

**Final**

**Munitions Response Third-Party Quality Assessment  
Quality Assurance Summary Report for  
Remedial Investigation of the South Shore Area (SSA)  
Former Mare Island Naval Shipyard  
Vallejo, California**

**January 2016**



Prepared for:  
**Department of the Navy  
Base Realignment and Closure  
Program Management Office West  
San Diego, California**

Prepared by:  
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Prepared under:  
**Naval Facilities Engineering Command Southwest  
Contract Number N62473-13-C-2405  
DCN: ECM-2405-0000-0008**



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Quality Assurance Summary Report for  
Remedial Investigation of the South Shore Area (SSA)  
Former Mare Island Naval Shipyard,  
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Submitted by:  
**Environmental Cost Management, Inc.**



\_\_\_\_\_  
Signature

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## ABBREVIATIONS AND ACRONYMS

bgs	below ground surface
DGM	digital geophysical mapping
DoD	Department of Defense
DQO	data quality objective
ECC	Environmental Chemical Corporation
ECM	Environmental Cost Management, Inc.
EODMU9	Explosive Ordnance Disposal Mobile Unit Nine
ESS	Explosives Safety Submission
IA	Investigation Area
MEC	munitions and explosives of concern
MINS	former Mare Island Naval Shipyard
mm	millimeter
MPPEH	material potentially presenting an explosive hazard
MRP	Munitions Response Program
Navy	Department of the Navy
NOREAS	NOREAS, Inc
NTCRA	non-time-critical removal action
PMA	Production Management Area
QA	quality assurance
QAIPP	Quality Assurance Implementation Project Plan
QC	quality control
RI	Remedial Investigation
RFC	request for field change
SOP	standard operating procedure
SSA	South Shore Area
SWMU	Solid Waste Management Unit
UST	underground storage tank
UXO	unexploded ordnance

## ABBREVIATIONS AND ACRONYMS (Continued)

UXOQC	unexploded ordnance quality control
UXOQCS	Unexploded Ordnance Quality Control Specialist
Weston	Weston Solutions, Inc.

## 1.0 INTRODUCTION

Environmental Cost Management, Inc. (ECM), under Department of the Navy (Navy) Contract No. N62473-13-C-2405, was tasked to provide independent third-party quality assurance (QA) oversight services during the Munitions Response Program (MRP) remedial investigation (RI) at South Shore Area (SSA), located at the former Mare Island Naval Shipyard (MINS), Vallejo, California. The SSA RI was conducted by NOREAS, Inc. (NOREAS).

This report discusses the QA oversight activities that ECM conducted during the SSA RI from July 28, 2015, through August 19, 2015. A total of nine QA days were logged in the completion of this effort. The Navy tasked NOREAS with installing groundwater monitoring wells and soil borings and trenching areas to determine the likelihood of contamination from deck markers. The RI included surveys, unexploded ordnance (UXO)/munitions and explosives of concern (MEC) avoidance, trenching, well installation, and soil sampling. The requirements and activities for the MRP SSA RI are provided in the Remedial Investigation Work Plan for the Munitions Response Program SSA (RI Work Plan) (NOREAS, 2015b) and Explosives Safety Submission (ESS) (NOREAS, 2015a).

The MEC QA Specialist followed the Navy-approved Quality Assurance Implementation Project Plan (QAIPP) (ECM, 2013) under Contract No. N62473-13-C-2405. The QAIPP is applicable to all third-party QA activities associated with the MRP and performed at MINS in Vallejo, California. The QAIPP addressed the third-party QA objectives and describes the processes and organization necessary to ensure that all QA activities are performed in accordance with the MRP for MEC and the scope of work for each identified site.

### 1.1 SITE DESCRIPTION AND BACKGROUND

Mare Island is located in California, northeast of San Francisco, in Solano County. The Mare Island complex occupies 5,600 acres on a peninsula bound to the south by the Carquinez Strait, to the west by San Pablo Bay, and to the east by Mare Island Strait (Napa River), which separates it from the City of Vallejo, California. The City of Vallejo is located directly across the Mare Island Strait (Figure 1).

The SSA is located on the south end of Mare Island and includes portions of Investigation Area (IA) G and transfer parcel VII-B, along with a sliver of IX (Figure 2). The SSA has also been referred to as UXO 7. The SSA extends out from the base of the cliffs that define the southern boundary of the hills to the Carquinez Strait, and was created in several stages between 1930 and 1947. The material used to construct the SSA consisted primarily of rock and soil taken from the upland areas that was placed over the clays and silts that had been deposited at the edge of Mare Island. However, dredge materials may also have been used to expand portions of the SSA in the past. The SSA is bound on the west by dredge ponds and the IR05 area, on the south by Carquinez Strait, on the east by the Production Manufacturing Area (PMA), and on the north by the upland hills.

## **1.2 HISTORY OF MEC USE**

Originally, the entire southern portion of MINS was referred to as the ordnance facility. The ordnance facility included areas currently known as the Western Magazine Area, IR05, as well as the PMA and the SSA. The ordnance facility served a critical role as a munitions storage and production facility from 1857 until 1975. The purpose of the ordnance facility in the early years was to store and process the ammunition used aboard naval ships. Black powder munitions were emptied and refilled while ships were being repaired at MINS. Facilities for loading gun-cotton were built in the 1890s, and the loading of projectiles with ammonium picrate (Explosive D) was implemented by the beginning of World War I.

The ordnance facility was re-designated as the Naval Ammunition Depot in 1936 when ammunition manufacturing operations were initiated at the buildings located in the PMA. Many of the existing PMA production buildings were constructed during the period between 1936 and the beginning of World War II. Ordnance was received, maintained, refurbished, demilitarized, subjected to QA testing, and loaded on and off ships at the PMA and SSA portions of the Naval Ammunition Depot. The SSA was used for the storage of general shipyard items as well as for the storage and handling of munitions. Ordnance was not manufactured in the SSA. The key buildings and features of the SSA are illustrated in [Figure 2](#).

A wide variety of buried munitions items have been detected and removed from portions of the PMA and SSA, including propellants, munitions items filled with high explosives, small arms ammunition, fuses, primers, and small- to medium-caliber gun ammunition.

## **1.3 PREVIOUS STUDIES OF EXTENT OF MEC OR MPPEH CONTAMINATION**

### **1.3.1 MPPEH and MEC Previous Investigations and Removal Actions**

Four separate emergency munitions response actions were completed at the SSA by Explosive Ordnance Disposal Mobile Unit Nine (EODMU9) between August 1990 and May 1995 ([Weston Solutions, Inc. \[Weston\], 2011](#)) for material potentially presenting an explosive hazard (MPPEH) and MEC. The actions involved the mitigation of MEC hazards identified incidental to the MINS maintenance actions being performed by DON and contractor personnel at five locations in the PMA and SSA.

A shoreline area just west of Dike 14 in the SSA was the site of two separate emergency munitions response actions in August and September of 1990. On August 7, 1990, discovery of MEC exposed by MINS maintenance workers resulted in the surface clearance of multiple items, including 20-millimeter (mm), 40-mm, and 3-inch/50 caliber anti-aircraft rounds, by EODMU9 personnel. On August 27, 1990, additional MEC items were observed at the same site in the bottom of a shallow fire pit that had been excavated by unknown persons.

A second munitions response action was completed by EODMU9 personnel after an initial inspection by the MINS Explosives Safety Manager revealed additional buried MEC and related munitions items clustered together in a large conglomerate mass. Approximately 5,000 pounds of munitions dating from the Civil War through the post-World War II era were ultimately removed from the site and transported to China Lake Naval Air Warfare Center for disposal. Recovered

MEC included small arms ammunition, projectile fuses, and many additional 20-mm and 40-mm anti-aircraft rounds.

Another SSA munitions response action took place on June 9, 1993, when EODMU9 responded to a report of a munitions item on the beach just west of Pier 34. EODMU9 personnel identified, evaluated, and transported two MK 58 Marine Markers to a disposal range where they were destroyed.

A Preliminary Assessment was conducted to comprehensively address the nature and extent of potential UXO contamination at MINS. A number of buildings related to the SSA were assessed during the Preliminary Assessment. For most of them, no further action was recommended. Exceptions included Building A227, the transformer house, for which investigation of polychlorinated biphenyls was recommended. In addition, it was found that further investigation may be required at Building A259 to characterize the extent of petroleum-contaminated soil from a former underground storage tank (UST) located adjacent to the building (PRC, 1995a).

