FINAL

AFTER ACTION REPORT FOR 2008 FIELD SEASON FOR LAKE JEAN LJ-01 AND RIFLE GRENADE RANGE RG-01

FORMER NAVAL AIR FACILITY ADAK ISLAND, ALASKA

26 April 2010

Prepared For:

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DOCUMENT IDENTIFICATION

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Document Title:	Final After Action Report, 2008 Field Season for Lake Jean LJ-01 and Rifle Grenade Range RG-01
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Report Coverage:	This report presents the results of the Remedial Action at Lake Jean Area 01 (LJ-01) and the Non Time Critical Removal Action (NTCRA) at Rifle Grenade Range 01 (RG-01). These activities were conducted in accordance with the MEC Clearance Work Plan and associated plans, May 2008 (MC QAPP, 11 August 2008).
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REPORT OVERVIEW

Document Organization

The nature of the effort at Rifle Grenade Range (RG-01) and Lake Jean (LJ-01) was similar in many regards [same processes, same health and safety, same Standard Operating Procedures (SOPs)] and work was generally carried out under the same procedures.

To minimize the presentation of extensive and often redundant content, results of the two projects have been included in this single binder. The binder contains three parts. The footer of each page denotes the document Part and Page Number.

Part I presents specific descriptions of the site history and procedures followed that are similar for both projects.

Part II presents RG-01 specific history, procedures results, conclusions and recommendations.

Part III presents LJ-01 specific history, procedures, results, conclusions and recommendations.

The following appendices are included to provide supporting information.

Appendix A	Maps and Drawings
Appendix B	AOC Certification packages
Appendix C	Site Specific Training Records
Appendix D	Daily Production and QC Reports
Appendix E	Weekly Quality Control/Status Meetings
Appendix F	GPO Report with QA Certification Approval
Appendix G	Geophysical and UXO Team Logbooks/Journals
Appendix H	Ordnance Accountability and Inventory Log
Appendix I	Explosives and MD Disposal Documentation
Appendix J	Geophysical Data Tracking Log
Appendix K	Grid Data Tracking Log
Appendix L	Field Change Requests, Design Change Notices, Deficiency Notices, and Non-Conformance Reports
Appendix M	NOSSA and ADEC Audit Reports
Appendix N	Munitions Constituent Sampling Laboratory Reports
Appendix O	RG-01 Action Memorandum (for RG-01) OUB-1 Record of Decision (for LJ-01)
Appendix P	Adak GIS Database (electronic file on separate CD)

Part II and Part III each contain Appendices A through O. These appendices (A-O) are provided in an electronic PDF format on a Compact Disk (CD) located in the back of this binder. The appendices and files within the appendices are bookmarked for ease of navigation. A separate CD containing Appendix P, the Adak GIS Database, is also provided in the binder.

Compliance with NOSSAINST 8020.15A

This After Action Report (AAR) complies with the requirements of NOSSAINST 8020.15A, Enclosure (5). Table 1-1, below, presents a crosswalk to the applicable data locations.

TABLE 1-1: NOSSA AAR CROSSWALK

Item	AAR Requirement	Data Location
1.	Executive summary	Executive Summary: Part I
2.	Current, determined, or reasonably anticipated future land use for each Munitions Response Site (MRS) or Area of Concern (AOC) covered by this AAR	Section 1.4, Regulatory History: Parts II & III
3.	Description of each MRS, including size(s)	Section 1.2, Site Characteristics: Parts II & III
4.	Discussion of the removal action methods and technology, including relative effectiveness, and limitations of technologies used during the munitions response, and the effects on residual hazard/risk relative to that which was originally projected	Parts I, II, & II, Section 3.0, Procedures, and Section 6.1, Evaluation of Effectiveness: Parts II & III
5.	Rationale for any variations from the expected implementation of the approved Explosives Safety Submission (ESS)] that affected the outcome	Section 4.3, Deviations from Project Plans: Parts II & III
6.	Information regarding areas within the MRS where munitions response activities were not conducted, together with the rationale for not conducting them	Section 4.0, Results, and Appendix A: Parts II & III
7.	Summary of the Munitions and Explosives of Concern (MEC) and Material Potentially Presenting an Explosive Hazard (MPPEH) found and/or recovered, including final disposition of each	Sections 4.0, Appendix H, and Appendix I: Parts II & III
8.	Summary of the project QC and QA reports	Sections 4.1.15, Appendix B and Appendix M: Parts II & III
9.	A summary of the land use controls that were implemented, if any, and the areas to which they apply	Sections 1.4: Parts II & III
10.	A summary of provisions for long-tem management, including maintenance, monitoring, record-keeping, 5-year reviews, etc	Part I, Section 2.0 and Sections 1.4: Parts II & III
11.	Request to cancel any EZs or other site approvals established in support of the munitions response	Sections 4.3: Parts II & III
12.	Maps (scale 1”/400’ preferred) showing:	
12a.	Current, determined or reasonable anticipated future land use	Appendix A, Figure A-01, Parcel 4, Parts II & III.
12b.	Areas within an MRS where response actions were executed and the clearance depth of two ft for RG-01 and four ft for LJ-01	Part II, Appendix A, Figure A-04 and Part III, Appendix A, Figure A-01

Item	AAR Requirement	Data Location
12c.	Areas within an MRS where response actions were not performed	Part II, Appendix A, Figure A-04 and Part III, Appendix A, Figure A-01
12d.	MC sampling locations and analytical results	Part II, Appendix A, Figure A-39 and Sample #s:RG-01-SL01 and RG-01-SL-02, Appendix N, breached munitions
12e.	Residual munitions hazard and chemical risk	NA
13.	Digitally recorded and geo-referenced maps of subsurface geophysical anomalies, including suspected munitions	Appendix A: Parts II & III
14	Dig sheets for all excavations on projects where geophysical mapping and investigation occurred	Appendices J & K: Parts II & III
15.	Color photographs of major activities and recovered MEC	Sections 1 - 6: Parts I, II & III
16.	Videotape with voice narration showing major response activities and recovered MEC.	NA - No video used
17.	Description and results of laboratory analyses of MC sampling	Part I, Section 3.2 and Appendix N Part II
18.	Archaeological sites or environmentally sensitive areas that were encountered and a description of any corrective, mitigation, or protective measures taken	NA - No archaeological sites or environmentally sensitive areas encountered

Executive Summary

Rifle Grenade Range (RG-01)

Under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Federal Facilities Agreement (FFA), the U.S. Navy was required to complete all necessary remedial actions for site areas within Operable Unit (OU) B-2 on Parcel 4 of the former Adak Naval Complex, located at Adak Island, Alaska. Among these areas is the former Rifle Grenade Range-01 (RG-01), which has been designated as Munitions Response Site (MRS) RG-01. In 2004, the Navy performed a RI/FS of OUB-2 and RG-01 was one of the Areas of Concern (AOCs) scheduled for remedial investigation. However due to the extremely hazardous nature of 40mm grenades, no entry to the site or investigations were performed at RG-01. Based on this the Navy decided to perform an accelerated response, a Non Time Critical Removal Action (NTCRA), to remove the hazardous munitions. The objective of the accelerated response action was to remove all Munitions and Explosives of Concern (MEC), Material Potentially Presenting an Explosive Hazard (MPPEH), and Munitions Debris (MD) from this site as necessary to safely support the reasonably anticipated future use of the site as a wildlife refuge.

The current land use is Navy Restricted access and Institutional Controls (IC) inspections and reporting will be determined in the OUB-2 Record of Decision (ROD). In the long term, this site will be transferred to the U.S. Fish and Wildlife Service (USFWS) via the Department of the Interior (DOI) for use as a wildlife refuge when the remediation is complete. After the land transfer occurs, the anticipated land uses will be consistent with the Alaska Maritime National Wildlife Refuge (AMNWR) lands (e.g., subsistence/wildlife management/recreation activities).

The Department of the Navy, Naval Facilities Engineering Command Northwest (NAVFAC NW) tasked USA Environmental, Incorporated (USAE) under USAE's Munitions Response Contract (MRC) for Worldwide Sites to perform a MEC Engineering Evaluation/Cost Analysis (EE/CA) to identify and recommend the best response action alternative for a NTCRA of RG-01. The EE/CA was reviewed and approved by the stakeholders and an Action Memorandum, dated 8 September 2006, approved requiring an analog NTCRA to a depth of 2 ft below the mineral soil surface.

In 2006, USAE performed the NTCRA on RG-01 and recovered and destroyed a total of 96 live MEC items. Of these, 87 were 40mm high explosive (HE) grenades. The other nine MEC items were seven live 40mm riot control tear gas (CS) grenades, a live bomb fuze, and one live cartridge-actuated device (CAD). The live bomb fuze and CAD were most likely "kick-outs" from a nearby demolition range during previous disposal operations. Based on the amount of small arms and other target debris encountered on the eastern portion of the range, the area was also extensively used for firing of small arms up to and including .50 caliber weapons. During the 2006 field season, one grid was expanded due to the discovery of MEC near the eastern boundary of the range and the Adak requirement for a 15-m buffer around MEC. Due to time constraints, the decision was made to delay the expansion of any additional grids on the eastern boundary until the next season.

In 2008 USAE performed an analog clearance on the five RG-01 expansion areas identified during the 2006 NTCRA prior to follow-on Digital Geophysical Mapping (DGM) surveys and encountered MEC within the 15-m buffer zone that required an additional analog step-out. A 100 percent DGM survey of accessible areas (slopes <30 degrees, no obstacles or standing water) at RG-01 was performed after completion of the analog clearance and required analog step-outs of four grids.

During the DGM clearance, MEC was encountered near boundaries of four grids and it was necessary to perform a step-out of the grids to maintain the 15-m buffer around MEC. The additional step-outs were first analog cleared and then DGM surveyed and cleared. During RG-01 clearance operations in 2008, USAE located and disposed of, by detonation, 71 MEC items, including 70 40mm grenades and one 3.5 inch rocket; six items of MPPEH including a projectile fuze, a bomb fuze, a 40mm projectile, a CAD, and

two partial 40mm breached munitions. Based on observations by UXO personnel, the MPPEH items, rocket, and breached munitions were most likely "kick-outs" from the nearby former Open Burn/Open Detonation (OB/OD) area. Munitions Constituents sampling and testing was performed at the locations of the two breached munitions, in accordance with the approved MC QAPP. One of the locations showed RDX levels above screening level but below action level so additional sampling was performed on the location.

Disposal of MEC/MPPEH was performed by detonation using donor explosives shipped to Adak and stored in the Government's portable explosives magazine. MPPEH and MD was inspected by UXO technicians, certified by USAE, verified by the Government representative, and then flashed in a thermal flashing unit (TFU) prior to being sealed in barrels and shipped off island on the barge to a recycle facility for final disposal.

An aggressive Quality Control (QC) program was in place throughout the project. Blind Seed Items (BSIs) were emplaced prior to DGM Surveys [two QC BSIs per acre plus additional ones by Quality Assurance (QA)] with a 100% detection rate achieved. There were no DGM QC or QA failures for the DGM clearance.

Quality Assurance on Adak was provided by a Government QA Contractor. The QA Contractor provided GPO certification of USAE DGM Teams, inspections of data collection, verification of target selections, oversight of day-to-day operations, and final QA checks and acceptance of all RG-01 clearance operations.

The 2006 and 2008 RG-01 NTCRAs met all requirements of the Action Memorandum and the approved Explosives Safety Submission (ESS). The MEC clearance, including the analog and follow-up DGM clearances, meets the remediation requirement of the Action Memorandum of a clearance to 2 ft and no further clearance should be necessary. Although the NTCRA cleared RG-01 to the Action Memorandum requirements, the final remedy has not been determined so the results of this work will be brought forward to the OUB-2 RI/FS for further remedy evaluation.

No Further Action (NOFA) is recommended for additional MEC clearance to a depth of 2 ft within the boundaries established for RG-01. NOFA is recommended for breached munition RG-01-SL-02; however, breached munition RG-01-SL-01 will require further review in the OUB-2 RI/FS.

Lake Jean (LJ-01)

Previously, geophysical investigation and munitions clearance\remediation at this 3-acre site took place in 2000, 2001 and 2004. During the 2004 field season, LJ-01 was defined as three different Units of Production (UoP). UoP 7 was the 2000 work area, UoP 7A was the 2001 work area, and UoP 9 was the 2004 work area where expansion grids were completed to ensure that all Munitions and Explosives of Concern (MEC) items had a 15-m ordnance-free buffer around them.

During 2004 field work, an area with construction debris was identified and designated as an "*exception area*." This area was not completed during the 2004 field season because the equipment and time were not available to complete clearance. As work proceeded in 2004, problems were identified (MEC encountered during the AOC Certification process) with the 2000 and 2001 field work. As a result, the geophysical anomalies identified in the earlier field work were re-investigated and additional ordnance was identified. However, this work was not completed during the 2004 field season. During operations in 2004, a total of 69 targets were labeled as ordnance-related items in the entire LJ-01 area (2000, 2001, and 2004). Six of these items were UXO, four were practice ordnance (MD), and the remaining 59 targets were classified as Abandoned Ordnance (DMM). It should be noted that these 59 remaining targets were actually comprised of a total of 229 individual DMM items.

The Department of the Navy, NAVFAC NW, tasked USAE, under USAE's Munitions Response Contract (MRC) for Worldwide Sites, to perform a MEC Clearance to:

- Investigate all anomalies to a depth of 4 ft below the mineral soil surface in accordance with the ROD.
- Conduct intrusive investigations of the remaining targets for 2004.
- Clear the remaining construction debris in the "*exception area*" and investigate all geophysical anomalies in the area.
- Perform a 100 percent DGM survey of the entire UoP 7 and UoP 7A areas.
- Intrusively investigate additional targets identified during the DGM survey and complete the AOC certification process for UoP 7 and UoP 7A and the exception area (1.33. acres).

In 2008, 48 MEC items were recovered and disposed of in accordance with the WP; these MEC items, consisting of Discarded Military Munitions (DMM) and MPPEH. The MEC recovered included: twenty seven hand grenade fuzes; sixteen projectile fuzes; two 20mm cartridges; two 20mm projectiles; and a hand flare. In addition small arms ammunition of various types was recovered. No breached munitions requiring sampling were encountered and disposal of MEC/MPPEH and MD was performed in conjunction with disposal operations at AOC RG-01. No MEC was encountered within the 15-m buffer of the LJ-01 boundary, and therefore no step-outs were required.

