M UXOQCS (Mike Ligon), CH2M Project Biologist (John Martin), and CH2M GIS Lead (Jesse Clements).

Navy Response: John Martin has been removed from Worksheet #3 & 5. Mike Ligon and Jesse Clements have been added to the project organization chart.

MEASUREMENT/DATA ACQUISITION ELEMENTS

2. Worksheet #17

a) Revise the QAPP reference in Figure 17-1a. The decision tree cites "UXO 13 TCRA QAPP" instead of the current UXO 16.3 document.

Navy Response: The QAPP reference in Figure 17-1a has been corrected to "UXO 16.3 Site Screening Process QAPP."

3. Worksheet #22

a) Determine if the "ITS Function Test" acceptance criteria should also have information on the instrument response (similar to the acceptance criteria listed for the on-land air test row). Revise as applicable.

Navy Response: The "Acceptance Criteria" for the "ITS Function Test" has been corrected in Table 22-2 to read: "Audible response consistent with expected change in tone in presence of small ISOs within ITS." In Table 22-1, "ITS Function Test" has been replaced with "Temporary ITS Set Up" and the "Failure Response" revised to: "SUXOS re-performs seed emplacement if UXOQCS observes seeds are not emplaced in accordance with DFW 4." Additionally, the air test row has been deleted, as this test is covered in Table 22-2.

4. Worksheet #37

a) In the "Personnel Responsible for Participating in the DUA" subsection, consider adding that Navy and regulatory personnel involvement in the DUA will be conducted at the report review stage.

Navy Response: As has been done for all applicable previous reports for Vieques sites, Navy and regulatory personnel involvement in the DUA is done at the applicable report review stage (i.e., the UXO 16.3 SSP Report).

OTHER COMMENTS

5. Attachment A

a) Verify if there should be a SOP for the seafloor surface instrument-aided visual survey. Add the procedure to Attachment A as appropriate.

Navy Response: Sufficient details regarding the seafloor surface instrument-aided visual survey is provided in the main body of the QAPP, obviating the need to add an SOP.

Responses to PRDNER Technical Review of
Draft UXO 16.3 Site Inspection at Mosquito Pier and Mosquito Pier Causeway
Quality Assurance Project Plan
Atlantic Fleet Weapons Training Area – Vieques
Former Naval Ammunition Support Detachment, Vieques, Puerto Rico
Dated March 2024

GENERAL COMMENTS

1. PRDNER requests that if breached MRC items are discovered, the Navy shall collect sediment samples from a subset of these items for analysis of munition constituents. This data could be used to support a remedial investigation.

   Navy Response: Finding of a breached item will confirm the presence of MEC release. Therefore, in accordance with DQO Step 5 in Worksheet #11, the Navy and regulatory agencies will determine the appropriate path forward (removal action and/or remedial investigation) for which a QAPP will be prepared. Through the joint scoping process for that QAPP, the location(s) of sediment samples warranted will be developed.

2. Table 10-1 notes that bombs are a potential MEC item transported off Navy ships. However, the types and diameters of bombs that may have been transported off Navy ships is not listed in Table 10-2. Please clarify the diameter of these bombs, if they self-bury and to what depth, noting that piles commonly extend to depths greater than the intrusive investigation depth of 12 inches below the sea floor.

   Navy Response: As stated in Worksheet #11, "[t]he munitions brought to the pier would have been for land-based training, not those associated with air-to-ground (e.g., bombs) or ship-to-shore (e.g., 16-inch projectiles)." Bombs were inadvertently listed in Table 10-1 and have been removed.

PAGE-SPECIFIC COMMENTS

1. Pdf p. 38, Conceptual Site Model (CSM), first para, second sentence: Recommend editing "This munition" to "The munition".

   Navy Response: The text has been updated to "The highest-density munition in…."

2. Pdf p. 41, Table 10-2: Remove "Projectile" after each "Mortar" designation; move the "66 mm Projectile (LAW M72)" to the "Rocket" section as it's a 2.36" Rocket; and edit ".5 caliber" to ".50 caliber" in the SAA [small arms ammunition] section.

   Navy Response: The table has been updated as requested.

3. Pdf p. 47, Data Quality Objective (DQO) Step 2, second para: "For example, an empty ammunition can would be considered MPPEH upon initial discovery but would ultimately be determined to be munitions debris (MD), which poses no explosive hazard."

   Please edit this sentence as an ammunition can determined to be empty wouldn't be reclassified as MD, but rather range related debris (RDD).

   Navy Response: The text has been revised as requested.

4. Pdf p. 59, Worksheet (WS) #12, Anomaly Resolution, Activity Used to Assess Performance column: This column doesn't mention any type of verification sampling, yet this type of sampling is listed as being performed in Section 5 of JE-SOP-06-U. Please confirm if this task will be performed. If it will be, please add the task description within the table. This comment is also applicable to Pdf p. 70, WS #17 DFW 5.

   Navy Response: No verification sampling is planned, which is why there is no statement in the QAPP about performing verification sampling. Please see the SOP statement in Worksheet #17 that indicates what is stated in the QAPP takes precedence when there is a difference between what the QAPP and SOPs state.