A Preliminary Assessment/Site Inspection for non-radiological sites was conducted at 95 solid waste management units (SWMUs) that were previously identified during a 1987 RCRA facility assessment at MINS. Of these sites, five SWMUs (SWMUs 91, 93, 101, 106, and 125) are located within the SSA vicinity. The report recommended that the contaminant-related sites “should be investigated under the Navy’s Installation Restoration Program,” but further indicates that the primary area of concern for SMWU 125 is the ordnance production area (PRC, 1995b).

A UXO intrusive investigation at the SSA was conducted between August 1997 and May 1999, based on the presence of 1,093 geophysical anomalies identified during a previous geophysical survey. During the intrusive investigations, 1,810 MEC items were recovered from the SSA (Roy F. Weston, 2003). The MEC items were removed to a minimum depth of 4 feet below ground surface (bgs) and up to 10 feet bgs in locations near active or maintained utilities. None of the MEC items recovered showed evidence of having been fired and all were classified as discarded military munitions. Also recovered were 156,753 other live ordnance items (predominantly small arms ammunition), 767,373 inert ordnance items (munitions-related debris), and 688,419 pounds of scrap metal (Roy F. Weston, 2003).

In addition to the MEC items, a single 1.5-inch-diameter radio-luminescent deck marker, or radium button, was found near Dike 14 on January 8, 1999. Radiological scanning of the deck marker indicated emissions of low-level radioactivity at a rate of 0.4 millirems per hour (Roy F. Weston, 2003). The item was identified during the screening of soil excavated near Dike 14 to remove ordnance. As a result of the finding, all of the soil removed from the excavation, several hundred cubic yards, was screened for radioactive material. No additional radioactive material was identified. Approximately 567 cubic yards of impacted soil were excavated from the three sites at the oven/primer pit area and disposed at an appropriate offsite permitted facility.

Energetics (TNT, TDX, and Tetryl) were not detected during the field screening activities. However, the field screening results indicated elevated levels of copper, lead, and zinc in the soil, which is typical of an area used as a munitions burn site. A repetitive process of excavation and confirmation soil sampling was completed to ensure that all soils containing copper, lead, or zinc at concentrations above established action levels had been removed.

Between 2003 and 2006, an investigation was conducted to characterize the nature and extent of MEC items in the shoreline (including nearshore and mudflat areas) and shallow water areas of the PMA, SSA, and IR 04 ([Environmental Chemical Corporation \[ECC\], 2010](#)). The investigation was completed in two phases, including a geophysical survey (Phase I) followed by excavation of selected geophysical anomalies (Phase II) identified during the first phase. For Phase I, a total of approximately 92 acres was surveyed during the summers of 2003 and 2004. As a result of the Phase I investigation activities, 2,482 geophysical anomalies were identified in the shoreline and mudflat areas of the SSA ([ECC, 2010](#)).

Based on the Phase I results, a total of 765 geophysical anomalies in the SSA was selected for Phase II intrusive investigation. During the summer of 2006, the selected anomaly locations identified during Phase I were reacquired and excavated to a depth of approximately 4 feet bgs, where possible. As a result of the Phase I investigation activities, a total of 2,482 geophysical anomalies was identified in the shoreline and mudflat areas of the SSA ([ECC, 2010](#)). As a secondary objective, the investigation also included a sedimentation study to evaluate the potential for subsurface MEC exposure and transport in the offshore areas of the SSA, PMA, and IR 04 due to the actions of waves or currents. The results of the sedimentation study indicated that any buried MEC items that may be present in the nearshore and mudflat areas of the SSA would likely remain buried even in the event of storm-generated waves, tidal currents, or vessel traffic in Carquinez Strait. The investigation report recommended continued investigation of the remaining anomalies in the shoreline areas of the SSA.

A digital geophysical mapping (DGM) survey of all accessible areas within both the PMA and SSA was completed in 2006 ([Weston, 2008](#)). Wetland areas and debris piles within the boundaries of the PMA and SSA were excluded from the DGM survey. The DGM survey included crawl spaces under three buildings, one of which is located in the SSA (Building A163), to determine whether geophysical data could be obtained. A total of 28,805 geophysical anomalies was identified by the 2006 DGM survey at the PMA and SSA: 13,938 anomalies in the PMA and 14,324 anomalies in the SSA ([ISR JV, 2014](#)). A total of 543 anomalies was identified in the three surveyed building footprint areas, of which 207 anomalies were noted beneath Building A163 in the SSA.

Based on the results of the 2006 DGM survey, an Engineering Evaluation and Cost Analysis /Interim Remedial Action Plan was prepared by Weston for a munitions non-time-critical removal action (NTCRA) at the PMA and SSA ([Weston, 2011](#)). The NTCRA included excavation and screening of soils to a depth of 4 feet bgs at each targeted geophysical anomaly location. The work performed by Weston, including the geophysical surveys, munitions and non-munition items found, munition constituents sampling, radiological screening, and non-munition related investigations and activities, is summarized in the RI Work Plan ([NOREAS, 2015b](#)).

## **2.0 PROJECT OBJECTIVES AND OPERATIONAL APPROACH**

### **2.1 PROJECT OBJECTIVES**

ECM has been tasked with providing independent third-party QA oversight services during MRP removal actions and investigations at MINS, Vallejo, California. During the MRP removal actions and investigations, contractors will investigate sites to determine whether MEC/MPPEH items are present, and if present ensure that MEC and MPPEH items are properly handled, stored, and disposed.

ECM will coordinate activities with the Navy to ensure that projects are managed in accordance with Department of Defense (DoD) and Navy requirements and each site's approved work plan and ESS, and that all project objectives are met in a timely and cost-effective manner. The QA Team will provide full-time field QA oversight during the first week of each major field project and will adjust extent of oversight as appropriate for the first week of any new task after startup.

### **2.2 OPERATIONAL APPROACH**

The following field investigation activities were performed during the MRP RI:

- Advance and sample 52 soil borings throughout the SSA. Samples correspond with those areas where potential impacts from chemical contaminants are most likely to have occurred.
- Install and sample nine groundwater monitoring wells in the SSA to provide information about hydrogeologic conditions, potential contaminant impacts, and general water quality.

### **2.3 HANDLING, STORAGE, AND DISPOSAL**

Handling and storage of recovered items, including soils, was implemented as described in the RI Work Plan ([NOREAS, 2015b](#)). No MEC or MPPEH was recovered or encountered on site. During drilling operations, the drill tailings were properly recovered and placed in 55-gallon labeled drums. The drums containing the soils were stored on site pending analytical results to determine their final disposition.

The NOREAS Radiation Safety Officer identified a deck marker at a depth of 1 foot on August 19, 2015. The deck marker and surrounding 1-foot-thickness of soil were placed into a 55-gallon drum. The drum was transported to a Navy-approved storage building, where it was properly labelled and stored. The soil recovered from the excavation was placed and processed on a plastic pad buffered with a 6-inch lift of clean sand. The purpose of the sand was to prevent the heavy equipment from breaking through the plastic while the excavated soils were transported and loaded onto the pad. During this QA effort none of the containerized material nor the soils on the pad had been taken off site for disposal.

## **2.4 SCOPE AND OBJECTIVE OF QA SERVICES**

The objective of this QA effort was to assess the Navy contractor's efforts in removing MEC/MPPEH from sites within the SSA at MINS, Vallejo, California. The MEC QA Specialist reviewed the field work and project documentation to provide a high degree of confidence that work performed by the Navy's contractor is in accordance with the applicable RI Work Plan and Explosives Safety Submission. The Navy Remedial Project Manager uses the QA services to:

- Observe and document any discovery of MEC/MPPEH.
- Assure an audit trail of data is collected, documented, and maintained.

### 3.0 QUALITY ASSURANCE OVERSIGHT AND ACTIVITIES

The MEC QA Specialist performed the following QA activities throughout the duration of field activities performed by NOREAS at the MINS SSA site:

- Assessed the contractor field teams' overall explosive management program.
- Assessed the contractor's field activities using their site-specific Standard Operating Procedures (SOPs).
- Assessed the contractor's personnel qualifications.
- Assessed the MEC Quality Control (QC) program, including on-site procedures, activities, and documentation by the UXO QC Specialist (UXOQCS).
- Assessed excavation operations including evidence of excavation depths from 2 to 4 feet bgs.
- Assessed avoidance of anomalies.
- Performed QA inspections of no less than 10 per cent of all investigated areas.

All QA oversight activities were performed in accordance with the QAIPP ([ECM, 2013](#)). The following subsections discuss each of the QA oversight activities listed above.