An aggressive QC program was in place throughout the project. BSIs were emplaced prior to DGM Surveys (two QC and one QA) with a 100% detection rate achieved. There were no DGM QC or QA failures for the DGM clearance.

Quality Assurance on Adak was provided by a Government QA Contractor. The QA Contractor provided GPO certification of USAE DGM Teams, inspections of data collection, verification of target selections, oversight of day-to-day operations, and final QA checks and acceptance of all LJ-01 clearance operations.

The documentation provided in this AAR supports the conclusion that all detected MEC in accessible areas of UoP 7, UoP 7A, and the 2004 exception area was removed to a depth of four ft below the mineral soil surface in accordance with the requirements of the OUB-1 ROD and project planning documents. Based on the AOC Certifications in the 2005 OUB-1 AAR and this 2008 AAR, NOFA and close-out are recommended for LJ-01. Information from this AAR will be added to a future Remedial Action Completion Report (RACR) for all OUB-1 sites.

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LIST OF ACRONYMS

AA	Anti-Aircraft
AAR	After Action Report
Adak	Adak Island, Alaska
ADEC	Alaska Department of Environmental Conservation
AHA	Activity Hazard Analysis
AMNWR	Alaska Maritime National Wildlife Refuge
AO	Abandoned Ordnance
AOC	Area of Concern
AOPC	Area of Potential Concern
APP	Accident Prevention Plan
APPL, Inc.	Agriculture and Priority Pollutants Laboratories, Inc.
APT	Armor-Piercing Tracer
bgs	Below Ground Surface
BIP	Blow-in-Place; Blown in Place
BRAC	Base Realignment and Closure
BSI	Blind Seed Item
CAD	Cartridge-Actuated Device
Cal	Caliber
CD	Compact Disc
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COPC	Chemical of Potential Concern
CPR	Cardiopulmonary Resuscitation
CS	Riot Control Tear Gas
CTO	Contract Task Order
DCN	Document Change Notice
DDESB	Department of Defense Explosives Safety Board
DFW	Definable Feature of Work
DGM	Digital Geophysical Mapping
DGPS	Differential Global Positioning System
DMM	Discarded Military Munitions
DN	Deficiency Notice
DoD	Department of Defense
DOI	Department of the Interior
DOT	Department of Transportation
DQO	Data Quality Objective
DVD	Digital Versatile Disk
ea	Each
EDD	Electronic Data Deliverable
EE/CA	Engineering Evaluation/Cost Analysis
EM	Electromagnetic
EMT	Emergency Medical Technician
EOD	Explosive Ordnance Disposal

EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
ESOH	Environment, Safety, and Occupational Health
ESQD	Explosives Safety Quantity-Distance
ESS	Explosives Safety Submission
EZ	Exclusion Zone
FCR	Field Change Request
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft	foot/feet
FTP	File Transfer Protocol
GIS	Geographical Information System
GPO	Geophysical Prove-Out
GPS	Global Positioning System
HAZWOPER	Hazardous Waste Operations
HE	High Explosive
HEAT	High Explosive Anti-Tank
HEDP	High-Explosive Dual Purpose
HFD	Hazardous Fragmentation Distance
HEI	High Explosive Incendiary
HTRW	Hazardous, Toxic, or Radiological Waste
Hz	Hertz
IC	Institutional Control
ICMP	Institutional Control Management Plan
ID	Identification
ITS	Instrument Test Strip
LAW	Light Anti-Tank Weapon
lb	pound
LJ-01	Lake Jean Area 01
LUC	Land Use Control
MAUW	Modified Advanced Underwater Weapons Compound
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
MGFD	Munition with the Greatest Fragmentation Distance
MIS	Multi-Incremental Sampling
MLLW	Mean Lower Low Water
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRC	Munitions Response Contract
MRS	Munitions Response Site
MS	Matrix Spike
MSD	Minimum Separation Distance; Matrix Spike Duplicate
mV	Millivolt
NA	Not applicable

NAD	North American Datum
NAF	Naval Air Facility
NAS	Naval Air Station
NAVFAC NW	Naval Facilities Engineering Command Northwest
NAVSEA	Naval Sea Systems Command
Navy	United States Navy
NEDDS	Navy Electronic Data Delivery System
NOFA	No Further Action
NOSSA	Naval Ordnance Safety and Security Activity
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
NTR	Navy Technical Representative
OB/OD	Open Burn/Open Detonation
OE	Ordnance and Explosives
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PA	Preliminary Assessment
PD	Point Detonating
PDA	Personal Digital Assistant
PDF	Portable Document Format
PPE	Personal Protective Equipment
ppm	Parts per Million
PQCM	Program Quality Control Manager
Projo	Projectile
PSE	Preliminary Source Evaluation
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QASP	Quality Assurance Surveillance Plan (QASP)
QC	Quality Control
QCM	Quality Control Manager
QD	Quantity Distance
RA	Remedial Action
RACR	Remedial Action Completion Report
RADWP	Remedial Action Design Work Plan
RCA	Root cause analysis
RG-01	Rifle Grenade Range - 01
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RTK	Real Time Kinematic
SAERA	State-Adak Environmental Restoration Agreement
SD	Self Destruct
SHSP	Site Health and Safety Plan

SI	Site Investigation
SM	Site Manager/Site Superintendent
SOP	Standard Operating Procedure
SOW	Statement of Work
SUXOS	Senior UXO Supervisor
TAC	The Aleut Corporation
TDEM	Time Domain Electromagnetic
TFU	Thermal Flashing Unit
TL	Team Leader
TNT	trinitrotoluene
TSD	Team Separation Distance
UFP	Uniform Federal Protocol
UoP	Unit of Production
USAE	USA Environmental, Inc.
USCS	Unified Soil Classification System
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
UXOQC	Unexploded Ordnance Quality Control
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
UXOTI	UXO Technician I
UXOTII	UXO Technician II
UXOTIII	UXO Technician III
WMP	Waste Management Plan
WP	Work Plan
WS	Worksheet
WWII	World War II

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FINAL

AFTER ACTION REPORT FOR 2008 FIELD SEASON FOR LAKE JEAN LJ-01 AND RIFLE GRENADE RANGE RG-01

FORMER NAVAL AIR FACILITY ADAK ISLAND, ALASKA

PART I: BACKGROUND AND PROCEDURES COMMON TO BOTH AOCS

26 April 2010

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1.0 INTRODUCTION

Because the nature of the effort at Rifle Grenade Range (RG-01) and Lake Jean (LJ-01) was comparable in many regards, much of the work was generally carried out under the same procedures. Thus, Part I of this After Action Report (AAR) addresses those aspects that were similar [same processes, same health and safety, same Standard Operating Procedures (SOPs)] USAE conducted this work under the Munitions Response Contract (MRC) for Worldwide Sites, Contract Number N62742-05-D-1868, Contract Task Order (CTO) KR02.

1.1 ORGANIZATION

Part I is comprised of the following sections, which cover an introduction, major work activities, technical approach, field procedures and documentation, data management, and Quality Control (QC), and a compilation of the clearance findings and results based on field work and data collected during the field season:

- Section 1.0 - Introduction
- Section 2.0 - Project Objectives
- Section 3.0 - Definable Feature of Work (DFW)-Specific Procedures and Documentation
- Section 4.0 - Overarching Quality Control\Quality Assurance Procedures
- Section 5.0 - References.

The focus of this section is to present information common to both investigation areas. Part II and Part III focus on information and results specific to RG-01 and LJ-01, respectively. For the convenience of the reader, hard copies of Maps & Drawings from Parts II and III, Appendix A, are provided in this binder. Other site data from the clearance operations are contained in the location-specific Appendices A through O for Parts II and III on the compact disk (CD) included in this binder.

1.2 ADAK CHARACTERISTICS

1.2.1 CLIMATE AND WEATHER

Adak Island has a polar maritime climate characterized by persistent overcast skies, high winds, frequent and often violent storms, and a relatively narrow range of temperature fluctuation throughout the year. Adak is located in the region of the polar front, the zone of convergence between temperate westerly winds (which actually blow from the southwest at this latitude) and the polar easterly winds. In the area of the Aleutian Islands, this interface of air masses creates a semi-permanent low-pressure zone, which is particularly strong in the winter and generates the frequent low-pressure (cyclonic) storms characteristic of the North Pacific region.

Weather on the island can be very localized and fog, low ceilings, precipitation, and clear weather can occur simultaneously within a distance of a few miles of each other. Storms occur during all seasons, with the most frequent and severe storms during winter. The average total annual precipitation for Adak Island (measured at the airport) is about 152 centimeters (cm) (60 inches), most of which falls as rain in the lower elevations. Average monthly precipitation varies from a low of about 7.6 cm (3 inches) during June and July to a high of 7 to 8 inches during November and December.

Snowfall averages over 254 cm (100 inches) a year at sea level, but because of the relatively warm temperatures, snow depth rarely exceeds 0.3 meter (m) to 0.6 m (1 to 2 ft). The snow level (the elevation at which precipitation falls as snow instead of rain) varies with the temperature. Typically, snow occurs on Adak Island between November and April, but it melts fairly quickly at elevations less than 305 m (1,000 ft) above mean lower low water (MLLW). At elevations greater than 305 m above MLLW, snow that falls between November and April will generally remain as snowpack throughout the winter. Between May and October, snow rarely falls at sea level. From June through September, snow melts in the higher elevations, augmenting streamflow, and most precipitation falls as rain over the entire island. Permanent

snowpack is not typical in the Operable Unit (OU) B-2 sites because most of the sites are at lower elevations.

Wind conditions are typified by local directional shifts and rapid changes in velocity. Average wind velocity is 12 knots, with gusts in excess of 100 knots recorded during winter storms. High winds, with gusts over 50 knots, are frequent during the summer months.

Monthly temperatures range from a low of 32.9 degrees Fahrenheit (°F) [0.5 degrees Centigrade (°C)] in February to a high of 51.3 °F (10.7 °C) in August. The highest recorded temperature for Adak Island is 75 °F (23.8 °C) (recorded in August 1956), and the lowest recorded temperature is 3 °F (-16.1 °C) (recorded in January 1963 and again in February 1964).

1.2.2 SURFACE FEATURES AND TOPOGRAPHY

The topography of northern Adak Island is directly related to its volcanic origin, with few areas of flat land. The western portion of the Range Complex at Andrew Lake is a valley surrounded on three sides (north, west, and south) by steep slopes leading upward to Mt. Moffett. The valley is drained by Moffett Creek, which forms a small alluvial plain adjacent to Andrew Lake. A number of small ponds and wetland areas are distributed around the eastern portion of the range complex.

1.3 ADAK ISLAND HISTORY

Adak Island was reserved as part of the Aleutian Island National Wildlife Refuge by Executive Order in 1913. Adak remained largely unoccupied until August 1942, when U.S. forces (U.S. Air Force and U.S. Navy) established an air base and staging area to support operations against Japanese installations on nearby Kiska and Attu Islands.

After World War II, the U.S. Air Force used these facilities until 1951, when they became Naval Air Station (NAS) Adak under control of the U.S. Navy. The NAS Adak was re-designated as the Naval Air Facility (NAF) by the 1993 Base Realignment and Closure (BRAC) Commission, and was later selected for closure by the 1995 BRAC Commission. The military mission on Adak Island ended in March 1997. Since then, the Adak Island population has fluctuated between 100 and 1,000 persons. Currently, less than 70 - 150 people reside on Adak Island, depending on the time of the year. An ordnance survey completed in 1996 by Navy Explosive Ordnance Disposal (EOD) Mobile Unit Eleven Detachment Whidbey Island personnel indicated that UXO was present in many areas of Adak Naval Complex, including RG-01 and LJ-01.

1.4 ADAK REGULATORY HISTORY

In October 1992, the former Adak Naval Complex was proposed for the National Priorities List (NPL), and officially placed on the list in May 1994. The Federal Facilities Agreement (FFA), an agreement among the Navy (as Lead Agency), the Environmental Protection Agency (EPA) (regulatory lead), and the State of Alaska that specified the scope, process, and overall schedule for environmental investigations to be completed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process, was signed in November 1993.

The FFA, which specified the scope of work to be completed under the CERCLA process, initiated a series of studies: Preliminary Source Evaluations (PSEs) of non-petroleum sites and studies of petroleum sites under the State Adak Environmental Restoration Agreement (SAERA).

From 1993 through 1996, four rounds, or batches, of PSEs were conducted. The PSE process included a risk-based screening evaluation of human health and ecological risk at the PSE sites. Sites identified by this process as requiring additional evaluation were included in the base-wide Remedial Investigation/Feasibility Study (RI/FS) performed by URS. Field work for the base-wide RI/FS began in the spring of 1996 and was completed in the summer of 1996. The RI/FS report was published in September 1997 (URS 1997).

Prompted by the decision to close NAF Adak and transfer the facility out of Federal ownership additional data was collected in 1999 [Draft Site Investigation (SI) Report, Foster Wheeler Environmental 2000a], along with previously collected data and archival information, were used to prepare a Draft Preliminary Assessment (PA) Report (Foster Wheeler Environmental 2000b). The PA Report identified areas of potential concern (AOPCs) that were screened against criteria developed by a Project Team that included EPA, Alaska Department of Environmental Conservation (ADEC), the Navy, and consulting members. The screening criteria were used to evaluate the likelihood and density of contamination with an analysis of the supporting evidence. Results of the screening provided recommendations for moving some AOPCs to No Further Action (NOFA) status, and for moving other sites, now labeled Area of Concern (AOC), forward into the RI/FS process.

Following the PA in 2000, an OU, known as OU-B, was created to manage the investigation and remediation of MEC contamination in the areas warranting further response (Foster Wheeler Environmental 2000b). An RI/FS Work Plan (WP) (Foster Wheeler Environmental 2000c) also was developed to facilitate a consistent investigation of the identified AOCs within OU-B, allowing a determination of the nature and extent of MEC contamination in each area and the collection of data needed to support hazard assessment and decision making with regard to the remediation of MEC.