#### 3.1 CONTRACTOR EXPLOSIVES MANAGEMENT PROGRAM

The MEC QA Specialist conducted oversight inspections at the onset of field activities and periodically throughout the course of the project to evaluate the compliance of the contractor's explosives management program with the requirements of the RI Work Plan, including documentation and QC.

The QA Compliance Inspection was documented on the QA Compliance Checklist and observations were recorded on the MEC QA Daily Reports as indicated in the QAIPP ([ECM, 2013](#)). The completed QA Compliance Checklist is presented in [Appendix A](#). QA audits of project plans and field documentation and inspections of field operations were also conducted and documented on the MEC QA Daily Reports provided in [Appendix B](#).

#### 3.2 CONTRACTOR FIELD ACTIVITIES

The QA Field Activity Outline ([Table 2](#)) contains a list of the areas that the MEC QA Specialist observed during project operations performed by NOREAS. The table contains the definable features of work and the related references, methods of surveillance, and the QA documentation used.

The MEC QA Specialist observed that NOREAS personnel regularly checked their equipment and that they were thoroughly trained on their respective equipment prior to operations. The MEC QA Specialist noted on the QA Compliance Checklist ([Appendix A](#)) and MEC QA Daily

Reports ([Appendix B](#)) that equipment was operated properly during the QA inspections and field activities.

### **3.3 CONTRACTOR PERSONNEL QUALIFICATIONS**

Prior to the start of fieldwork, the MEC QA Specialist reviewed the personnel requirements and certifications of all field personnel to ensure compliance with the requirements of the contract and the RI Work Plan ([NOREAS, 2015b](#)). No deficiencies were found during these reviews.

### **3.4 MEC AND GEOPHYSICAL QC PROGRAM**

During the field investigation, ECM performed follow-up QA inspections and observations of operations as specified in the QAIPP ([ECM 2013](#)). The inspections and observations were documented on the MEC QA Daily Reports ([Appendix B](#)), which includes the MEC activity being performed, location being observed, and inspection and observation results. The MEC QA Specialist ensured project compliance during the following field activities:

- Implementation of safe work practices when avoiding anomalies;
- Use of appropriate personal protective equipment;
- Use of proper equipment (e.g., magnetometer, etc.);
- Implementation of MEC avoidance procedures;
- Operation of heavy equipment such as drill rigs, excavator and front end loader; and
- Storage and disposition of materials that were containerized.

The MEC QA Specialist also observed UXO Quality Control (UXOQC) meetings and inspections before and during field activities and recorded the information on the MEC QA Daily Reports provided in [Appendix B](#). The MEC QA Specialist performed inspections to confirm that NOREAS personnel conducted QC follow-up inspections of field activities to identify items excavated during intrusive activities. Inspections were also performed by the MEC QA Specialist to ensure that UXOQC procedures implemented by NOREAS complied with the QA/QC procedures stated in the RI Work Plan. The NOREAS UXOQC program was found to be in compliance once Field Change Request 001, dated August 25, 2015, was implemented as described in Section 3.7.

### **3.5 BLIND SEED PLACEMENT AND RECOVERY**

The QA blind seed program is a QA process in which QA personnel strategically emplace simulated UXO items within the project production area to test and validate complete areal coverage by geophysical and MEC teams and the quality of the detection process. The validity of blind seeding as a QA tool is based on assumptions that seed items will accurately mimic the target munition. Blind seeding was not conducted on this site as the function of the UXO Construction Support was to avoid anomalies, which would include blind seeds.

### **3.6 DETECTION AND REMOVAL OF ANOMALIES**

The MEC QA Specialist performed a QA inspection and oversight of NOREAS's UXO personnel performing avoidance of anomalies. The MEC QA Specialist observed that the UXO Technician properly conducted avoidance operations and properly characterized all items that were excavated. No MEC or MPPEH items were encountered.

### **3.7 CORRECTIVE ACTIONS**

One field change request was submitted to the Navy Team during field operations for the MRP RI. Field Change Request 001, dated August 25, 2015, was issued because the precise location where the radiologic item (deck marker) was found during excavation activities in 1999 cannot be determined. The deck marker was located within former grid SS26G/H. Because the exact location of the deck marker is unknown, re-excavation of the entire grid was required to ensure that it is properly screened and sampled for potential residual radiologic impacts. This excavation includes a 15-foot by 60-foot area and extends to the top of the bay mud, which may be as deep as 6 feet below grade in some locations. Field Change Request 001 is provided in Appendix C.

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## **4.0 DIGITAL GEOPHYSICAL MAPPING QUALITY ASSURANCE**

No geophysical activities were conducted during this effort.

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## 5.0 QUALITY ASSURANCE CONCLUSIONS

Third-party QA oversight of field activities were performed to the requirements specified in the QAIPP (ECM, 2013) to ensure that all work performed by NOREAS during the SSA RI was in compliance with the RI Work Plan (NOREAS, 2015b) and ESS (NOREAS, 2015a). Specific field activities performed included UXO avoidance and excavation at specific locations.

Based on observations made during third-party QA oversight and QA inspections of all material that was excavated, NOREAS conducted field activities in compliance with the project documents, including the Data Quality Objectives (DQOs) presented in Table 1.

- The contractor field teams' complied with the overall explosive management program. This was accomplished by review of all available documentation for the project.
- A QA Review was prepared and completed to evaluate the contractor's field operations using their site specific SOPs to ensure that they were implemented properly.
- Personnel qualifications of all of the contractor's field personnel were reviewed prior to initiation of field activities
- The MEC QC program and onsite procedures, activities, and documentation for UXOQC were verified by the MEC QA Specialist by the observation of the UXO Construction Support equipment functionality test.
- The MEC QA Specialist, planned, implemented, and tracked the blind seed action to assess the detection of anomalies and removal of MEC.

In addition, QA was performed on the following non-munitions related activities;

- The contractor properly handled and containerized the one deck marker that was discovered.
- The contractor properly handled the materials (soils) from the drilling operations and the excavation area.
- Radiological monitoring of the areas for well placement, excavation area personnel, and equipment was properly conducted.

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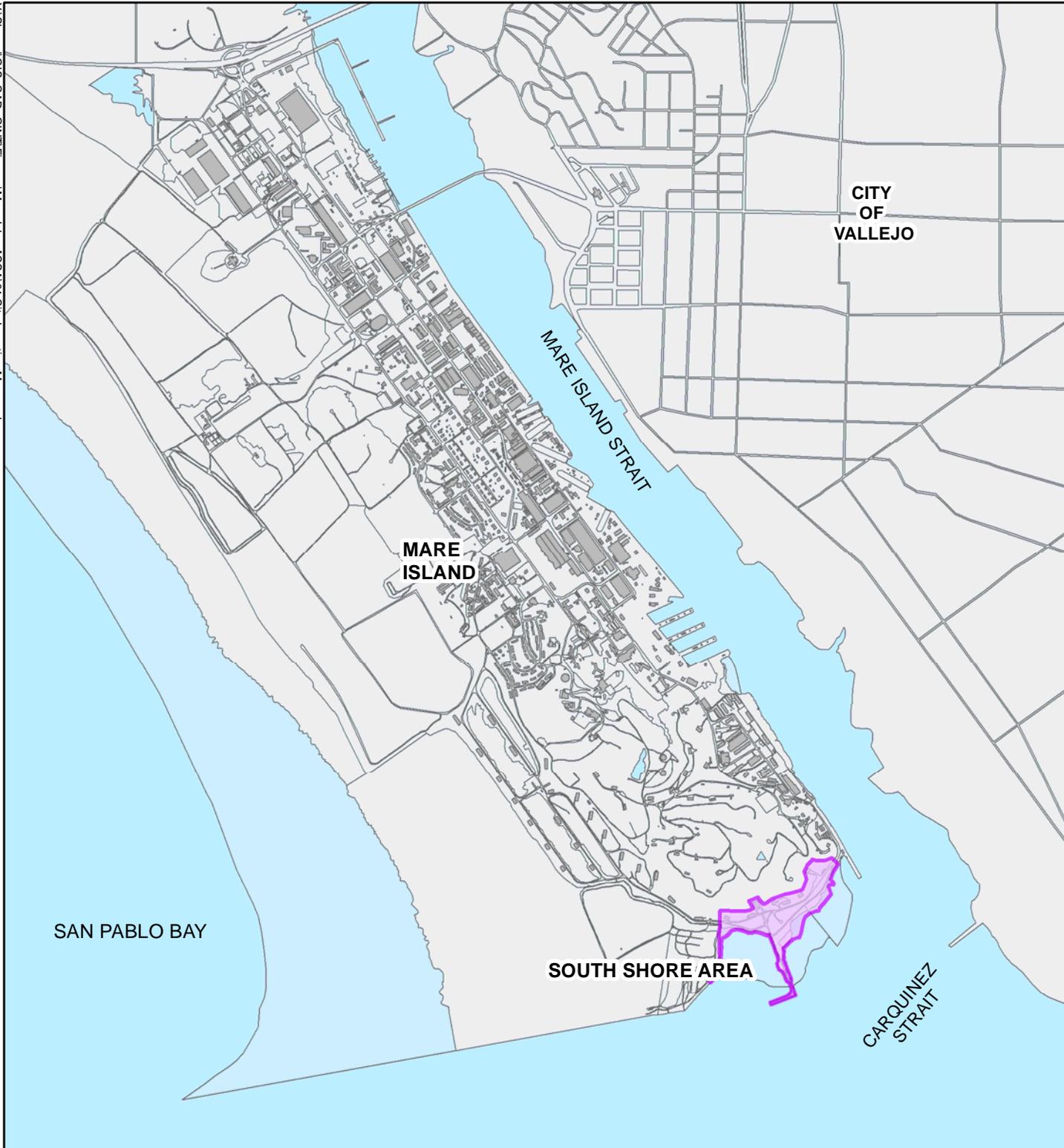
## 6.0 REFERENCES