The Navy began implementing this RI/FS WP in 2000. By the end of the first field season, the Navy recognized that certain areas of the military reservation (primarily those in Parcel 4 areas), would require an extended period of time for assessment and remediation due to the nature of the contamination and/or the lack of an effective technical approach for remediation. In order to expedite the assessment and cleanup of those portions of the military reservation that could be transferred in a timely manner, OU-B was divided into two parts: OU-B1 and OU-B2. OU-B1 contained the AOCs (including LJ-01) that were slated for transfer to The Aleut Corporation (TAC) as part of the land transfer agreement. These AOCs and surrounding property were contained in Land Transfer Parcels 1 through 3.

OUB-2 contained the remaining AOCs that were expected to require an extended period for remediation. These AOCs and surrounding buffer areas were contained in Land Transfer Parcel 4, which is slated for ultimate transfer to the U.S. Department of the Interior (DOI) for inclusion in the Alaska Maritime National Wildlife Refuge (AMNWR). The final Land Transfer Parcel, Parcel 4, contains the AOC RG-01 and LJ-01 within OUB-2. Remediation of ordnance contamination in this Land Transfer Parcel is not yet complete.

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2.0 PROJECT OBJECTIVES

2.1 RG-01

The project objective for RG-01 was to remove MEC (primarily 40-mm projectiles, but other MEC may also be present) to a depth of 2 ft. A 15-m border area that is 40mm-free (UXO, practice, or expended CS) will be established with the analog geophysical survey. The DGM survey was conducted on the same area with removal of all anomalies detected to a depth of 2 ft.

2.2 LJ-01

The project objective for LJ-01 was to remove MEC to a depth of 4 ft and to complete a 15-m DMM free border area around the perimeter of the AOC. The majority of the 15-m DMM-free border was completed during previous removal action, with the exception of a portion along the north and east side of the unit of production (UOP) (see Figure 5, UOP 7 and UOP 7a MRS LJ-01). Anomalies were removed to a depth of 4 ft.

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3.0 DFW-SPECIFIC PROCEDURES

The field methods that are common for both the RG-01 and LJ-01 projects are presented in this section. This section is oriented to the DFWs presented in the approved Quality Assurance Project Plan (QAPP), Worksheet (WS) #14. Each subsection below presents the principal method subdivided into field procedures, documentation, and QC. All activities were accomplished in accordance with the approved WP, SOPs, the Munitions and Explosives of Concern (MEC) QAPP, Munitions Constituents (MC) QAPP, and Field Change Requests (FCRs).

3.1 PROCEDURES FOR MUNITIONS AND EXPLOSIVES OF CONCERN

3.1.1 SITE PREPARATION

3.1.1.1 Procedures

USAE personnel mobilized to Adak in June 2008. Upon arrival, they inventoried and inspected equipment from the barge shipment and established an administrative area in a leased set of quarters on Adak. USAE performed site-specific training, coordinated communications and other support; confirmed that all personnel had the proper qualification and training records; coordinated Medical Evacuation (MedEvac) flights and medical support on Adak, installed the Type II Explosive Magazine [for Material Potentially Presenting an Explosive Hazard (MPPEH) storage] near RG-01, and coordinated project details with City of Adak personnel, specifically, with the City Manager.

Coordination with all personnel was vital for safe and efficient intrusive operations. The Senior UXO Supervisor (SUXOS) was responsible for management of all ordnance-related activities. As the senior UXO qualified manager on site, he was responsible for proper coordination of activities with project management, the Navy, and local emergency and support service providers. Before site activities, the SUXOS notified security/police, fire, and medical personnel, as well as any other appropriate personnel/ organizations per the approved WP. The community was informed of the project schedule and the expected impacts, and bulletins were posted at the school, the City offices building, and all public buildings.

3.1.1.2 Documentation

Data generated during Site Preparation included inventories of all equipment for completeness and operability. The explosives were inventoried to ensure the quantities received matched the shipping documents and invoices. The explosives storage area was inspected for proper grounds keeping and electrical grounding requirements (see Part II, Appendix I).

3.1.1.3 Quality Control

The QC staff verified that the following elements of the Site Preparation DFW were accomplished before the project began.

- An operational readiness review meeting was conducted.
- The WP project checklists were completed.
- Personnel authorized to receive and sign for explosives were authorized in writing to do so.
- The explosives storage magazines were sited, grounded, secured, and placarded in accordance with the Explosives Safety Submission (ESS) and the WP.
- The magazine keys were controlled in accordance with the WP.

These checks were conducted as required throughout Site Preparation.

3.1.2 DOCUMENTATION REVIEW

3.1.2.1 Procedures

All personnel were required to review the WP, Environmental Protection Plan (EPP)/Waste Management Plan (WMP), Accident Prevention Plan (APP)/Site Health and Safety Plan (SHSP), Activity Hazard Analysis (AHA) Worksheets, the MEC and MC QAPPs, and the SOPs pertinent to their assigned tasks and sign the acknowledgement forms for these project documents.

3.1.2.2 Documentation

The acknowledgement forms confirming review of the project documents by staff are located in Part II, Appendix C.

3.1.2.3 Quality Control

The QC staff verified that all project personnel reviewed the required documents prior to beginning tasks and signed acknowledgement sheets as required.

3.1.3 DOCUMENTATION CONTROL

3.1.3.1 Procedures

Prior to the onset of field activities, the Site Manager established a filing system for approved documents and field data. All documentation generated was maintained in the Field Office on Adak.

3.1.3.2 Documentation

Field crews and management personnel recorded operations and inspections as either electronic data using a Personal Digital Assistant (PDA) or computer, in a log book, or via hard copy forms generated on site. All hard copies of applicable documentation have been scanned as electronic files for inclusion in this report as Appendices.

3.1.3.3 Quality Control

The QC Manager verified the following steps were accomplished to control project documents.

- Files were set up and administered with a topical index system.
- Documents and records submitted for inclusion in the project files were legible and complete.
- The document control plan was followed for submission of FCRs to approved project plans, tracked through the approval process, logged onto the FCR Log, and changes posted to the working documents upon approval. FCRs and the FCR Log are included in Parts II and III, Appendix L.
- The documents and records were properly retained and shipped back to the USAE corporate office at the end of the project.

The QC Manager tracked all submitted FCRs by posting them on the FCR Log, tracked the FCRs through the approval process, and verified the posting of the changes to the working documents, once approved. The approved FCRs and the FCR Log are located in Part II, Appendix L.

3.1.4 PRE-OPERATIONAL TEAM TRAINING

3.1.4.1 Procedures

Teams trained on or familiarized themselves with the instruments required for their assigned tasks (e.g., Whites, EM61, survey equipment, etc.). (See Figure 3-1.) Additional training conducted onsite included Explosives Driver's Training, Cardiopulmonary Resuscitation (CPR)/First Aid, and the Adak-required UXO Awareness training. Training was conducted during initial mobilization, as well as for new staff, when required.

FIGURE 3-1: SETUP AND TRAINING OF EM61

3.1.4.2 Documentation

Each employee's qualifications for his/her assigned position were documented on the Personnel Qualification Verification Form. Training and verification documents are located in Part II, Appendix C.

3.1.4.3 Quality Control

The Quality Control Manager (QCM) verified that all site personnel possessed the requisite training and experience for their position and documented their qualifications on the Personnel Qualification Verification Form prior to beginning the project. As additional personnel were added to the project, QC personnel verified their training and experience using the same process.

3.1.5 GIS MANAGEMENT

3.1.5.1 Procedures

USAE developed a Geographical Information System (GIS) by building upon existing GIS data that was established for the sites. The existing data consisted of site boundaries, results of previous work accomplished at the sites, and aerial photos. USAE then incorporated field data such as intrusive results, grid status, and step-out boundaries into the Adak GIS.

Using the up-to-date data, USAE was able to keep positive control on project status and provide status maps as needed. The GIS data was also used to identify the location of items that required a step-out of the site boundary to maintain the MEC free 15-m buffer. The GIS Manager would then modify the site boundary and send the additional clearance area back to the field for approval and clearance.

3.1.5.2 Documentation

In order to assist in the intrusive investigations, USAE developed custom data entry forms that were used to collect the results from investigating geophysical and analog anomalies. These data entry forms were developed using the NAVFAC Navy Electronic Data Delivery System (NEDDS) guidelines as a template. The forms were loaded onto Trimble GeoXT data collection/Global Positioning System (GPS) units to be used inside of ESRI's ArcPad mobile GIS software. The GeoXTs were downloaded daily and the intrusive results were sent to USAE's on-site Data Manager for approval. The Data Manager checked for completeness and accuracy of the intrusive data. Any missing or incorrect data was identified and sent back to the field crews for completion and/or correction. Once the results were approved, the data was sent to USAE's GIS Manager for inclusion into the Adak GIS database.

3.1.5.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Maps were complete for all AOCs.
- All maps included a legend, scale, north arrow, figure number, revision number, date, and page number.
- Grid corners and perimeter stakes were correctly labeled on the maps and in the field.
- Geo/target maps were in color, contained state plane coordinates, north arrow, distance scale, millivolt scale and anomaly numbers.

3.1.6 GPO CERTIFICATION

3.1.6.1 Procedures

A Geophysical Prove Out (GPO) was established on Adak by the Government's Quality Assurance (QA) Contractor for certification of equipment and personnel prior to Digital Geophysical Mapping (DGM) survey operations (see Figure 3-2). The purpose of this GPO was to demonstrate and document the site-specific capabilities of the Geonics EM61-MK2 with the 1.0- x 0.5-meter coil; navigation equipment [Real-Time Kinematic Differential Global Positioning System (RTK DGPS)]; geophysical survey method; data transfer, processing, and analysis; data management and associated equipment; and personnel to operate as an integrated system capable of meeting the data quality objectives (DQOs).

FIGURE 3-2: DGM TEAM AT GPO

A secondary purpose of the GPO plot was to provide a site-specific equipment and personnel quality control baseline, to evaluate and document daily performance in accordance with the project DQOs. USAE compared the daily data to the original GPO data to verify sensor detection performance, navigation accuracy, data processing and analysis consistency, and results reporting (e.g., target locations) accuracy. USAE utilized two 3-man DGM teams for DGM operations on Adak. During initial site training, the Project and Site Geophysicists provided EM61 training to the team members, all of whom were UXO qualified technicians. Both DGM teams received an initial personnel and equipment certification for surveying and reacquisition in accordance with the approved Navy-provided GPO Certification Plan (GPO Certification data and documentation can be found in Part II, Appendix F). If either personnel or equipment had changed during site operations, a follow-up inspection and re-certification would have been required; however, there were no changes to either.

During the 2008 field season, USAE employed the following equipment:

- A Trimble 5700 RTK DGPS base station
- An EM61 with the 1.0- by 0.5-m coil and an Allegro CE field data logger with each DGM team
- A Trimble R8 RTK DGPS rover with each team
- A laptop computer with:
  - Geonics sensor software for downloading and exporting electromagnetic (EM) data
  - Trimble's Geomatics Office software for mapping and transferring GPS data
  - Geosoft's Oasis Montaj software (v7.0) for initial processing and field analysis.

The DGM teams deployed the EM61 in the stretcher mode for all survey work. During the surveys, the RTK DGPS antenna was mounted over the coil center. During reacquisition, the EM61 was deployed in its standard wheel mode and the RTK DGPS antenna was mounted to a range pole. The DGM teams configured the EM61 data loggers to record all four bottom coil time gate data at a 10-Hertz (Hz) rate. The rover RTK DGPS output data was recorded at a one-Hertz rate.

The certification area consisted of a 50-ft x 520-ft grid within the OUB-2 GPO area in Parcel 4.

3.1.6.2 Documentation

USAE performed data processing and analysis on-site. Processed maps and selected target lists were uploaded to the QA Contractor's shared web site for data review and anomaly reacquisition demonstration.

Additional information, including objectives, procedures, and methods, is contained in the GPO Summary Report. The GPO Summary Report and GPO Certifications are located in Part II, Appendix F.

3.1.6.3 Quality Control

Geophysical data quality was a function of data management and the overall process from data collection through processing and interpretation. Data quality was verified through the GPO certification process for the equipment and operators' ability to meet the project's DQOs and through the implementation of the three-phase control process outlined in the MEC QAPP. Equipment QC checks were performed at the beginning and end of each survey day. The DGM team set up the equipment and performed the following QC tests prior to collecting production data:

- RTK DGPS reoccupation checks (rover reports known location within plus or minus one-quarter of a ft)
- Sensor warm up of at least five minutes each time the sensor was turned on
- Sensor nulling and RTK DGPS input check
- Morning static checks for:
  - Background for one minute (two millivolts peak to peak)
  - Spike test for one minute (± 20% of standard item response after background correction)
  - Return to background for one minute (two millivolts peak to peak)
  - 30 seconds of cable shake (data profile does not exhibit data spikes)
  - 30 seconds of operator/personnel testing (two millivolts peak to peak)
- Latency test over a known object in opposite directions (repeatability of response amplitude ± 20%, positional accuracy of ± 0.656 ft).

The Site Geophysicist downloaded the morning QC checks and examined them for conformance with the project metrics. Documentation of daily GPO checks is provided in Part II, Appendix D.

At the end of each survey day, the following static checks were acquired:

- Background for 1 minute [2 millivolts (mV) peak to peak]
- Spike test for 1 minute (±20% of standard item response after background correction)
- Return to background for 1 minute (2 mV peak to peak)
- Acquire repeat data over one line of the AOC (repeatability of response amplitude ±20%, positional accuracy ±0.656 ft).

Operations QC checks were performed using the three-phase QC surveillance checklist delineated in the MEC QAPP, WS #35. The QC surveillance checklists identify the QC requirements for each DFW

associated with collecting, processing, and interpreting geophysical data and the frequency each check was accomplished by the QC staff.

3.1.7 GEODETIC SURVEYING

3.1.7.1 Procedures

Prior to the start of operations at the AOCs, USAE installed the boundary (and internal survey grids at RG-01) using a Trimble RTK-DGPS in accordance with SOP 2 of the WP. The survey team consisted of two UXO technicians who were experienced in the use of the RTK-DGPS; these individuals established a base station at a known benchmark on Adak and then navigated to points determined by the use of the Adak Island GIS database. They marked AOC boundaries to include the limits of 30 degree slopes (as measured by an inclinometer), exception areas such as standing water, obstacles, and installed internal search grid corners.

The survey team used MEC avoidance procedures consisting of the use of an analog metal detector to detect and avoid metallic anomalies. Avoidance was used for all movement throughout the site to minimize or eliminate any contact with possible surface MEC or MPPEH. Prior to installing grid and boundary markers, the locations were checked with the metal detector to preclude driving stakes into possible subsurface MEC/MPPEH.