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## **FIGURES**

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**LEGEND**

 SOUTH SHORE AREA BOUNDARY FOR RI

N



DEPARTMENT OF THE NAVY  
BRAC PMO WEST  
SAN DIEGO, CALIFORNIA

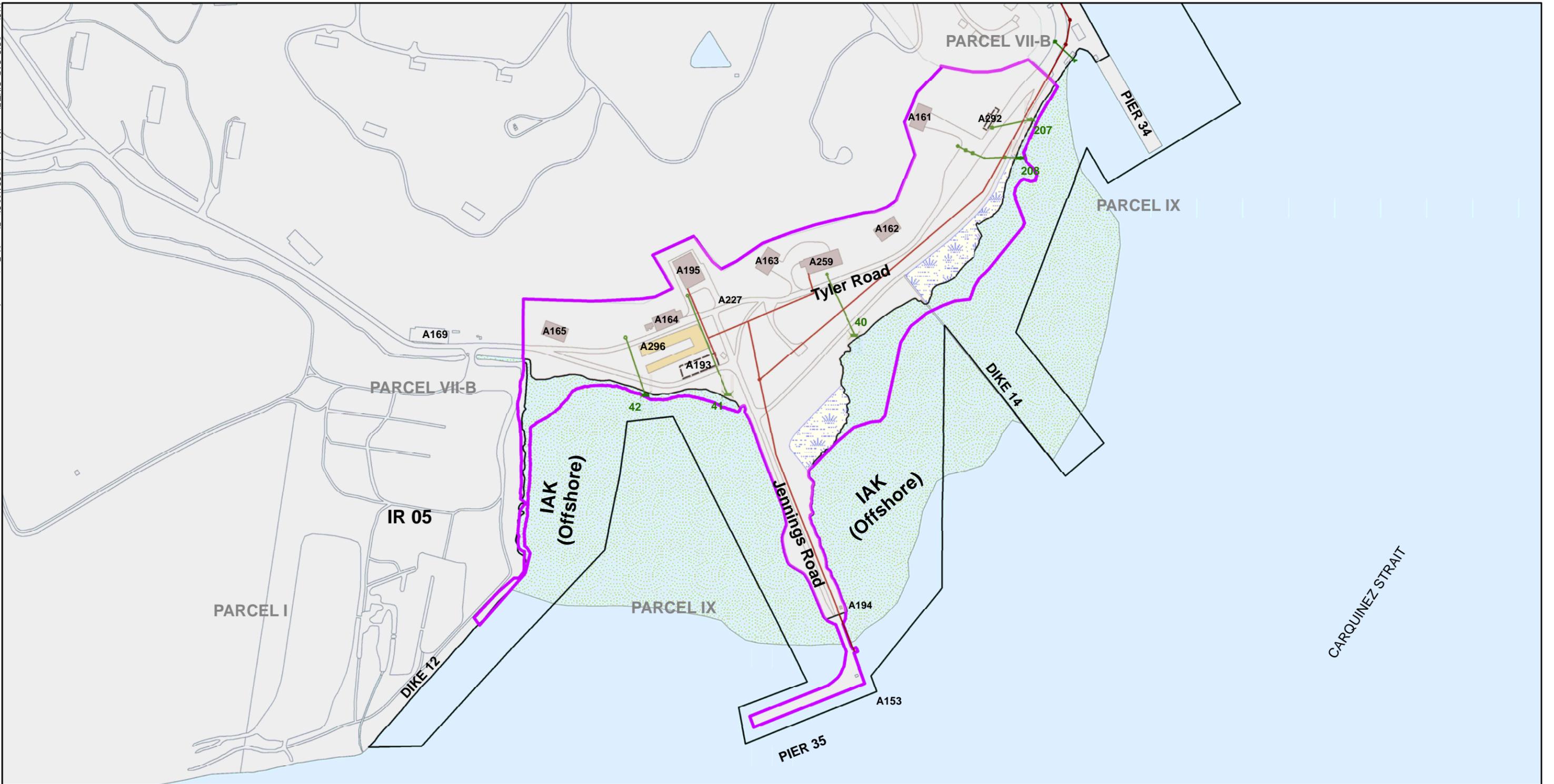
FORMER MARE ISLAND NAVAL SHIPYARD  
VALLEJO, CALIFORNIA  
ESS-DR

**FIGURE 1**  
SITE LOCATION MAP



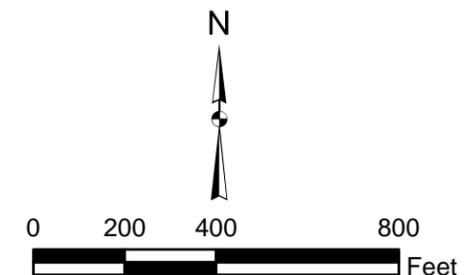
DATE: MARCH 2014  
CONTRACT NO.: N62473-12-C-4812

X:\Shared\GIS\_CAD\_GINT\Figures\Mare Island\SSA02 Site Plan with Features.mxd



**LEGEND**

- INVESTIGATION AREA (IA)
- TRANSFER PARCEL BOUNDARY
- SANITARY SEWER PIPELINE (SWMU 106)
- STORM SEWER DRAIN LINE (SWMU 93)
- INVESTIGATION AREA K (IAK)
- BUILDINGS
- REMOVED BUILDING
- SOUTH SHORE AREA BOUNDARY FOR RI
- WETLANDS
- TIDAL MUDFLATS
- EXPLOSIVES SAFE HAVEN
- STORM SEWER OUTFALLS (SWMU 93)



DEPARTMENT OF THE NAVY  
BRAC PMO WEST  
SAN DIEGO, CALIFORNIA

FORMER MARE ISLAND NAVAL SHIPYARD  
VALLEJO, CALIFORNIA  
SAMPLING AND ANALYSIS PLAN

**FIGURE 2**  
SITE PLAN WITH FEATURES

## **TABLES**

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**Table 1. Data Quality Objectives**

<b>What is the DQO?</b>	<b>How Was It Assessed?</b>	<b>Was the DQO Met?</b>
1. Assess the contractor field teams' overall explosive management program	All available documentation for the project was reviewed.	Yes
2. Assess the contractor's field operations using their site specific SOPs.	A QA Review was prepared and completed to evaluate the SOPs and ensure that they were implemented properly.	Yes
3. Assess the contractor's personnel qualifications	Personnel qualifications were reviewed prior to field activities.	Yes
4. Assess the MEC QC program and onsite procedures, activities, and documentation for UXOQC.	UXO Construction Support equipment functionality test was observed and verified by the MEC QA Specialist.	Yes
5. Assess the detection of anomalies and removal of MEC.	The MEC QA Specialist, planned, implemented, and tracked the blind seed action.	Yes

**Notes:**

- DQO – data quality objective
- MEC – munitions and explosives of concern
- QA – quality assurance
- QC – quality control
- SOP – standard operating procedure
- UXOQC – unexploded ordnance quality control