Daily, the USAE team positioned the base RTK DGPS at a survey point established in Parcel 4 of OUB-2, suitably located between RG-01 and LJ-01 (Figure 3-3). This point was located and established using Tidal Bench Mark 18 (PID UW7919) as the reference point and all survey points are documented in the Adak GPS Checks.xls spreadsheet located in Part II, Appendix J (Geophysical Data Tracking Log). All data is reported in North American Datum 1983 (NAD83) Alaska State Plane (10), US Survey feet. The daily base station setup was verified by using the rover RTK DGPS receiver to measure a second known location. This reoccupation test was used to confirm that the measured point at this second known location was within the 0.25 ft measurement performance objective, as described in the WP. These daily measured reoccupation tests were recorded in the RTK DGPS data controller and were transferred daily by the Site Geophysicist to the Adak GPS spreadsheet, which is provided in Part II, Appendix J, Folder 02 (Adak Instrument/GPS Checks). All reoccupation tests passed the performance metric for the duration of the project.

FIGURE 3-3: GPS CONTROL POINT

3.1.7.2 Documentation

All gathered data was recorded in the respective Team Leader (TL) logbooks. The SUXOS conducted periodic reviews of the logbooks, and at the end of the project, the logbooks were scanned into the project data files (Part II, Appendix G).

3.1.7.3 Quality Control

The QC staff verified the following tasks were accomplished during the Grid or Transect Construction DFW.

- That location consistency between all primary control points and the monuments was met

- The coordinate system and units were consistent with the requirements outlined in the WP.
- That relative coordinate systems established on field sketch maps included an indicated North designation.
- Survey crew field notes and logbooks were accurate, complete, and consistent.
- Field acquisition setup was accomplished by occupying at least one control point not used to define the acquisition setup.

In addition, QC staff and the Government QA Contractor verified the limits of 30-degree slopes and other exception areas (see Part II, Appendix B, Folder 00-AOC Certification).

3.1.8 GRID/TRANSECT CONSTRUCTION

3.1.8.1 Procedures

Grid construction was accomplished during the Geodetic Surveying task; these procedures are described in Section 3.1.7.

3.1.8.2 Documentation

All gathered data was recorded in the respective TL logbooks. The SUXOS conducted periodic reviews of the logbooks, and at the end of the project, the logbooks were scanned into the project data files (Part II, Appendix G).

3.1.8.3 Quality Control

In addition to the QC steps accomplished for the Geodetic Surveying, the following QC steps were accomplished for the Grid Construction:

- Corner grid points were clearly marked and legible.
- Verified that metal nails were placed at grid corner locations.

3.1.9 DEBRIS REMOVAL

3.1.9.1 Procedures

The primary purpose of debris removal was to rid the site of surface ordnance and remove all above-ground metallic objects that would interfere with subsequent geophysical surveys. Any surface MEC or debris (such as old tires, barrels, or construction debris) was removed from the grid(s) during the clearance. Any debris removed (other than munitions debris) was moved outside the AOC boundaries, consolidated, and left in place.

3.1.9.2 Documentation

All gathered data was recorded in the respective TL logbooks. The SUXOS conducted periodic reviews of the logbooks, and at the end of the project, the logbooks were scanned into the project data files (Part II, Appendix G).

3.1.9.3 Quality Control

Upon task completion, the QC staff verified that all debris that may interfere with the follow-on geophysical mapping survey or endanger the survey crew was removed in accordance with the WP.

3.1.10 BRUSH CLEARANCE

3.1.10.1 Procedures

Based on experience during the 2006 RG-01 activity and a site visit to LJ-01 in 2007, grass was expected to be as high as 3 to 4 ft. Grass this high would impede worker access, and could affect the depth to which metallic objects were detected during DGM and handheld geophysical instrument operation. Therefore, grass clearance was anticipated in some areas of the sites. Vegetation clearance teams consisted of UXO technicians cutting the grass to a height of no closer than 6 inches above the tundra surface.

3.1.10.2 Documentation

All gathered data was recorded in the respective TL logbooks. The SUXOS conducted periodic reviews of the logbooks, and at the end of the project, the logbooks were scanned into the project data files (Part II, Appendix G).

3.1.10.3 Quality Control

The QC Staff ensured the brush clearance crews were properly equipped, including Personal Protective Equipment (PPE), and the task was completed in accordance with the WP. The QC inspection was performed to ensure that vegetation was removed to no closer than 6 inches to the tundra surface.

3.1.11 CHECK INSTRUMENTS AT THE ITS

3.1.11.1 Procedures

QC personnel established an Instrument Test Strip (ITS) adjacent to RG-01 for testing the Whites XLT® Spectrum metal detector. The Whites was used during analog clearance, intrusive investigations and for UXO avoidance when required. The ITS consisted of appropriate inert seed items or simulants for 40mm grenades and 81mm and 60mm mortars. All UXO technicians processed through the ITS daily to demonstrate their ability and the instruments' capability to detect seed items.

Any instrument that did not pass the ITS was evaluated for faults and then repaired, if possible. Five instruments were taken out of service and allowed to dry out for a few days, rechecked in the ITS and subsequently passed. Instruments that were non-repairable were taken out of service; five instruments also were returned to USAE for repair and replacement instruments requested.

The instruments' battery levels were monitored for voltage level throughout the day to ensure sufficient power (a minimum of eight volts) to properly operate the instruments. If batteries fell below eight volts, the instrument display would indicate "Low Battery," prompting the operator to replace the rechargeable battery with the back-up battery pack (the back-up battery pack incorporates eight AA batteries) when the voltage dropped below the minimum voltage required to properly operate the instrument.

No lines or grids were resurveyed because of the battery voltage since there were no documented instances of an instrument operated below the minimum voltage requirements for reliable detection. QC checks on all grids determined the effectiveness of the analog clearance efforts.

3.1.11.2 Documentation

Records documenting performance of the daily instrument checks conducted at the ITS are provided in Part II, Appendix B, Folder 07.

3.1.11.3 Quality Control

The QC staff verified that the ITS was installed in accordance with the WP, that each analog instrument performed as specified when checked at the ITS, and recorded the performance results of each instrument on the Operator/Instrument Performance Record prior to the use of each analog instrument.

3.1.12 GEOPHYSICAL DATA COLLECTION

3.1.12.1 Procedures

The DGM teams used the Geonics EM61-MK2, a high-resolution time domain electromagnetic (TDEM) induction sensor capable of detecting both ferrous and non-ferrous metallic objects, in conjunction with RTK-DGPS, to detect subsurface metallic objects. USAE surveyed the AOCs with sets of overlapping survey lines spaced every two and one half ft to completely cover the area within the site boundary. Surveys began along the site's longest boundary to minimize turnaround time. Areas of the site that remained inaccessible to the DGM team (e.g., obstacles, slopes greater than 30 degrees as measured with an inclinometer, obstacles such as large soil mounds, and pockets of standing water deeper than six inches) were documented in the positioned sensor data maps (see Part II, Appendix B, Folder 00, Inaccessible Areas). The DGM team avoided areas of standing water but attempted to extend portions of the sensor over these areas to provide coverage that was as complete as possible.

One member of the DGM team marked the lanes with plastic pin flags every 15 to 20 ft behind the survey crew to ensure adequate sensor overlap on returning lines. Speed was also maintained to meet the project's along-track sample density DQO of less than or equal to 0.6 ft per sample. This was equivalent to a survey speed of 4.1 mile per hour or less. DGM data was collected in accordance with SOP 2 of the WP.

3.1.12.2 Documentation

Those areas with slopes greater than 30 degrees were marked with plastic pin flags and then recorded with the RTK DGPS. A boundary file for each AOC was developed and delivered to the QA Contractor for review; each file was then provided to USAE's GIS Manager for incorporation into the project GIS database and inclusion on final maps (provided on CD in Parts II and III.

After returning from the field, the DGM TLs submitted the flash memory storage card from the Allegro field data logger with that day's raw geophysical and DGPS instrument test and survey data, copies of field log books, and the RTK DGPS data logger to the Site Geophysicist for data download, processing, and archiving (see Part II, Appendix J, Adak Data Tracking Form spreadsheet).

All USAE geophysical field crews performed daily instrument checks and completed checklists in accordance with SOP 2 of the WP. These daily instrument checks were used to document performance metrics. The metrics were recorded in either digital format or field log books. Digital data consisted of combined EM61-MK2 sensor data and RTK DGPS information recorded in *.R61 data files on an Allegro CE field data logger and RTK DGPS information recorded in the DGPS survey controller. Data recorded in field log books included date and location of work, personnel and/or team names, equipment serial numbers, site conditions, work stoppages, and other relevant events. All pages in the log books were sequentially numbered and entries were signed by the appropriate TL. The log books were filed in team-specific folders; copies of these files are included in Part II, Appendix G.

Data deliverables included raw (*.R61 and *.M61) and processed geophysical data (*.xyz), geophysical target maps (*.pdf) and target anomaly dig sheets (*.xls and *.csv). All geophysical data were logged by the Data Manager. The Data Manager kept an Excel spreadsheet of geophysical Data Tracking Forms, which logged when and where geophysical data were collected, when it was processed, naming conventions, quality control statistics, and location in the master database. A separate Data Transfer and Storage file recorded the date of electronic file submission to the QA Contractor. Both of these tracking documents can be found in Part II, Appendix J.

3.1.12.3 Quality Control

All daily geophysical QC and production data was made available to the QCM and uploaded to the QA Contractor's shared web site. All QC DGM documents can be found in Appendix J.

To ensure high-quality geophysical data, daily QC tests were carried out in accordance with the WP. These instrument checks were used to document performance metrics. Digital data consisted of combined EM61 sensor data and RTK DGPS information recorded in *.R61 data files on an Allegro CE field data logger and RTK DGPS information recorded in the DGPS survey controller. Prior to collecting data for any of the tests, the EM61 was warmed up for a minimum period of five minutes. Morning static QC tests logged background, spike (response to a known target), cable shake, and personnel checks. Afternoon static tests logged background, spike, and background checks. The statistics for each of these tests are included in Part II, Appendix J, Folder 02, Adak Static and Response Check Statistics spreadsheet. The DGM teams also collected a dynamic morning and afternoon latency or repeat test over a known target. The results of each of these tests are provided in Part II, Appendix J, Folder 02, Latency Tracking Form spreadsheet.

Prior to collecting DGM data in the AOC, the QC staff dispersed blind seed items (BSIs) in the AOCs, generally at a rate of one per surveyed grid (including the step-out grids). The GPS locations of the BSIs were captured with the RTK-DGPS and recorded to ensure all items could be accounted for during the intrusive investigations. Additionally and independently, the QA Contractor randomly seeded the AOCs with BSIs.

In summary, the QC staff verified the following tasks were accomplished for this DFW.

- Communications between the collections TL, the Site Geophysicist, and the Project Geophysicist were established and maintained.
- The daily equipment checks were performed in accordance with the WP.
- Pre-project tests were performed and digitally documented as defined in the GPO Certification Plan.
- Navigational consistency (line spacing and data coverage) was maintained around obstacles.
- Minimum separation distances (MSDs), per the GPO results, were maintained for the two-person carry.
- Field notes and logbook entries were clear, complete and consistent.

Data transfer protocols in the WP were followed.

3.1.13 GEOPHYSICAL DATA PROCESSING

3.1.13.1 Procedures

Daily, USAE's Site Geophysicist performed data processing, in accordance with WP procedures, resulting from the DGM surveys. The data processing was necessary to develop an initial listing of all metallic sources that produced a response equal to or greater than the GPO-established anomaly selection threshold (e.g., 40mm grenades at RG-01), which was provided to the UXO Quality Control Specialist (UXOQCS) and then to the QA Contractor for processing and concurrence.

All EM61 data processing was performed on-site by the USAE Site Geophysicist in accordance with the WP. The geophysical data was downloaded into a laptop computer for on-site review and editing. Proprietary software supplied by the instrument's manufacturer (DAT61) was used to convert the data files from binary *.R61 files to ASCII format as *.M61 files. All raw and processed data files (*.R61 and *.M61) were submitted daily via the QA Contractor's shared web site, upon completion of DGM activities.

3.1.13.2 Documentation

After data file conversion, the data was uploaded to Geosoft's Oasis Montaj v.7.0 software. The daily positioned geophysical data (*.M61 file) were imported to discrete individual databases in Oasis Montaj. These individual databases were part of a larger master database/project in Oasis Montaj. After import, a site-specific software script was utilized to transform the geographical coordinates (latitude, longitude) to the project coordinate system and units, rearrange headers to meet QA Contractor specifications, and level the data using a 100-point rolling median filter. Then all necessary corrections for positional latency were applied, based on results from the morning and/or afternoon QC latency test results. Data were then gridded using a minimum curvature gridding algorithm, contoured, and displayed on an Oasis map for target selection in the same manner as the GPO data were processed. Targets were selected from these maps initially by running the data through Geosoft's UX-Detect software module. All data was picked using the Blakely method and on leveled Time Gate 1 data. This method selects all anomaly peaks that exceed a user-defined threshold for three or more samples (does not select data spikes). The results are included in Part II, Appendix J, Folder 04.

3.1.13.3 Quality Control

DGM QC checks consisting of Initial, Preparatory, and Follow-ups (see Part II, Appendix B, Folder 14) were performed and all results were monitored by the USAE Site Geophysicist and USAE QCM. All daily performance checks and survey data DQOs were documented and made available to the QA Contractor for review. All DGM QC checks were inspected and approved by QA and documented (see Parts II and III, Appendix B, Folder 00, Final QA) that the equipment, operators, processing, and data management were in conformance with project requirements and were able to meet project objectives. The QC staff verified the following tasks were accomplished for this DFW.

- A digital data acquisition log was maintained.
- A digital processing/interpretation log was maintained.
- The file management system included the collection team's identification and the collection date.
- Data were stored by date and the raw data were never compromised (data was separated and backed-up).
- Files stored by date were merged as necessary into grids for ease of use by other project personnel.
- Processing and analysis efforts were documented in the appropriate digital files.
- Processing and analysis efforts were documented in the project coordinate system.
- Sample separation (down-track data density), across-track line spacing, and dynamic noise were meeting project DQOs.
- Instrument bias was removed, signal drift corrected (leveled), and minor instrument positioning (lag and/or latency) corrections were applied.
- Known control points, e.g., grid corners, were in the data at the correct coordinate location (within the margin of error).
- Geophysical personnel checked that the processing and interpretation scheme were consistent with meeting the project objectives as stated in the WP.
- RTK DGPS checks
- Static checks
- Dynamic latency repeat checks
- Data processing and analysis checks for sample separation and line spacing.

3.1.14 DATA INTERPRETATION

3.1.14.1 Procedures

In collaboration, USAE production, QC, and QA personnel developed target pick list thresholds based on the GPO certification. These lists were then provided to the reacquisition teams and the intrusive investigation teams. Data processing used the results of the GPO Certification to evaluate millivolt (mV) response thresholds of the EM61 for target selections for the items of interest (see Part II, Appendix J, for target listings and data processing checklists).

Each of the anomalies selected by Geosoft as a target was analyzed by the Site Geophysicist, and evaluated as to its validity and position. Targets found to be invalid or incorrectly located were removed or relocated (e.g., multiple picks on large anomalies were consolidated into single picks). Additionally, anomalies that were not automatically selected by UX-Detect, yet deemed to represent a potential UXO target, were manually selected.

3.1.14.2 Documentation

All of the originally selected anomalies were recorded in each delivered target database (Oasis *.xyz file). The Excel target data spreadsheets and Oasis target maps were then exported and given to the UXOQCS, who reviewed the DGM data and anomaly selections. Upon review and acceptance of the data and anomaly selections by the UXOQCS, all final processed data (Oasis *.xyz files), target maps (*.pdf files), and target dig lists (*.xls spreadsheets) were submitted to the QA Contractor's shared web site, with an informational email documenting what data was submitted for review and approval. All target maps are included in Parts II and III, Appendix A. The dig lists are provided in Parts II and III, Appendix J, Folder 04; intrusive results are included in Parts II and III, Appendix K. The DGM data are included in Parts II and III, Appendix J.

3.1.14.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Data interpretation parameters were defined at the GPO for the task prior to data acquisition.
- Specific interpretation criteria (contours, color scheme, track path plotting, etc.) and classification scheme were documented and followed by the interpreters.
- Dig sheets and target maps were generated that included target information tables and graphical representations of the test grid geophysical data.

3.1.15 DATA MANAGEMENT

3.1.15.1 Procedures

This DFW is specific to managing the geophysical data collected for the project. As discussed in Sections 3.1.13.1 and 3.1.13.2, after returning from the field, the DGM TLs submitted the flash memory storage card from the Allegro field data logger with that day's raw geophysical and DGPS instrument test and survey data, copies of field log books, and the RTK DGPS data logger to the Site Geophysicist for data download, processing, and archiving. All geophysical data were archived daily on a portable hard drive by the Data Manager and stored in a fireproof safe.

3.1.15.2 Documentation

Documentation for Parts II and III can be found on the CD in the respective folders, as appropriate, in the following:

- Appendix A - Target Maps
- Appendix D - Daily GPO Checks

- Appendix J, DGM Checklists
- Appendix J, Dig Lists
- Appendix K - Intrusive Results.

3.1.15.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Project data were managed in a spreadsheet.
- Daily transfer of data to the Site Geophysicist for processing was conducted (done by hard copy).
- Consistency between interpreted data and results of anomaly excavations was checked.
- All data was backed up on a daily basis (on an external hard drive).
- Dig results were compared with geophysical target anomaly dig sheets and maps to ensure dig results were representative of the geophysical anomaly characteristics (data verification check).
- Interpreted anomalies were intrusively investigated as required and documented (data verification check).

3.1.16 ANOMALY REACQUISITION

3.1.16.1 Procedures

A target list (identified during DGM surveying and associated data processing/analysis, as discussed above) with the DGPS coordinates was provided to the reacquisition TL at the beginning of each work day. The teams deployed the EM61 in the wheeled mode during anomaly reacquisition.

The reacquisition teams were responsible for the procedures detailed in the following subsections.

System Setup and Equipment Checks

The daily setup of the RTK DGPS system and EM61 TDEM induction sensor were per the WP. Equipment checks included:

- RTK DGPS Reoccupation checks (rover reports known location within 0.25 ft)
- EM61 sensor warm up of at least five minutes each time the sensor is turned on
- EM61 nulling and real time spike test (±20% from previous checks).

Navigation/Occupation

The navigation to the desired coordinates (anomaly relocation) is performed by:

- Using instrument data and visual aids to interactively navigate to coordinates of the target
- Precise marking of the target coordinates to ensure interpreted location was reacquired as accurately as possible (tolerance ±0.25 ft)
- Marking the interpreted location using a plastic pin flag with a unique target anomaly ID.

Anomaly Refinement

The target was refined from the interpreted location with the EM61 sensor. The reacquisition teams would maneuver the EM61 coil over the flagged location in several directions, up to a 2.5-ft radius from the initial anomaly target location while monitoring the Allegro display to find the peak mV response on Time Gate 1. The location and amplitude of the peak mV response was recorded with the RTK DGPS and the anomaly identifier (plastic pin flag) was relocated to this refined location. These refined target locations were compared to the picked target locations for any discrepancies (see Figure 3-4).

If no anomaly response was found at the flagged position, the team searched the location to a 2.5-ft radius. If no anomaly was located within the search radius, it was recorded as a 0 mV response on the

PDA and a no find. No finds triggered a root cause analysis (RCA) in accordance with the WP. The pin flag was left at its original location for intrusive investigation to verify the instrument response. The Site Geophysicist checked and analyzed the no finds and compared data from the PDAs for correct data entries. For any anomalies that may have had a high probability of being an artifact of the data acquisition and/or data processing sequence, he would enter a comment in the interpretation file [(e.g., noise due to coil bump) (see Part II, Appendix J, Folder 04)].

3.1.16.2 Documentation

Reacquisition peak responses and any location offsets were recorded on the PDA (see Parts II and III, Appendix J, Reacquisition Comparison spreadsheet). Refined target locations and anomaly amplitudes were compared to the picked target locations and original millivolt readings for any discrepancies. Target reacquire comparisons are provided in Parts II and III, Appendix J, Folder 04.

FIGURE 3-4: ANOMALY REACQUISITION

3.1.16.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Data were loaded onto the positioning system in the correct format and the filename was consistent with the dig sheet nomenclature.
- At least one point was reacquired prior to reacquiring any anomalies (a grid corner, geodetic control point, etc.) and checked if the offset from the known point was within the tolerance (0.25 ft).
- Targets were located and flagged in the field with the correct ID from the dig sheet.
- The reacquired location was digitally recorded by the positioning system with the same target ID that was present on the dig sheet.
- 10% of the reacquired versus interpreted coordinates were checked to ensure they were within the clearance specified in the QAPP (2.5 ft).
- The reacquisition team marked the flags and placed them in the ground far enough to prevent them from being dislodged.
- There was effective communication between the reacquisition team, the Site Geophysicist, and the data processing center.

3.1.17 INTRUSIVE INVESTIGATION

3.1.17.1 Procedures

Prior to the clearance, the Exclusion Zone (EZ) was established in accordance with the approved ESS and WP. The Emergency Medical Technician (EMT) was stationed at the main road gate access to RG-01 in order to provide coverage for concurrent operations at RG-01 and LJ-01. The EMT monitored access at the gate to ensure that only essential personnel entered the area. Non-essential personnel and visitors were stopped at the gate and the UXO Safety Officer (UXOSO) was notified. The UXOSO provided UXO escort for all visitors (see Part II, Appendix D, for the Visitor Log and Part II, Appendix G, for the UXOSO Log) with the exception of QA personnel and the Navy Technical Representative (NTR).

QA personnel were designated essential personnel and provided their own UXO escort. The QA personnel provided UXO escort for the NTR.

Intrusive teams consisted of a TL and two to six UXO Technicians, depending on availability of the shared resources between the two USAE concurrent projects. All intrusive investigations were hand dug and anomalies were investigated to 2 ft below the mineral soil surface at RG-01 and 4 ft at LJ-01. The specific intrusive investigation procedures are outlined below.

- The intrusive team used the PDAs and pin flags left by the reacquisition team to locate numbered target anomalies. The Whites metal locator was then used to determine the boundaries of the anomaly prior to excavation.
- Each anomaly was investigated in accordance with SOP 5 of the WP by locating the boundaries and excavating gently to one side of the target. A shovel was used to excavate to within 12 inches of the anomaly. The final 12 inches of cover were removed using a small trowel or gloved hand.
- Munitions debris was collected at designated locations within the work area for transport to the storage area and flashing, pending shipment off-island for demilitarization.
- If the anomaly was determined to be MEC, the item was recorded and marked, and the SUXOS was notified.

Once the anomaly was removed, the TL inspected the excavation both visually and with the Whites to ensure that all anomalies present within the required dig depth had been removed. If an anomaly remained when reaching the clearance depth, the location was annotated on the intrusive log as dig abandoned, checked by QC, and verified by QA (see Parts II and III, Appendix B, QC Submittals and Final QA acceptance). Upon completion of the excavations and the required QC checks, the hole was marked and left open for QA checks. Once QA completed a grid, the holes were backfilled.

3.1.17.2 Documentation

Team Leaders used checklists daily to ensure all procedures and safety measures were reviewed and that necessary equipment was on hand to perform operations safely and effectively. These checklists included:

- A daily team vehicle maintenance inspection to ensure the vehicle met all safety and operating requirements (Part II, Appendix I)
- A MEC equipment checklist to ensure the team had the required and usable tools and equipment to perform operations (Part II, Appendix I)
- A tailgate safety briefing at the work site to detail safety and site-specific procedures (Part II, Appendix D).

The checklists were completed by team per day, whether that team worked in one AOC or several during that period.

The intrusive teams were provided with Trimble GeoXH PDAs running ESRI ArcPad version 7.1. Upon QA approval of target dig lists, the USAE GIS Manager would import the target dig lists into ESRI ArcPad *.axf files that were sent via File Transfer Protocol (FTP) to the on-site Data Manager and uploaded to the PDA.

The TL recorded recovered anomaly data on a PDA, using pull-down menus or manually entered on data collection dig sheets. The PDA menus were developed and customized to ensure that data recorded was consistent with the requirements of the NEDDS for inclusion in the Adak database. The TL completed all fields in accordance with the pull-down menu instructions. At the end of the day, the TL turned over the PDA to the Data Manager. The Data Manager reviewed the intrusive results with each intrusive TL, checked the data for completeness and accuracy (see Parts II and III, Appendix J), downloaded the data to the project database, and transferred the reviewed intrusive results to the USAE FTP site.

Throughout operations, USAE maintained a Grid Data Tracking Log (see Parts II and III, Appendix K) showing anomalies and DGM targets investigated and a MEC Log (see Parts II and III, Appendix H) of all UXO, MPPEH, and DMM encountered. These logs were updated from UXO team documentation and from intrusive data recorded on PDAs. The data reported included target numbers (when applicable for DGM clearance), location, depth, orientation, and the item's nomenclature.

3.1.17.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- The intrusive teams investigated all targets on the provided dig lists.
- Anomaly reporting was done using the PDA or accountability log.
- A photograph was taken of recovered MEC items.
- The QC staff checked 10% of the excavated holes to ensure they were cleared of MEC/MPPEH.
- Description of an anomaly as "left in place" was correct.

Excavated target holes were backfilled once the QA process was completed.

3.1.18 POST-INTRUSIVE TARGET VALIDATION

3.1.18.1 Procedures

USAE's Site Geophysicist reviewed 100% of the intrusive results, including all "no-finds." If the intrusive results met the DGM data expectations, then the Intrusive Results Review Form was issued with a statement that the Site Geophysicist concurred with all intrusive results for that grid. If in his estimation the intrusive results did not meet the DGM data expectations, an RCA was triggered, the suspect target was identified on the Intrusive Results Review Form, and the anomaly was rechecked. The Intrusive Results Review Forms for each grid are included in Parts II and III, Appendix J, Folder 04.

If no discrepancies existed or after all anomaly results were deemed complete and satisfactory, the data were submitted to the QCM for final review. The QCM generated a QC report for each completed grid and delivered the QC report, the final target map, and final dig list to the QA Contractor. The QA Contractor's personnel performed their oversight activities and documented their findings in a QA Certification report.

Step Outs: The WP required a safety buffer between MEC encountered and the RG-01 and LJ-01 boundaries of 15 m, at a minimum; if not, it was required to step-out the boundary and conduct clearance until the area was cleared to the safety buffer distance.

Failure Criteria: Failure criteria for RG-01 and LJ-01 were based on the MEC QAPPs and the Action Memorandum for the NTCRA for RG-01 and the Remedial Action proscribed by the OUB-1 ROD for LJ-01. The failure criteria for RG-01 were locating, during QC or QA, a piece of metal equivalent in size to a 40mm grenade or larger, or failure to detect and recover a BSI during DGM surveys. The failure criterion for LJ-01 was failing to detect and recover a BSI emplaced by QC and/or QA.

3.1.18.2 Documentation

The QC report accepting grids as complete, prepared by the QCM and approved by the QA Contractor, provided the results from the QC checks. The reports, prepared by grid, list the following information:

- The number of targets investigated by the MEC team
- The quantity of targets, by target number, the QC staff inspected
- The number of "no finds" or false positives, if any, encountered
- The targets, by number and millivolt reading, inspected because the anomaly type (items recovered) did not match what would have been expected because of the millivolt reading

- The number of recovered anomalies, if any, that required disposal
- Any inaccessible areas encountered in the grid
- A verification of sloped areas initially labeled to be 30 degrees or more, were correctly identified.

The QC and QA reports are included in Parts II and III, Appendix B, AOC Certification, Folder 00.

3.1.18.3 Quality Control

The QC staff verified this DFW was accomplished by:

- Working with the Site Geophysicist to verify that the excavation results validated the data interpretation and anomaly selection, to include the BSI.
- Rechecking targets where the data interpretation and the excavation results were not conclusive, prior to submitting the grid to the QA Contractor.