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**Table 2. QA Field Activity Outline**

<b>Definable Feature of Work</b>	<b>Reference <sup>1,2,3,4</sup></b>	<b>Oversight Method</b>	<b>Documentation</b>	<b>Performance Indicators</b>
Work Plan Execution	Work Plan	Initial Compliance Periodic Field Follow up Inspection	QA Inspection/Daily Report	Compliance with approved plans Personnel knowledgeable of plan requirements Personnel meet qualifications Resources managed effectively
QC	Work Plan	Periodic Review of QC Documentation	QA Inspection/Daily Report	Pass/fail rate on QC inspections Root cause analysis and correction process
Anomaly and Intrusive Investigation Operations	Work Plan	Periodic Field Inspections Observations	QA Inspection/Daily Report	Safe work practices for MEC Anomaly avoidance per the Work Plan and ESS
Blast and Fragmentation Protection	Work Plan ESS DoD 6055.9-STD	Periodic Field Inspections Observations	QA Observations/ Daily Report	Appropriate EZ's maintained Nonessential personnel not within the EZ Engineering controls used Demolition per ESS
MPPEH Handling	Work Plan DoD 6055.9-STD	Daily Observations	Daily Report	No MEC items were encountered

**Notes:**

1. NOREAS– Final Explosives Safety Submission for the Remedial Investigation of the South Shore Area Former Mare Island Naval Station Vallejo, California.
2. DoD, 2004. DoD Directive 6055.9, “DoD Ammunition and Explosives Safety Standards.” October. Available Online at: <http://www.ddesb.pentagon.mil/DoD6055.9-STD%20%20Oct%202004.pdf>.

DoD – U.S. Department of Defense  
ESS – Explosives Safety Submission  
EZ – exclusion zone  
MEC – munitions and explosives of concern  
MPPEH – material potentially presenting an explosive hazard  
QA – quality assurance  
QC – quality control  
NOREAS – NOREAS, Incl  
SOP – standard operating procedure

**APPENDIX A**  
**QA COMPLIANCE CHECKLIST**

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## QA COMPLIANCE CHECKLIST

**Date: July/August 2015**

**Site Name: Mare Island South Shore Area (SSA)**

1. Project Documents: WP, SAP/QAPP, ESS, APP/SSHP	Yes	No	N/A	COMMENTS
a. On site and signature page signed	X			
b. Check for modifications/changes and up to date	X			
c. Proper depth of clearance identified	X			
d. Corrective action standards established	X			
e. Proper target ordnance identified/test sources/test plot established			X	
f. Most Probable Munitions (MPM) identified	X			
g. MSD established			X	
h. Standards for turn-in of recovered MPPEH and range-related debris			X	
i. Exclusion Zone (EZ) identified			X	
2. Documentation Requirements/Publications Available On Site	Yes	No	N/A	COMMENTS
a. MRS Self-Assessment Checklist, evaluation completed by the Contractor's Project Manager and SUXOS the first week of field activities. NOSSAINST 8020.15C			X	
b. Notice to Proceed from client	X			
c. Contractor personnel qualifications and supporting certifications for all UXO personnel verified, e.g., EOD certification, equipment certifications, etc.	X			
d. Certificate of grounding, lightning protection for magazines (if required)			X	
e. Approval letter, MSD 1/600 (if required)			X	
f. Explosive Safety Submission (ESS) (if required)	X			
g. Delivery order & all modifications & Change Orders	X			
h. Explosives permits/license (if required)			X	
i. Dig permits for utilities (if required)			X	
j. Rights of Entry (ROE) (if required)			X	



## QA COMPLIANCE CHECKLIST

<b>2. Documentation Requirements/Publications Available On Site (cont.)</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
k Current MEC SOPs, readily available	X			
l Other applicable reference publications/materials, readily available	X			
<b>3. QC Files Established IAW, WP, SAP/QAPP</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Daily/weekly QC reports/audits	X			
b. Weekly/monthly reports (if provided)			X	
<b>4. Accident Prevention Plan (APP) Site-Specific Safety &amp; Health Plan (SSHP)</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. On site and signature page signed	X			
b. Hazard Analysis & Risk Assessment for all tasks & equipment	X			
c. OSHA physical on site and current	X			
d. Training: General site workers, HAZWOPER qualified, 40-hour HAZWOPER & current 8-hour refresher (if required)	X			
e. Personnel Protective Equipment (PPE)	X			
f. First Aid equipment immediately available	X			
g. Emergency eye-washes/showers comply with ANSI standards	X			
h. Fire extinguishers (specify type, size, and location)	X			
i. Visitor safety briefing	X			
j. Emergency Notification List posted & available	X			
k. Emergency routes/maps available & issued to each team	X			
l. Work task identified in Activity Hazard Analysis (AHA)	X			
m. Current MSDS(s) on site	X			
n. Minimum of two personnel on site, First Aid/CPR trained, EM 385-1-1	X			
o. 16-unit First Aid kits approved by a licensed physician in the ratio of 1 for every 25 personnel or less. EM 385-1-1		X		



## QA COMPLIANCE CHECKLIST

<b>4. Accident Prevention Plan (APP) Site-Specific Safety &amp; Health Plan (SSHP) (cont.)</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
p. Adequate means of reporting accidents/near misses to client	X			
<b>5. Facilities – Reference EM 385-1-1</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Adequate work space/facilities (restrooms, etc.)	X			
b. Good housekeeping (no fire hazards, tripping hazards, etc.)	X			
c. Approved and suitable containers for flammable, toxic, or explosive materials	X			
d. Approved/adequate explosive storage facilities			X	
e. Fire/emergency exits clear & unbarred. Fire extinguisher location(s), and route of escape posted as appropriate in facility	X			
f. Site security adequate	X			
g. Toilets IAW EM 385-1-1	X			
h. Washing facilities IAW EM 385-1-1	X			
<b>6. Equipment – Reference Approved WP/Manufacturers Operators Manual</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Tools appropriate and serviceable	X			
b. Personnel Protective Equipment (PPE) present, serviceable & utilized	X			
c. Equipment calibrated (Last Cal. Date-----, Next Cal. Date-----)	X			Applied to radiation detectors
d. Survey equipment inspected & serviceable	X			
e. Heavy equipment inspected & serviceable IAW EM 385-1-1, Section 16; include back up alarm and equipped with 1 fire extinguisher, 5-BC	X			
f. Competent person identified to inspect and accept Heavy Equipment IAW EM 385-1-1	X			
g. Identified site vehicles are equipped with First Aid kits and a 5-BC fire extinguisher IAW EM 385-1-1	X			
h. Geophysical equipment on hand & serviceable			X	
i. Two separate means of communication: radio(s)/cell phone, land line(s)	X			



## QA COMPLIANCE CHECKLIST

7. Explosive Storage/Receipt/Transportation Requirements – Reference NAVSEA OP 5, Volume 1	Yes	No	N/A	COMMENTS
a. Proper storage containers Type 2 magazine(s) conforming to standards set forth in Section 55.206 of ATFP 5400.7			X	
b. Placards will be displayed on the magazine(s) IAW w/DOD 6055.9-STD, Chapters 2 & 3 for Hazard Division stored in the magazine(s)			X	
c. Explosive compatibility groups segregated into appropriate Hazards Divisions listed in Chapter 3, DOD 6055.9-STD			X	
d. Security locks for the magazine(s) shall meet the requirements listed in Section 55.208 (a) (4), ATFP 5400.7			X	
e. Key control will be documented in the WP			X	
f. Lightning Protection System serviceable & tested (Test Date ___)			X	
g. Fire-fighting placarding will be posted on the fence (IAW DOD 6055.9-STD, Chapter 8 and <b>NAVSEA OP 5, Volume 1</b> for Hazard Division stored in the magazine(s)			X	
h. Fire protection consisting of extinguishers, 10-BC or larger located at magazine area & vegetation and trash cleared in and around magazine area			X	
i. Quantity distance from magazine IAW WP & Explosive Safety Submission (ESS)	X			
j. Accountability records maintained IAW 55.125, ATFP 5400.7			X	
k. Explosive NEW limits do not exceed limits stated in the WP & ESS			X	
l. Licenses/permits (if required)	X			
m. Initial receipt procedures & documentation on site			X	No explosives delivr'd
n. Procedures for transportation of explosives IAW EM 385-1-1, and <b>NAVSEA OP 5 Vol 1</b>			X	None to be used
o. Pre-operational checks of vehicle transporting explosives using checklist			X	
p. Cargo properly segregated, blocked, and in approved containers, <b>NAVSEA OP 5, Vol 1</b>			X	
q. Receipt procedures accounting for each item of explosives/documentation on site			X	
r. Individuals authorized to receive, issue, and transport identified in writing			X	



## QA COMPLIANCE CHECKLIST

<b>7. Explosive Storage/Receipt/Transportation Requirements – Reference NAVSEA OP 5, Volume 1 (cont.)</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
s. Final disposition procedures documented	X			On one deck marker
t. Reconciliation, lost/stolen receipt documents/procedures on site		X		
u. Inventory conducted weekly @ minimum			X	
<b>8. MEC Operational Plans –Approved WP, SAP/QAPP, ESS and APP/SSHP</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Contractor following methodology defined	X			
(1) Daily safety meeting conducted by UXO Technician	X			
b. Detection equipment used	X			
(1) Pre-operational checks performed prior to sweep operations	X			
(2) Operational condition annotated in log book	X			
(3) Team composition	X			One UXO Technician
(4) Quality control	X			
(5) Quality control documentation	X			
c. Operational teams using approved procedures			X	UXO Construction Support used
(1) SUXO conducted physical check prior to operations	X			
(2) Pre-operational/safety brief conducted	X			
(3) Individual sweep lanes marked IAW WP			X	Area UXO sweep conducted
(4) Contacts marked & investigated properly	X			
(5) Results of sweep operation recorded	X			
(6) All MEC, MD, MDEH and MPPEH is examined and positively identified by at least the SUXO and the UXOQCS			X	No MEC found
(6.1) Actions taken when MEC items identified are consistent with WP/MPM			X	No MEC found



## QA COMPLIANCE CHECKLIST

<b>8. MEC Operational Plans –Approved WP, SAP/QAPP, ESS and APP/SSHP (cont.)</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
(7) All MEC/UXO clearly marked			X	No MEC found
d. QC operations IAW WP, and SAP/QAPP	X			
e. MPPEH inspected/vented/segregated			X	No MPPEH found
f. Geophysical test grids appropriate			X	
g. Project database and PDAs entries are consistent with intrusive results			X	
<b>9. Disposal Operations IAW WP, SAP/QAPP, ESS and 60-1-1-31</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Disposal method			X	
b. Adequate security for disposal operation			X	
c. Disposal Notification List available			X	
d. All necessary notifications made			X	
e. Movement of MEC items if determined safe to move to explosive storage or consolidate for disposal operations IAW project plans			X	
f. Are protective mitigation measures being used appropriate for MEC being destroyed?			X	
g. Disposal Procedures IAW project plans			X	
h. Conducted adequate Demolition Brief			X	
(1) Misfire procedures properly performed			X	
<b>10. Location Survey &amp; Mapping Plan</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>COMMENTS</b>
a. Registered land surveyor	X			
b. Surveyors received site-specific training	X			
c. UXO escort provided	X			
d. Grid stake, locations swept with geophysical equipment prior to driving stakes			X	



## QA COMPLIANCE CHECKLIST

10. Location Survey & Mapping Plan (cont.)	Yes	No	N/A	COMMENTS
e. Survey notes being recorded	X			
11. Quality Control Plan IAW WP and SAP/QAPP	Yes	No	N/A	COMMENTS
a. QC operational checks being conducted	X			
b. QC grid sweep pattern adequate	X			Conducted during trenching
c. Results of QC checks being recorded	X			
d. Nonconformance reports issued if QC checks show discrepancies, or for QA failures			X	No QC or QA failures
e. Intrusive results/database/PDAs entries are checked by UXOQC			X	
12. Vegetation Removal IAW, WP	Yes	No	N/A	COMMENTS
a. Equipment operated to prevent impact with possible surface MEC	X			
b. Cutting does not present implement hazard			X	
c. UXO personnel monitoring cutting operation			X	
d. MEC discovered marked/handled appropriately			X	
e. Equipment being operated safely & IAW Operators Manual	X			

**Signature:**

*John D. McCormick*

**APPENDIX B**  
**MEC QA DAILY REPORTS**

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Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 07-28-15

Report #: 001

Weather Conditions: Hot

Temperature: Low: 57 High: 97

Wind: MPH 04

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity).
- *Attended and observed a detailed review of the work plan, site safety plan and activity hazard analysis plans in addition to the daily operational brief conducted by NOREAS.*
- Observed Bristol's UXO Technician properly investigating the area for the first well location.
- Observed the NOREAS Radiation Safety Officer properly conducting continuous radiological monitoring.
- Observed GREGG Drilling safely performing drilling operations.
- Observed soil samples being properly collected and processed by NOREAS.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor did have difficulty with the hand auguring process due to so much debris being encountered within the first four feet i.e. concrete and asphalt debris. The problem was overcome by hand auguring to six inches then using the drill rigs auger, drilling down in small increments and then removing the drill so as to continue with the UXO monitoring. This was done to a depth of five feet. After the UXO checks were completed, the well was drilled to depth.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 07-28-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## PICTURES



Photo 1: [Drill rig preparation after the location was cleared by the UXO Technician]



Photo 2: [Acquiring soil samples from the hand auger]



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Using a PID to perform vapor checks on the soil samples]**



**Photo 4: [Continuous radiological monitoring was conducted]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Hand auguring encountered a lot of concrete and asphalt debris]**



**Photo 6: [Back filling the well to depth]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 07-29-15

Report #: 002

**Weather Conditions: Hot**

**Temperature: Low: 59 High: 96**

**Wind: MPH 04**

**Precipitation: 0.00**

**Site Conditions: Dry**

- **Work Performed:** (Indicate location and description of activity).
- Observed Bristol's UXO Technician properly investigating the area for the third and fourth well location.
- Observed the NOREAS Radiation Safety Officer properly conducting continuous radiological monitoring of the well location and personnel.
- Observed GREGG Drilling continue to safely perform drilling operations.
- Observed soil samples being properly collected and documented by NOREAS.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor continues to follow the work plan and as of the date of this report has installed four wells.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 07-29-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## PICTURES



**Photo 1: [Driller hand auguring after being cleared by the UXO Technician]**



**Photo 2: [NOREAS continues to place all soil tailings in drums]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Placing the well pipe into the well]**



**Photo 4: [Installed flush mount well pipe prior to vault installation]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Radiation checks being performed on the drill crew]**



**Photo 6: [Location of the fourth well being checked by the UXO Technician & Biologist]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-03-15

Report #: 003

Weather Conditions: Hot

Temperature: Low: 59 High: 75

Wind: MPH 03

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed NOREAS conducting a proper safety brief.
- Observed Bristol's UXO Technician properly investigating the area for the seventh and eighth well locations.
- Observed the NOREAS Radiation Safety Officer properly conducting continuous radiological monitoring of the well location and personnel.
- Observed GREGG Drilling continue to safely perform drilling operations.
- Observed soil samples being properly collected and documented by NOREAS.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report has installed seven of the eight wells.*
- *NOREAS should finish the eighth and final well installation in the AM tomorrow and begin core sampling operations.*
- *It is NOEAS's intention to place the concrete pads and bollards on the wells after the core sampling operations are complete.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-03-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [The UXO Technician & Radiation Safety Officer checking Well location 7]**



**Photo 2: [NOREAS RSO Performing radiation checks at well location 7]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



Photo 3: [Hand augering to 4" with UXO monitoring]



Photo 4: [Soil samples from well 7 being processed]



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Well 7 head prior to the steel cap being installed]**



**Photo 6: [Well 7 installed without the pad and bollards that will be installed after the core sampling is completed]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-04-15

Report #: 004

Weather Conditions: Hot

Temperature: Low: 59 High: 78

Wind: MPH 03

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed NOREAS conducting a proper safety brief.
- Observed Bristol's UXO Technician properly investigating the area for the first and second core sample locations.
- Observed NOREAS Install the eighth and final well.
- Observed the NOREAS Radiation Safety Officer properly conducting continuous radiological monitoring of the well location and personnel.
- Observed GREGG Drilling continue to safely perform drilling operations.
- Observed soil samples being properly collected and documented by NOREAS.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report has installed all eight wells. The eight wells still need to have concrete pads poured and bollards installed. The one flush mount well is completed.*
- *NOREAS began core sampling operations.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-04-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [The single flush mount well is completed]**



**Photo 2: [Bristol's UXO Technician and NOREAS RSO checked the first core sample location prior to sampling]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Core samples were taken from 4' to 10']**