3.1.19 EXPLOSIVE DISPOSAL OF MEC\MPPEH

3.1.19.1 Procedures

All MEC and MPPEH that contained explosives components or that could not positively be determined not to contain explosives were disposed of using an explosive donor charge. MEC was either blown-in-place (BIP) if determined to be unacceptable to move, or detonated along with additional MEC in consolidated detonations if the MEC was acceptable to move. MEC unacceptable to move was BIP daily. MPPEH was stored in the on-site MPPEH magazine and demolition was performed either weekly or in conjunction with a day's scheduled BIP (see Parts II and III, Appendix H for the MEC Log and photographs of the items). UXO personnel detonated MEC/MPPEH and other munitions items using jet perforators (shape charge) to ensure no explosives or reactive material remained, prior to flashing and final disposal off site. All demolition took place at the RG-01 site, as required, and consolidated shots of items in the MPPEH magazine were performed in the former Open Burn/Open Detonation (OB/OD) area adjacent to the RG-01 site. During site setup and training, a notice was placed on the Adak High School OE Awareness bulletin board outlining areas for MEC operations and stating that demolition operations may be ongoing daily at the AOC. Prior to disposal operations, all technicians assigned to or working with disposal teams attended a site-specific orientation. The purpose of the orientation was to review MEC disposal and emergency response procedures (see Part II, Appendix I, for the demolition operations checklists).

The demolition team conducted checks of the demolition equipment and the vehicle used for transporting the donor explosives. Explosives for operations consisted of jet perforators, detonating cord, and electric blasting caps.

The explosives were shipped via barge from Anchorage and stored in the explosives magazine adjacent to RG-01 [see Part II, Appendix A, Figure A-03, for the RG-01 Quantity Distance (QD) Map]. When USAE personnel arrived on Adak, they inventoried the explosives shipped on the barge, created magazine data cards, and secured the explosives in the magazine.

3.1.19.2 Documentation

The demolition TL recorded all items scheduled for disposal in his logbook and provided them to the SUXOS for inclusion in the Daily Production and QC Reports. The disposal-related checklists are located in Part II, Appendix I; the Daily Production and QC Reports are located in Part II, Appendix D.

All explosive receipts, issues, accountability records, and magazine inspections were completed and maintained in accordance with the WP and as documented in Part II, Appendix I.

3.1.19.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Explosives were properly receipted and turned in if not totally consumed.
- The required notifications were made prior to commencing demolition operations.
- Vehicles were properly placarded and chocked when parked; also, a First Aid kit and two 10-lb fire extinguishers were available on the disposal site.
- All personnel were accounted for prior to commencing demolition operations.
- The demolition, MEC disposal, and emergency response procedures were reviewed prior to commencing demolition operations.
- The vehicle designated for explosive transportation met Department of Transportation (DOT) requirements.
- Misfire procedures were utilized, if necessary, and proper wait times were observed.

3.1.20 MPPEH INSPECTION

3.1.20.1 Procedures

Those MPPEH items that could be certified/verified as 5X Safe in accordance with NAVSEA OP 5 (Navy 2007) by USAE and the QA Contractor were inspected and certified/verified as free from explosives (Category 5X Safe); they were then stored and secured in a locally leased building in the Modified Advanced Underwater Weapons (MAUW) compound for further treatment in the TFU. Items that could not be certified as 5X were stored in the sited MPPEH magazine. In the event that the item was determined to be MEC (explosives remaining in the item), the item was rejected and returned for destruction through explosive detonation.

In accordance with the NAVSEA OP5 requirement, USAE requested authorization and received approval from the NAVFAC NW Commander for the SUXOS to certify the MPPEH. This 5X certification took place prior to final processing in the TFU as the TFU was not rated to process Hazard Class/Division 1.1 explosives.

3.1.20.2 Documentation

The results of the MPPEH Inspections were recorded in the TL logbooks and summarized on the Daily Production Reports (see Part II, Appendix D).

The authorizations for USAE and QA inspection, and the inspection/verification forms, are located in Part II, Appendix I.

3.1.20.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- Two 100% independent inspections of all recovered MPPEH were performed before consolidating with previously collected MPPEH.
- The QC staff conducted a random inspection of 10% of all recovered MPPEH.

3.1.21 THERMAL FLASHING

3.1.21.1 Procedures

The 5X Safe MPPEH was treated using a TFU, shown in Figure 3-5, to provide additional assurances that no residual energetic materials were present. No recovered items with energetic material other than small arms were flashed. TFU operational procedures are included in WP SOP 6.

FIGURE 3-5: THERMAL FLASHING UNIT (TFU)

3.1.21.2 Documentation

The TL conducted pre-operational checks of the TFU, PPE and safety equipment in accordance with the WP, and documented the results of the checks on the Thermal Flashing Equipment Checklist (see Part II, Appendix I).

3.1.21.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- The pre-flashing, flashing, and post-flashing procedures were performed in accordance with the WP.
- All flashing equipment and PPE were on hand and in operational condition.
- The operational temperatures were maintained and the burn and wait times were observed.

As a final step, the EXPRAY Kit was used on flashed material to determine the presence or absence of explosive residue as outlined in the WP.

3.1.22 CONTAINERIZING AND DOCUMENTING MPPEH FOR SHIPMENT

3.1.22.1 Procedures

Munitions debris was placed in 55-gallon, open-top, DOT-approved drums with locking lids.

The material was shipped under chain of custody control, first by barge and then by common carrier, to a scrap recycler/ processor at the end of the project (see Part II, Appendix I).

The scrap recycler/processor demilitarized the debris in accordance with DoD 4160.21-M-1 and provided documentation that the material was crushed, shredded, and/or smelted prior to release for resale.

USAE tracked the materials from generation on island through final destruction.

3.1.22.2 Documentation

Chain of custody tracking documentation and destruction documentation is included in Part II, Appendix I.

3.1.22.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- All MPPEH was stored, containerized, and sealed to prevent any inadvertent mixing of flashed material with unprocessed MPPEH.
- The chain of custody documentation was filled out properly.

3.1.23 FIELD DATA ENTRY AND LOG BOOK ENTRIES

3.1.23.1 Procedures

USAE teams and UXO management personnel maintained individual log books in addition to other required documentation. The UXO teams, which included DGM, reacquisition, intrusive, etc., were all UXO-qualified personnel and each individual TL maintained a logbook. However, as a team engaged in various operations, its primary function changed to carry out the required tasks at hand; thus, a "DGM team" in the morning may have transformed to an "intrusive team" or a "reacquisition team" later that same day. Furthermore, on any given day, a team may have worked in multiple AOCs or transitioned to the other USAE project at OUB-1. In addition, the field management, consisting of the SUXOS, UXOSO, UXOQCS, and QCM, also maintained their daily logs.

The SUXOS reviewed logbooks on a weekly basis and at the end of the project.

3.1.23.2 Documentation

Logbooks were scanned into the project data files and are included in Part II, Appendix G.

3.1.23.3 Quality Control

The QC staff observed that data entries were being recorded in real time, not after the fact, and entries were complete, accurate, and met the project quality objectives (PQOs).

3.1.24 SAFETY MEETINGS

3.1.24.1 Procedures

General Safety Briefings were conducted daily by the SUXOS and UXOSO covering safety topics applicable to the entire site. Generally and depending on planned activities, the following topics were discussed:

- Work assignments
- Site Specific Explosives Safety Quantity-Distance (ESQD)
- Team separation distances (TSDs)
- Entry and control points
- Review of emergency procedures
- Review of ordnance safety
- Review of communications procedures and equipment
- Review of any site-specific hazards and the measures that will be used to mitigate those hazards
- Review of environmental concerns
- Procedures for coordination of intrusive investigation work with personnel performing non-MEC activities
- Weather conditions for the day
- Physical and biological hazards
- Safe work practices.

Each TL also conducted a daily Tailgate Safety Briefing to their team prior to commencing the day's tasks. The Tailgate Safety Briefing covered topics such as the specific hazards associated with traversing the grids, carrying the EM61, MEC, explosive disposal procedures, thermal flashing operation, etc.

3.1.24.2 Documentation

The SUXOS documented the daily briefing in his logbook and obtained the signatures of attendees using a form designed for this purpose. The General Safety Briefings are included in Part II, Appendix D, 02-Daily Operations and the Tailgate Safety Briefings are included in Part II, Appendix D.

3.1.24.3 Quality Control

The QC staff observed the general daily safety briefings and the tailgate safety briefings conducted by the team leaders.

3.1.25 EQUIPMENT MANAGEMENT

3.1.25.1 Procedures

The UXOQCS managed the project equipment readiness by checking the teams as they performed pre-operational checks and auditing the equipment checklists completed by the equipment operators (Instrument Test Forms, Vehicle Checklists, DGM Equipment Checklist, etc.). Equipment found inoperable was taken out of service for repair or replacement.

3.1.25.2 Documentation

The UXOQCS recorded the audit results on the Daily QC Reports, which were then summarized on the Weekly QC Report, Part II, Appendix E.

3.1.25.3 Quality Control

The QC staff verified the following tasks were accomplished for this DFW.

- An inventory of all equipment, by serial number where applicable, was completed.
- Equipment components were marked with unique identifiers, such as color-coded tape, for each acquisition team.
- Equipment damaged during the project was reported on an incident report.
- A safe and effective power charging station was set up and maintained by a team member.
- Equipment was properly secured while in transit and in storage.

Damaged or non-functioning equipment was documented by serial number.

3.1.26 EQUIPMENT CHECKS

3.1.26.1 Procedures

Each team conducted checks on all equipment prior to placing it in use on the project.

3.1.26.2 Documentation

Checklists were used to record the results of the pre-operational checks and submitted to the UXOQCS or SUXOS for review and inclusion into the project data file (see Table 4-1 for the location within the appendices of the various equipment checklists and forms).

3.1.26.3 Quality Control

The QC staff observed that all required equipment checks were completed daily and that the checks were documented by the teams.

3.2 PROCEDURES FOR MUNITIONS CONSTITUENTS

Sampling locations for soil were chosen based on the presence of breached munitions and/or visually stained soil in the vicinity of breached munitions.

Breached munitions were found at two locations in RG-01 during UXO clearance activities. No breached munitions were found at LJ-01. MC sampling at RG-01 was performed in accordance with the MC QAPP (see Figure 3-6).

FIGURE 3-6: MC SAMPLING

Breached munitions were found at two partial 40mm breached munitions, target #CS41-146 and target #CU41-313, in RG-01 during UXO clearance activities. MC sampling at the two locations was performed in accordance with the MC QAPP, which specified collection of multi-incremental samples (MIS) from 10-ft by 10-ft grids centered on the former locations of the breached munitions. The samples were collected, packaged, and sent to Agriculture and Priority Pollutants Laboratories, Inc. (APPL) for analysis using the procedures specified in the MC QAPP. The chain of custody, analytical results, and field engineer's notes for the MC samples are provided in Part II, Appendix N, Munitions Constituents Sampling Lab Results.

The concentration of RDX in one multi-incremental sample (MIS) soil sample exceeded the screening level established in the MC QAPP. However, the MC QAPP did not specify procedures for collection of follow-up samples or further evaluation at locations where MIS results exceed screening levels. Additional discrete sampling was performed because the MIS sampling results exceeded the screening level. Due to time constraints, this was not a project team decision as per the plans. An FCR (FCR-12) that detailed the design and sampling procedures was developed, sampling personnel were re-mobilized, and the additional sampling was performed during the week of October 6 -12, 2008.

Based on knowledge of ADEC risk assessment guidelines, the sampling design consisted of 10 (i.e., 9 normal and 1 field duplicate) discrete soil samples obtained from the 10-ft by 10-ft MIS sample grid for RG-01-SL-01. The follow-up samples were analyzed for RDX using EPA Method 8330. The follow-up samples were collected, packaged, and sent to APPL laboratories for analysis. The chain of custody documentation, analytical results, and field engineer's notes for the follow-up samples are provided in Part II, Appendix N, Munitions Constituent Sampling Lab Results.

Note: The analytical results for the MIS and follow-up samples collected at RG-01 will be included in the MC risk screening evaluation being conducted as part of the remedial investigation (RI) for OUB-2 because RG-01 is included in OUB-2. The risk screening evaluation in the OUB-2 RI report will determine if the presence of MC in soil at RG-01 requires additional remedial action, or if MC at RG-01 can be assigned NOFA status.

3.2.1 SAMPLING

Although the sample areas were cleared of MEC before soil samples were taken, a UXO technician escorted the samplers for safety reasons. The UXO technician used a handheld magnetometer to scan the sample area to ensure that buried MEC (or any anomalies) were not encountered.

It was important to remove any munitions and explosives of concern before sampling so that potentially explosive soils were not shipped to the laboratory for analysis. To that end, the following procedure was employed:

- The breached munition and associated explosive materials, including visible chunks and pieces of explosives, were removed by the UXO technician. The munition and removed MEC were handled, secured, and staged for disposition.
- Remaining soil in the immediate vicinity of the former breached munition and explosive materials was field screened with EXPRAY to determine qualitatively whether explosives were present or absent in the soil to be sampled (see Figure 3-7). Any removed soil would have been packaged, secured, and staged for disposition.

FIGURE 3-7: POSITIVE EXPRAY TEST OF CU41-313

When the sample location was deemed safe, MIS and follow-up soil samples were collected from 0 to 3 inches below the surface of the mineral soil layer.

3.2.2 DOCUMENTATION

A DGPS was used to document the coordinates of each sample location. Each sample had a unique identification and photographs were taken of each sample location. The Project Chemist completed the packaging and chain of custody documentation for the collected MC samples. The samples were then labeled and packaged for shipment off-island. Chain of custody forms, sample labels, field forms, and field logbook entries were completed during the field event.

3.2.3 ANALYSIS

Once off-island, the samples were analyzed by the laboratory (APPL) to determine if Chemicals of Potential Concern (COPCs) were present at levels exceeding action levels. All soil samples were analyzed for explosives by EPA Test Method 8330B at the laboratory (APPL) and perchlorate by EPA Test Method 6850. Once the samples were analyzed, they were properly disposed by the laboratory.

3.2.4 QUALITY CONTROL

In accordance with the MC QAPP and FCR-12, quality control samples for MC sampling included collection and analysis of triplicate MIS samples during MIS sampling, collection and analysis of field duplicate samples during follow-up sampling, and analysis of matrix spike/matrix spike duplicate (MS/MSD) samples, as described below.