**Photo 4: [Once the core samples were taken, the bore holes were back filled with concrete]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [The RSO checking the second boring location after being scanned by the UXO Technician]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-11-15

Report #: 005

Weather Conditions: Hot

Temperature: Low: 58 High: 83

Wind: MPH 03

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed NOREAS conducting a proper safety brief.
- Observed Bristol's UXO Technician properly investigating the area for the first and second core sample locations.
- Observed NOREAS hand auguring the core sample areas within the marsh area.
- Observed the NOREAS Radiation Safety Officer properly conduct continuous radiological monitoring of the well location and personnel.
- Observed GREGG Drilling continue to safely perform drilling operations.
- Observed soil samples being properly collected and documented by NOREAS.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report, two of the eight above ground wells have concrete pads poured and bollards installed. The one flush mount well does not require pad or bollards.*
- *The IQA continues to perform random function test on the UXO Technicians locating equipment.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-11-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [Gregg Drilling hand auguring the bore locations in the marsh area]**



**Photo 2: [Soil sampling continues to be properly conducted]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [The Biologist and UXO Technician, checking the bore location prior to boring]**



**Photo 4: [Radiation monitoring continues to be performed]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Concrete pads and bollards installed on two of the eight wells that require them]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-12-15

Report #: 006

Weather Conditions: Hot

Temperature: Low: 58 High: 84

Wind: MPH 03

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
  - Observed Bristol's UXO Technician properly investigating the core sample locations.
  - IQA performed a function check on the UXO Technicians locator in order to ensure that it was working properly.
  - Observed the NOREAS Radiation Safety Officer properly conduct continuous radiological monitoring of the well location and personnel.
  - Observed GREGG Drilling continue to safely perform drilling operations.
  - Observed soil samples being properly collected and documented by NOREAS.
1. **Ordnance or Ordnance Related Material Encountered; Condition and Location:**
    - N/A
  2. **Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):
    - N/A
  3. **Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):
    - N/A
  4. **Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):
    - N/A.
  5. **Other comments or additional information:**
    - *The contractor still continues to follow the work plan and as of the date of this report all eight wells have been installed. Bollards and forms were installed on the remaining wells. Concrete will be poured tomorrow.*
    - *NOREAS had to offset some core sampling locations due to the UXO Technician locating anomalies and due to reaching refusal as some areas have a high concentration of rock, asphalt and construction debris BGL.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-12-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [UXO Tech checking boring locations in a heavy anomaly area]**



**Photo 2: [Hand auguring the bollards holes after the UXO Tech sweep the area]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Bollards installed, all that is left is the concrete pour]**



**Photo 4: [Off setting bore location due to hitting refusal at 4']**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Down-hole radiation monitoring]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-17-15

Report #: 007

Weather Conditions: Hot

Temperature: Low: 61 High: 85

Wind: MPH 03-07

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed the containment pad being constructed that will contain the soil from the excavation area.
- IQA performed a function check on the UXO Technicians locator in order to ensure that it was working properly.
- Observed the NOREAS Radiation Safety Officer properly conduct continuous radiological monitoring of the sand being brought to the containment pad.
- IQA confirmed that the two new construction personnel (equipment operators) were qualified to be on-site.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report all eight wells have been installed.*
- *NOREAS was confident that they would be able to start some of the excavation today. The containment pad took longer than expected to construct as only one truck was being used to transport the sand to the site.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-17-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [NOREAS building the soil containment pad for the material from the excavation]**



**Photo 2: [10 loads of sand were transported to the containment pad]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Radiation level checks were performed on each load of sand brought to the containment pad]**



**Photo 4: [The sand was spread out to a depth of 6"+]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [25 drums containing drill spoils remain, awaiting transportation off-site]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-18-15

Report #: 008

Weather Conditions: Hot

Temperature: Low: 62 High: 85

Wind: MPH 05-15

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed the containment pad being completed.
- IQA performed a function check on the UXO Technicians locator in order to ensure that it was working properly.
- Observed the NOREAS Radiation Safety Officer properly conduct continuous radiological monitoring of the equipment and the material being taken out of the excavation area.
- IQA observed a complete review of the excavation plan and the AHA's associated with it.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report all eight wells have been installed.*
- *NOREAS started excavation operations after 1100. They were delayed as they had an audit conducted by the NAVFAC ROICC office. They were still able to complete approximately 50% of the excavation. Their plan is to finish during low and slack tide tomorrow.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-18-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [NOREAS RSO performing radiation background checks on the heavy equipment before the commencement of excavation operations]**



**Photo 2: [Radiation background check was performed at the excavation site prior to removing material]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Initial dig in an effort to locate the depth of the bay mud]**



**Photo 4: [Radiation checks were performed on every scoop of material that was excavated prior to be transported to the spread and scan pad]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [Material from the excavation being spread out on the spread and scan pad]**



**Photo 6: [The bay mud was encounter at a depth of 2-3'+/- throughout todays excavation]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 7: [UXO monitoring was continuous during the excavation]**



**Photo 8: [It was inevitable working so close to the shoreline that the excavation area would fill with water as the tide came in]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 9: [Excavator operators view of the excavation area]**



**Photo 10: [The excavation area is approximately 50% complete as of today]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

## Munitions & Explosives of Concern (MEC) QA Daily Report

Date: 08-19-15

Report #: 009

Weather Conditions: Hot

Temperature: Low: 58 High: 84

Wind: MPH 05-10

Precipitation: 0.00

Site Conditions: Dry

- **Work Performed:** (Indicate location and description of activity)
- Observed the completion of the excavation area.
- IQA performed a function check on the UXO Technicians locator.
- Observed the NOREAS Radiation Safety Officer properly conduct continuous radiological monitoring of the excavation area.
- IQA observed the UXO Technician and the RSO properly excavate a radioactive Deck Marker.
- Observed the proper packaging and storage of the Deck Marker and its adjacent soils.

**1. Ordnance or Ordnance Related Material Encountered; Condition and Location:**

- N/A

**2. Disposition of Ordnance Items Encountered, Include Dates:** (i.e. turned over to Military EOD, Disposal by detonation, Storage awaiting disposition):

- N/A

**3. Verbal Instructions received or given:** (List any instructions received from client or given by ECM on Quality Assurance issues identified and the corresponding action to be taken):

- N/A

**4. Changed Conditions/Delays/Conflicts Encountered:** (List any conflicts, which have hindered the Quality Assurance process):

- N/A.

**5. Other comments or additional information:**

- *The contractor still continues to follow the work plan and as of the date of this report all eight wells have been installed.*
- *NOREAS completed excavation operations.*
- *While performing his usual radiation checks at the excavation site, the RSO while walking over to the excavator bucket to perform a routine radiation check had his radiation equipment on and the audio was engaged. He passed approximately 5' away from the SW corner of the excavation area and the radiation meter indicated a rapid spike in radiation well above background. The spot where the spike occurred was excavated by the UXO Technician and was continually monitored by the RSO with radiation detection equipment. At a depth of 1' a Deck Marker was located. The Marker was sealed on a plastic bag and along with soil 1' all around the Markers location was placed in a barrel and transported to building161 for storage.*



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)

Contract: N62473-13-C-2405

Location: Former Mare Island Naval Shipyard, Vallejo, CA

Prepared by: John McCormick

- *The ROICC and CSO were on site.*
- *The barrel containing the Deck Marker and material is not yet properly marked and labeled as NOREAS did not possess the necessary labels. They informed the ROICC of this and made arrangements to properly place them on the barrel tomorrow.*

**Contractor's Verification:** The above report is complete and correct. All material and equipment used and work performed during this reporting period are in compliance with the plans and specifications except as noted above.

**Date: 08-19-15**

**(Signature)**

**Name of QA: John McCormick**

**Unexploded Ordnance Quality Assurance (UXOQA)**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 1: [UXO checks were frequently performed during the excavation]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 2: [The RSO attempting to pin point the source of the radiation spike that he detected]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 3: [Radiation checks were continuously performed as the UXO Technician excavated the location of the radiation spike]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 4: [At a depth of 1' and 5' to the SW of the corner of the excavation site a Deck Marker was excavated and identified]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 5: [The hole with the pin flag in the foreground is where the Deck Marker was found]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 6: [The Deck Marker was placed in a plastic bag with adjacent attached material]**



Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick

Environmental Cost Management, Inc.



**Photo 7: [The hole were the Deck Marker was located was excavated to 1' all around its discovered location and the excavated material was placed in a drum]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 8: [The drum with the Deck Marker and its excavated soil was placed in building 161]**



Environmental Cost Management, Inc.

Project: NOREAS SSA RI (IQA)  
Contract: N62473-13-C-2405  
Location: Former Mare Island Naval Shipyard, Vallejo, CA  
Prepared by: John McCormick



**Photo 9: [The RSO performing and logging the final radiation checks on the drum with the soil and Deck Marker inside of building 161]**

**APPENDIX C**  
**REQUESTS FOR FIELD CHANGE**

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## FIELD CHANGE REQUEST FORM

Contract No. N62473-12-C-4812	CTO No. N/A	Field Change Request Form No. FCRF-001
Location South Shore Area, Former Mare Island Naval Shipyard		Date August 25, 2015
<b>RE:</b> Drawing No. <u>N/A</u>		Section 3.0 Final Status Survey Title <u>Section 3.3 Survey Units</u>
Specification Section <u>3.0, 3.3, 3.4, and 3.8</u>		Section 3.4 Number of Data Points Section 3.8 Media Sampling and Title <u>Analysis</u>
Final Work Plan for Radiological Screening and Survey Activities, South Shore Area, Former Mare Island Naval Shipyard, Vallejo, Other <u>California (RAD WP)</u>		
<b>Description</b> (items involved, submit sketch, if applicable) <p>This FCR describes the expansion of the excavation and sampling activities associated with the free-release/Final Status Survey (FSS) activities at the South Shore Area. The sections of the RAD WP referenced above describe the excavation, screening, and sampling procedures for the free release of an area where a single radio-luminescent deck marker was found and removed in 1999. The original plan was for clearance of a 10' by 10' excavation down to a depth of 4 feet below grade. Based on the small size of the excavation, a total of 8 confirmation samples for analysis for Radium-226 were planned.</p> <p>The size and scope of the original excavation was based on the need to clear a small area of soil immediately surrounding the location where the deck marker was found and removed. However, precise survey or coordinate data for the item is not available as it was found during the screening of soil stockpiles during excavation for UXO in the area in January 1999 as described in the <i>UXO Intrusive Investigation Summary Report, South Shore Area, Mare Island, Vallejo, California</i> (Weston, January 2003). Information provided in the Master Grid Clearances Sheets field notes provided as Appendix B of the report indicates that the deck marker was found in the soils removed from UXO clearance grid SS26G/H, which consists of an area approximately 10' by 55' in size (see Figure 1). Additional information in the field notes indicates that the soil was excavated to top of the bay mud, which was encountered at depths as deep as 6 feet below grade in some locations.</p>		

## FIELD CHANGE REQUEST FORM

### Reason for Change

Because the precise location where the radiologic item was found cannot be determined, the entire area within former grid SS26G/H that was previous excavated in 1999 should be re-excavated to ensure that that it is properly screened and sampled for potential residual radiologic impacts due to the presence of the former deck marker in that area.

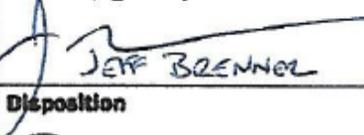
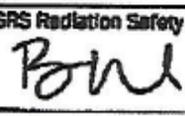
### Recommended Disposition (submit sketch, if applicable)

For the reasons described above, the area of the excavation will now be expanded to 15' by 60' (see Figure 1) and will extend to the top of the bay mud which may be as deep as 6 feet below grade in some locations. It is anticipated that the total volume of excavated soil will range from 150 to 175 cubic yards (cy). Based on this increase, a total of 36 confirmation soil samples will be collected and analyzed for Radium-226 for a single MARSSIM Class 2 survey unit. This includes 18 samples from the excavated soil, and 18 samples from the floor and sidewalls of the excavation. The locations of the samples will be randomly selected using the Visual Sample Plan (VSP) software in accordance with the Work Plan for Radiological Screening and Survey Activities (Work Plan). In the event that more than 200 cy of soil are excavated, the soil and excavation will be divided into 2 survey units and the total number of confirmation samples collected and analyzed for Radium 226 will be increased to 72.

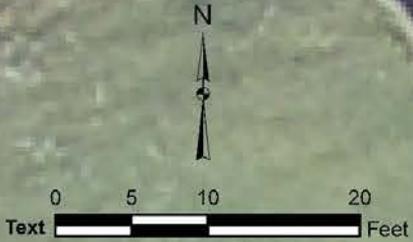
As part of the free release, the excavated soil will be surveyed a total of 3 times by a radiological control technician (RCT) using a 2-inch by 2-inch NaI scintillation detector (Ludlum Model 2350-1 with Data Logger), in accordance with the Work Plan. The initial survey will be conducted on each load of excavated soil from the excavator bucket. Following the initial survey at the removal area, the excavated soil will then be placed on a soil screening pad and spread out in a 6-inch layer. The RCT will then survey the spread out soil using the Ludlum Model 2350-1 Data Logger and scan method. Upon completing the survey of the 6-inch layer of soil, a front end loader will be used to back drag and flip the soil. After the soil has been "flipped" and spread out again into a 6-inch layer, the RCT will conduct a third and final survey using the same radiological equipment and method as before.

The soil screening pad will be constructed by clearing a 10-foot by 100-foot area of rocks and or sharp debris (see Figure 2). A layer of geofabric will then be placed on the ground, followed by a liner consisting of 6-mil plastic sheeting. A 6-inch layer of clean quarry sand will be placed on top of the liner to protect it from tearing or ripping while the loader loads and spreads soil on the pad. The liner will be bermed to contain any water or moisture that may drain from the excavated soils. Following the screening, the soil will be covered and maintained on the pad pending the results of the analytical sampling. If the soil screening results indicate the presence of radiation levels exceeding 3 standard deviations or more above the mean investigation level or the sampling results are above the release criteria, the screening pad materials will be surveyed for residual radiation to determine if they can be free-released for disposal as general construction debris. If the results of the soil screening and sampling do not indicate radiation levels greater than 3 standard deviations above the ILs and are below the release criteria, the screening pad materials will be disposed of as general construction trash.

## FIELD CHANGE REQUEST FORM

Contract No. <b>N62473-12-C-4812</b>	CFO No. <b>N/A</b>	Field Change Request Form No. <b>FCRF-001</b>	
Additional Details <b>N/A</b>			
Will this change result in a contract cost or time change? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Estimate of contract cost or time charge (if any) <u>    \$0    </u>			
Preparer (signature)  <b>JEFF BRENNER</b>	Date <b>8/25/15</b>	Preparer's Title <b>Principal Geologist</b>	
Site Superintendent/PQCM (Signature) 		Date <b>8/25/15</b>	
Disposition <input checked="" type="checkbox"/> Approved. <input type="checkbox"/> Not approved (give reason).			
NOREAS Engineer (Print and Sign) (if engineering related)  <b>Damshid Sadeghipour</b>	Date <b>8/31/2015</b>	NOREAS Project Manager (Print and Sign)  <b>JEFF BRENNER</b>	Date <b>8/31/15</b>
NOREAS PQCM (Print and Sign)  <b>ABRAM ETOSOFF, CM</b>	Date <b>8/31/15</b>	NOREAS Scientist (Print and Sign) (if science related) <b>N/A</b>	Date
NOREAS QC Program Manager (Print and Sign)  <b>Jeff Oslick</b>	Date <b>08/31/2015</b>	RSRS Radiation Safety Officer (Print and Sign)  <b>POW</b>	Date <b>8/31/2015</b>
Navy RPM (Print and Sign)	Date	Navy ROICC (Print and Sign)	Date

“Distribution:” Original to Project File, Copy to Site File,  
Project Manager, DON RPM, DON ROICC, PQCM, QCM



-  South Shore Area Boundary
-  Area of planned excavation for radiological Free-Release
-  Area of soil excavated and cleared for UXO in 1998-1999 UXO Intrusive investigation (Weston, 2003)

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**FIGURE 1**  
PROPOSED LOCATION AND EXTENT  
OF FREE-RELEASE EXCAVATION  
SOUTH SHORE AREA

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**NOREAS** Naval Ordnance Research and Engineering Activity      DATE: AUGUST 2015  
CONTRACT NO.: N62473-12-C-4812



-  South Shore Area Boundary
-  Area of planned excavation for radiological Free-Release
-  Area of soil excavated and cleared for UXO in 1998-1999 UXO Intrusive investigation (Weston, 2003)
-  Soil Screening and Temporary Staging Area Boundaries

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**Figure 2**  
Site Layout Plan – Free Release Excavation  
South Shore Area

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