- **Triplicate Samples -** The purpose of MIS triplicate samples is to gauge the representativeness of the results for MIS samples collected in a decision area (e.g., 10-ft by 10-ft area around breached munitions). One set of triplicate samples was collected at the breached munitions locations in

RG-01. The triplicate soil samples were collected using identical sample methods within the same 10-ft by 10-ft sample grid as the parent MIS soil sample (in this case RG-01-SL-02). The exception was that each MIS triplicate soil sample was collected from two alternate quadrants within each subsample grid. As a result, at the designated triplicate sampling location, MIS samples were collected from three of the four quadrants within each grid cell: one as the MIS parent, one as the MIS duplicate, and one as the MIS triplicate. The parent, duplicate, and triplicate MIS soil samples were given separate sample identification numbers (parent RG-01-SL-02; duplicate RG-01-SL-102; triplicate RG-01-SL-202).

- **Field Duplicate Samples -** The purpose of field duplicates is to gauge the variability in laboratory-reported sample results from a single sample location and interval. Field duplicates were collected at a frequency of 1 set per 10 follow-up samples. Extra sample volume was collected at the designated field duplicate location. The volume was then divided equally between sample containers, with one set of containers marked with the actual sample identification number and the second, field duplicate sample set marked with a different sample identification number (parent RG-01-SL-01A; field duplicate RG-01-SL-01J).
- **MS/MSD Samples -** The purpose of MS/MSD samples is to evaluate the quality of laboratory analytical methods. Extra volumes of sample are typically required for MS/MSD protocols. However, because of the volumes of soil that were required for the Method 8830B and Method 8830 analyses, no extra volume was required to make up the MS/MSD samples for soil. MS/MSDs were evaluated by the laboratory at a rate of 1 set per 20 samples.

Dedicated and disposable sampling equipment was used to collect the MIS and follow-up samples. Therefore, no source or equipment blanks were collected.

Each sample was individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information was recorded on chain-of-custody forms, and the samples were shipped / couriered to the laboratory (APPL, Inc.) via express delivery service.

The field engineer completed the packaging and chain of custody documentation for the collected MC samples. See Part II, Appendix N, Munitions Constituent Sampling Lab Results, for the sample results and the engineer's field notes.

3.2.5 ASSESSMENT\AUDIT

The following audit procedures were followed for MC sampling:

- Ensured that the sampling methods/procedures outlined in the MC QAPP were followed, and that any deviations were noted/approved.
- Determined potential impacts from noted/approved deviations, in regard to project requirements.
- Examined chain-of-custody forms against project requirements (analytical methods, sample identification, etc.).
- Examined packages against project requirements and chain-of-custody forms (holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).
- Determined potential impacts from noted/approved deviations, in regard to project requirements (e.g., precision/accuracy).
- Compared results of field duplicate sample analyses with RPD criteria.
- Field notes were reviewed periodically to determine completeness, appropriateness, ease of understanding, etc., of information recorded. Upon completion of field work, logbooks were placed in the project files.
- Chain-of-custody forms were reviewed against the samples packed in the specific cooler prior to shipment. Original chain-of-custody forms were sent with the samples to the laboratory, while a copy was retained for the project files.
- Sample receipt and log-in summaries were reviewed to determine potential receipt issues that may impact data quality and for consistency with the chain-of-custody forms.

- Data packages were reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.
- Data packages were reviewed by the validation firm.
- Data validation reports were reviewed by the Project Chemist.
- Electronic laboratory data and field data were reviewed for consistency with the hardcopy information.
- The validated analytical results were compiled in a tabulated summary. Entries were reviewed/verified against hardcopy information.

3.2.6 DATA REVIEW

The analytical data was reviewed by the laboratory prior to release to the selected contractor. Third-party Level IV data validation was performed by an independent data validation firm using data validation procedures and guidance specified in NAVFAC NW's *Standard Operating Procedure (SOP) for Navy Environmental Information Transfer, Version 4.0* (per Data Validation Procedures in the Field Standard Operating Procedures section), *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1999), and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 2004).

The purpose of the validation was not to specifically address ordnance or perchlorate analysis and are more pertinent to analyses performed using CLP analytical methodology; however, they were used as guidance for the validation process. The validation evaluated sample receipt conditions, holding times, calibrations, method blanks, surrogate recovery (explosives only), laboratory control samples, MS/MSD, analyte identification, and calculation verification. The validation was performed using project specific criteria, as well as criteria required in the DoD QSM, the DoD Perchlorate Handbook, and analytical methods. Since third-party data validation is a more stringent data review than filling in ADEC-required checklists, the validation reports will be provided in place of the ADEC checklists.

3.2.7 DATA MANAGEMENT

Data management included maintaining field logbooks, Chain-of-custody forms, Sample labels, Shipping records, and FCRs.

Field and analytical data will be submitted electronically by the contractor to URS, Inc., who will archive electronic data to the Navy's database, the Navy Installation Restoration Information Solution. To facilitate this process, the laboratory will provide analytical results electronically in the Naval Electronic Data Deliverable (NEDD) format. Hardcopy analytical data will be submitted to NAVFAC NW's designee (currently TetraTech EC, Inc.) for temporary storage and processing. The hardcopy data will then be submitted to the National Archive and Records Administration for 50-year storage.

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4.0 OVERARCHING PROJECT QUALITY CONTROL/QUALITY ASSURANCE

This section provides a detailed presentation of procedures associated with five distinct quality control / quality assurance components of the RG-01 and LJ-01 munitions clearances. The five components include:

- Project QC Procedures and Documentation
- DFW Documentation and QC Cross Walk
- QA Evaluation and Certification
- Regulatory and NOSSA Audits
- AOC Certification Process

4.1 PROJECT QC PROCEDURES AND DOCUMENTATION

4.1.1 THREE PHASES OF CONTROL

A Three-Phase Inspection Checklist was developed for each DFW. Appropriate DFW checklists were completed on each project field team prior to the actual performance of the MEC clearance. The Three-Phase QC Checklist incorporated the Preparatory, Initial, and Follow-Up QC inspection phases into one combined checklist. This QC checklist documented that all the pre-operational actions delineated on WS #34 and WS #35 had been met and that each field team was prepared to conduct field MEC clearance operations. A punch list of individual team deficiencies discovered during the Preparatory Phase was provided to the SM, UXOQCS, the Site Geophysicist, and the SUXOS for corrective action. A record of the completed checklists was maintained in the AOC QC file, the site QC file, reported in the Daily QC Report, and discussed in the Weekly QC Meeting.

4.1.2 DAILY PRODUCTION AND QUALITY CONTROL REPORTS

The Site Manager (SM) generated a daily report (see Appendix D) of site activities that included data provided by UXO teams, the Project Geophysicist, the UXOQCS, the QCM, the SUXOS, and the UXOSO. These reports, which provided real-time updates of project status, consisted of the following information:

- A Contractor Production Report that included details on weather, man-hours, production activities, MEC encountered, etc.
- A QC report detailing QC activities for the day
- A safety Meeting/Training Record.

The reports were provided daily to the NTR and posted to the Navy QA Contractor's shared web site for review and information. As both AOCs of RG-01 and LJ-01 were concurrent operations, the daily reports included activities at both.

This report summarized the daily production activities and the QC activities conducted, any test performed, materials or equipment that received required inspection, and any deficiencies noted with proposed or implemented corrective actions. These reports are located in Part II, Appendix D.

4.1.3 WEEKLY SUMMARIES AND QC MEETINGS

Throughout the field effort, USAE hosted a weekly QC and status teleconference to discuss current operations, issues, and other general information. The teleconferences were attended by various Navy, USAE, QA Contractor, and other stakeholders (see Part II, Appendix E, for copies of the Minutes of these teleconferences, including a list of attendees). Each week prior to the teleconference, an agenda and read-ahead documents were provided to all stakeholders; this documentation included pertinent

information to update all participants on the current status of field operations and possible issues that might have required stakeholder input and/or approvals. As a result of these teleconferences, issues were addressed in real time and any changes required were agreed to and implemented so as to complete all operations during the field season. As with the daily production reports, both AOCs of RG-01 and LJ-01 were included in the summaries.

The Weekly QC Status Reports, prepared by the QC Manager, provided a summary of the week's QC activities, including:

- The number of grids QC surveyed and the results of the surveys
- The number of instruments inspected, by serial number where appropriate, and the results of the inspections
- The daily validation of the GPS instruments functioning
- The number of three-phase QC checks conducted
- Comments concerning work in progress, lessons learned, and any areas of concern.

The Weekly QC Status Reports are located in Part II, Appendix E.

4.1.4 DEFICIENCY NOTICES AND LOG

Deficiency Notices (DNs) prepared during the project had a causal analysis conducted of the deficiency. The DN and causal analysis were provided to the SM and SUXOS for corrective actions by the production team. The Project QCM tracked the DNs through the completion of the corrective actions.

All deficiencies were documented on the Deficiency Log maintained by the Project QCM. The DNs, Deficiency Log, and causal analyses are located in Part II, Appendix L.

4.1.5 FCRS AND LOG

USAE used an FCR Form to request and document changes identified as a result of unanticipated field conditions or errors in the WP documents. Field personnel (to include site supervisors) were responsible for forwarding any request for change/revision to an existing document. Under no circumstance (with the sole exception of immediate safety concerns) were changes/revisions incorporated until they had been reviewed and approved by authorized contractor personnel and the appropriate Contracting Officer or his/her representative, as needed. Personnel who identified a need for change or revision to an existing document completed an FCR Form and submitted it to the management chain for processing.

The Project QCM determined the validity of the change/revision recommendation and, if deemed valid, forwarded the recommendation expeditiously to the SUXOS and SM, who in turn forwarded the request through the Corporate Quality staff, and the Program Manager (PM) for review and approval. A request for a change or revisions to an existing document followed a review and approval process that incorporated the various sections or departments, as needed, to determine the validity of the request and ensure that authorized, appropriate personnel agreed to and signed the approval form for a change or revision to be completed.

The PM was the final arbiter of the validity for the recommendation within the contractor organizational chain. If deemed valid, the PM contacted the Contracting Officer or his/her representative and requested that the change be incorporated into field procedures. Documents generated by the contractor were drafted, reviewed, finalized, and approved for use by the appropriate sections, to include Safety, QC, and Operations.

Once a change or revision was accepted and implemented, outdated or obsolete documents were removed from use and the change or revision disseminated and briefed to affected personnel, sections, or departments. Changes or revisions that affect other documents were briefed as well ensuring continuity between the various documents. If training was required by a change or revision, site management addressed the requirement and scheduled the necessary training, as appropriate.

Specific FCRs are discussed in Parts II and III, Section 4.3; all FCRs generated during the field effort are located in Part II, Appendix L.

An FCR Log was prepared and maintained by the SM during the field effort. All FCRs were entered on the FCR Log when submitted into the approval process. The FCR Log was updated to track the approval process and to annotate the date the NTR or RPM gave final approval of the request.

4.1.6 BLIND SEEDS

Prior to collecting DGM data in the AOCs, the QC staff dispersed Blind Seed Items (BSIs, inert munitions or simulants) at a minimum of rate of one per surveyed 200-ft x 200-ft grid, as well as the step-out grids. The GPS locations of the BSIs were captured with the RTK-DGPS and recorded to ensure all items were accounted for during the intrusive investigations. Additionally and independently, the QA Contractor randomly seeded the AOC with BSIs. See Parts II and III, Section 4.0, for detailed results of the BSIs recovered during the intrusive investigations.

4.2 DEFINABLE FEATURES OF WORK DOCUMENTATION AND QC CROSSWALK

This AAR includes extensive electronic appendices containing pertinent and relevant documentation for the project. The DFW documentation and QC cross walk, presented in Table 4-1, summarizes the project data collected and the party responsible for reviewing the data for completeness, incorporating it into the project files, and uploading it into the data management system. The frequency of QC audits for each DFW is also presented.

The approved WP and MEC QAPP outlined the QC management plan for the MEC clearance of RG-01. The QC staff implemented the plan through the Tier 1 and 2 QC process prescribed by QAPP (MC and MEC) Worksheets (WS) #34 and #35, verified the Measurement Performance Criteria outlined in QAPP WS #12, and audited the Field Equipment Calibration, Maintenance, Testing and Inspection from WS #22. The QC staff documented these QC actions by completing the QC Management Reports in QAPP WS #33.

Table 4-1 lists the QC Management Reports prepared, by DFW, for this project, the frequency of the QC checks/audits, and the Appendix in which the reports are located. Reports that apply to the project as a whole, and not specific to individual DFWs (e.g., Weekly QC Reports, QC Meeting Minutes), are listed at the end of the table. The sections following Table 4-1 provide a summary of the checks/audits preformed, by DFW.

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TABLE 4-1: CROSSWALK OF PROJECT AND QC DATA, BY DFW

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
Site Preparation	Project	Equipment Inventories Magazine Inspection Checklist Electrical Grounding Inspection	SUXOS/SM	Weekly	Appendix I
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 0**		As required	Appendix B, Folder 01
Document Review	Project	Document Acknowledgement Forms	SM	At start up and as personnel were added to project	Appendix C, Folder 04, Training Files
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 1**		At start up and as personnel were added to project	Appendix B, Folder 02
Document Control	Project	Field Change Request Field Change Request Log	PM	Weekly	Appendix L
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 9**		Weekly	Appendix B, Folder 03
Pre-Operational Team Training	Project	Personnel Qualification Verification Form Training Records	SUXOS	Initially and as personnel were added to the project	Appendix C
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 1**		As personnel were added to the project	Appendix B, Folder 04
GIS Management	Project	GIS Data Generated Maps	PM	As maps were generated	Appendix A
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 10**		As GIS Database was updated	Appendix B, Folder 05
GPO Certification	Project	1. Team Logbooks 2. GPO Summary Report 3. Final System Certification	Project Geophysicist/ SUXOS	Daily during the GPO Certification process	1. Appendix G 2. Appendix F 3. Appendix F

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
	QC	**1. Preparatory - 1** **Initial - 1** **Follow-up - 1** 2. QA Certification Approval		1. Daily throughout Certification 2. Conclusion of Certification	1. Appendix B, Folder 06 2. Appendix F
Instrument Test Strip	Project	Operator/Instrument Test Forms	UXOQCS	Daily	Appendix B, Folder 07
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 61**		Daily	Appendix B, Folder 07
Geodetic Surveying	Project	Survey Team Logbook	SUXOS	Per Occurrence	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 4**		Per Occurrence	Appendix B, Folder 08
Grid or Transect Construction	Project	Survey Team Logbook	SUXOS	Per Occurrence	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 5**		Per Occurrence	Appendix B, Folder 09
Debris Removal	Project	Team Logbook	SUXOS	Per Occurrence	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 1**		Per Occurrence	Appendix B, Folder 10
Brush Clearance	Project	Team Logbook	SUXOS	Per Occurrence	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 8**		Per Occurrence	Appendix B, Folder 11
Analog Clearance	Project	1. MEC Daily Activities Checklist 2. MEC Equipment Checklist 3. Vehicle Checklist 4. MEC-MPPEH Log	1. - 3: SUXOS 4. SM	Daily	1. Appendix B, Folder 18 2. Appendix B, Folder 27 3. Appendix B, Folder 27 4. Appendix H

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 20**		Daily	Appendix B, Folder 12
Geophysical Data Collection	Project	1. Team Logbooks 2. Data Tracking Form	Site Geophysicist	Daily	1. Appendix G 2. Appendix J
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 6**		Weekly	Appendix B, Folder 13
Geophysical Data Processing	Project	1. Field Editing Checklist 2. Data Processing Checklist 3. Latency Tracking Form 4. Static & Response Check Form 5. GPS Check Form	Project Geophysicist	Per Data Set	1. & 2. Appendix J, Folder 03 3. - 5. Appendix J, Folder 02
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 5**		Per Data Set	Appendix B, Folder 14
Geophysical Data Interpretation	Project	Data Processing Checklist	Project Geophysicist	Per Data Set	Appendix J, Folder 03
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 5**		Per Data Set	Appendix B, Folder 15
Data Management	Project	1. Electronic Submission Form 2. Data Storage and Transfer Checklist 3. Data Tracking Form	Site Geophysicist/ Data Manager	Daily	1. Appendix K 2. Appendix J, Folder 03 3. Appendix J
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 9**		Weekly	Appendix B, Folder 16
Anomaly Reacquisition	Project	1. Logbooks 2. Reacquire Comparison Form	Site Geophysicist	Weekly	1. Appendix G 2. Appendix J, Folder 04
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 8**		Weekly	Appendix B, Folder 17

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
Intrusive Investigation	Project	1. MEC Daily Activities Checklist 2. MEC Equipment Checklist 3. Vehicle Checklist 4. MEC-MPPEH Log	1. - 3: SUXOS 4.: SM	Daily	1. Appendix B, Folder 18 2. Appendix B, Folder 27 3. Appendix B, Folder 27 4. Appendix H
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 19**		Daily	Appendix B, Folder 18
Post-Intrusive Target Validation	Project	Intrusive Results Review Form	Site Geophysicist/ UXOQCS	Per Data Set	Appendix J, Folder 04, by individual grid
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 5**		Per Data Set	Appendix B, Folder 19
Explosive Disposal of MEC/MPPEH	Project	Demolition Equipment Checklists Demolition Health & Safety Checklists Demolition Operations Checklists Explosive Vehicle Checklists Explosives Usage Record	SUXOS/UXOSO	Per Disposal Event	Appendix I
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 22**		Per Disposal Event	Appendix B, Folder 20
MPPEH Inspection	Project	MEC Team Logbooks	SUXOS	Weekly	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 9**		Weekly	Appendix B, Folder 21
Thermal Flashing	Project	1. Thermal Flashing Equipment Checklist 2. Documentation and Disposal Form	1. Team Leader 2. SUXOS/QA Contractor	Per Flashing Event	Appendix I
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 8**		Per Flashing Event	Appendix B, Folder 22

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
Containerize and Document MPPEH for Shipment	Project	MPPEH Authorization MPPEH Certification/Verification Manifest	SUXOS/SM	Once	Appendix I
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 3**		Once	Appendix B, Folder 23
MC Sampling	Project	Field Sample Notes	Project Chemist	Weekly	Appendix N
	QC	Project Chemist Field Notes		Weekly	Appendix N, File 04
Field Data and Logbook Entries	Project	Logbooks	SUXOS	Weekly	Appendix G
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 10**		Weekly	Appendix B, Folder 25
Safety Meeting, including Tailgate Safety Briefing	Project	1. General Safety Briefings 2. Tailgate Safety Briefings 3. Safety Inspection	SUXOS	Daily	1. Appendix D, Daily Operations 2. & 3. Appendix D
	QC	**Preparatory - 1** **Initial - 1** **Follow-up – 67**		Daily	Appendix B, Folder 26
Equipment Management	Project	Daily and Weekly QC Reports	UXOQCS	Daily/Weekly	Appendix D & Appendix E
	QC	**Preparatory - 1** **Initial - 1** **Follow-up - 10**		Weekly	Appendix B, Folder 27

DFW	Data	Reports/Forms	Reviewer(s)	QC Audit Frequency	Location in AAR (CD-Parts II & III)
Equipment Checks	Project	1. Operator / Instrument Test Forms 2. MEC Equipment Checklists 3. Explosive Vehicle Checklists 4. DGM Instrument Checklists 5. Thermal Flashing Unit Checklists 6. Demolition Equipment Checklists	SUXOS/UXOSO	Weekly	1. Appendix B, Folder 07 2. Appendix B, Folder 27 3. Appendix I 4. Appendix, D, Folder 03 5. Appendix I 6. Appendix I
	QC	**1. Preparatory - 1** **Initial - 1** **Follow-up -14** 2. Survey Area Report 3. Operator / Instrument Test Forms		1. Weekly 2. & 3. Daily	1. Appendix B, Folder 28 2. Appendix D, GPO Daily Reports 3. Appendix B, Folder 07
All		Weekly QC Report		NA	Appendix E
All		UXO Daily QC Record		NA	Appendix D
All		Deficiency Notice		NA	Appendix L
All		Deficiency Notice Log		NA	Appendix L
All		Field Change Request		NA	Appendix L
All		Field Change Request Log		NA	Appendix L

4.3 QUALITY ASSURANCE EVALUATION AND CERTIFICATION

The documented QC results were submitted to the QA Contractor for acceptance.

QA Methodology: Battelle was contracted by the Navy as the QA Contractor to independently evaluate USAE by the requirements of the quality assurance surveillance plan (QASP). The QASP addressed the quality assurance on the full range of contractor quality control as presented in the approved project plans. The QASP presented:

- Methods for identifying any work that deviated from the approved project plans or was completed, in whole or in part, as required by the approved plans.
- Procedures to evaluate work against pre-work performance measures, including, but not limited to, personnel qualifications and the successful demonstration of GPO procedures.
- Methods for conducting QA audits of DGM and MEC removal activities, including, but not limited to:
  - Daily field audits of the data collection process
  - Daily field audits of the MEC dig/removal/disposal process
  - Verification of no-finds
  - Daily review of USAE QC documentation to evaluate whether there is an excessive no-find rate or other circumstance that would support changed conditions
- Methods for conducting QA of DGM data by reprocessing USAE's production and QC data, picking targets and matching QA picks against USAE's picks. The objective was to reach concurrence with the target picks and provide the concurrence to the Navy in writing.
- Procedures for performing QA on completeness of grids in accordance with the approved project plans (i.e., resurvey selected lanes within grids, process data and evaluate, reacquire randomly selected targets within grids and verify clearance in accordance with contract requirements) and provide a written statement for each grid.
- Details for the requirements for one combined end-of-field QA report that includes, at a minimum, methodologies, findings, conclusions and recommendations. The purpose of the report was to memorialize the independent government determination of whether the project met all QC requirements specified in the approved project plans.

QA Activities

The QA effort had three critical path decision points to evaluate:

- The Geophysical Prove-out
- Production DGM target picks
- Final grid acceptance inspections.

During production field activities, QA personnel conducted and documented field surveillance of USAE's activities to verify that the work was performed in accordance with approved project plans and SOPs. QA personnel reviewed USAE's personnel qualifications, certifications and plans, and inspected the following administrative areas:

- Personnel qualifications to hold the assigned project positions in accordance with DDESB TP 18
- Personnel have read and understood the site specific work plans and acknowledged by signing the appropriate verification forms
- Personnel have read and understood the Accident Prevention Plan (including the Site Safety and Health Plan) and acknowledged by signing the verification forms
- Adequate numbers of personnel were trained in First Aid and CPR

- Personnel met the training requirements of 29 CFR 1910.120
- Personnel had current physicals in accordance with 29 CFR 1910.120
- Work plans are adequate for operations within the AOCs and reviewed all FCRs
- QC checklists for each DFW
- Deficiency Notices generated
- Documentation of the surface clearance for compliance with the WP
- Anomaly target list, intrusive investigation dig sheets and data base entries for standardization and completeness
- QC grid close-out packages for completeness and whether the following QC activities were performed:
  - no-finds investigated
  - anomalies left in place investigated
  - mV discrepancies investigated
  - The portable magazines and the thermal treatment unit were sited correctly and properly grounded.

Additional QA information is located in Parts II and III, Section 5.0.

4.4 REGULATORY AND NOSSA AUDITS

ADEC conducted a site visit to the Lake Jean project on June 26-27, 2008, to audit the field procedures for compliance with the approved plans.

On July 28-29, 2008, NOSSA conducted an audit of RG-01 and LJ-01 for compliance with applicable explosives safety, environmental, and related requirements. The NOSSA auditor reviewed the project documentation and observed selected field operations.

4.5 AOC CERTIFICATION PROCESS

Activities conducted during the MEC clearance for the RG-01 and LJ-01 AOCs were documented and submitted for an AOC Certification. A certification package for each AOC, consisting of the results of the MEC clearance activities accomplished through the DFWs and the QC generated data including the three-phase inspection forms was compiled and reviewed by the Contractor's AOC certification team and certified by signature. The processes followed are presented in detail in the MEC QAPP WS #36 and are summarized in this section.

The AOC certification team included a cross-section of the project management team. The specific responsibilities of each member of the team are presented in the MEC QAPP WS #36. The members included:

- Project Manager (PM)
- Program Quality Control Manager (PQCM)
- Senior Geophysicist
- Site Manager (SM)
- Senior UXO Supervisor (SUXOS)
- Quality Control Manager (QCM) (UXOQCS in WS #36)
- Site Geophysicist.

The following procedures were accomplished for each AOC:

- The Site Geophysicist reviewed the GPO and DGM data and forwarded a signed cover letter attesting that to the best of his knowledge the data is accurate and complete.
- The QCM prepared a Certification Package for the AOC accompanied by the Individual Package Signature Sheet (prepared for each DFW), and Transmittal Sheet signed by all team members certifying that the AOC met the WP requirements based on the following criteria:
  - Personnel Qualifications
  - Personnel Training
  - Geophysical Prove-out (GPO) Data
  - Daily Instrument Check Records at Instrument Test Strip
  - QC Audits of Daily Logs
  - QC Audits of DGM data acquisition process
  - QC Audits of DGM data and target identification process
  - QC Audits of MEC Grid Sheets
  - QC Observation of Field Teams including confirmation of anomaly removal prior to backfill
  - QC Validation of Swept Areas [15% Random Surveys (RG-01 only) and BSI Program]
  - QC Verification of DQO Results.
- The SM and SUXOS reviewed the package and forwarded a signed recommendation for approval to the PQCM.
- The PQCM reviewed the package and forwarded a signed recommendation for approval to the PM.

The Program Manager reviewed, signed, and forwarded to the Navy Remedial Project Manager the Certification Package that states that the specific AOC has been completed in accordance with the WP. The AOC certification will be accomplished by the Adak Project Team through the comments resolution and approval of this AAR (which includes the Certification Package).

The AOC Certification Packages are included in Parts II and III, Appendix B.

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5.0 REFERENCES

- MEC Clearance Work Plan, Lake Jean (LJ-01) and Rifle Grenade Range (RG-01), Former Naval Air Facility, Adak Island, Alaska, dated May 2008, Revision 2, 11 August 2008
- OU-B1 Record of Decision, dated October 31, 2001
- Engineering Evaluation/Cost Analysis (EE/CA), Rifle Grenade Range (RG-01) dated 24 July 2006
- RG-01 EE/CA Action Memorandum dated September 8, 2006
- OPNAVINST 8020.15/MCO 8020.13, "Explosives Safety Review, Oversight, And Verification of Response Actions Involving Military Munitions" (14 Oct 2003)
- NOSSA Instruction 8020.15A (or INSTMarine Corps Equivalent), "Military Munitions Response Program Oversight"
- NAVSEA OP 5 Volume 1, Ammunition and Explosives Safety Ashore
- Department of the Navy Environmental Restoration Program Manual, August 2006
- DoD Explosives Safety Standards, DoD 6055.9-STD
- DDESB-PD Memo dated June 6, 2006 and NOSSA letter 8020 Ser N537/1272 dated 21 August 2006) for MEC operations at the Adak Island Munitions Response Area (MRA) and MEC Clearance at the Munitions Response Site (MRS) Rifle Grenade Range, RG-01.
- DDESB Technical Paper Number 18, dated December 2004
- DoD Defense Reutilization and Marketing Office Manual, 4160.21-M-1 (current edition)
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FINAL

AFTER ACTION REPORT FOR 2008 FIELD SEASON FOR LAKE JEAN LJ-01 AND RIFLE GRENADE RANGE RG-01

PART II: DOCUMENTATION SPECIFIC TO RIFLE GRENADE RANGE RG-01 ADAK ISLAND, ALASKA

26 April 2010

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1.0 INTRODUCTION

This Part II of the After Action Report (AAR) addresses the work that USAE performed at RG-01, Former Naval Air Facility (NAF) Adak, Alaska, during the 2008 field season. USAE conducted this work under the Munitions Response Contract (MRC) for Worldwide Sites, Contract Number N62742-05-D-1868, Contract Task Order (CTO) KR02.

1.1 ORGANIZATION

This Part II is composed of the following sections, which cover an introduction, major work activities, technical approach, field procedures and documentation, data management, QC, and a compilation of the clearance findings and results based on field work and data collected during the field season:

- Section 1.0 – Introduction
- Section 2.0 – Removal Action Objectives
- Section 3.0 – Field Procedures
- Section 4.0 – Results
- Section 5.0 – Project QC\QA Results
- Section 6.0 – Conclusions and Recommendations.

Other site data from the clearance operations are contained in Part II, Appendices A through O and are referenced throughout this AAR.

1.2 CHARACTERISTICS

RG-01 is located within the historical range area on the west side of Andrew Lake in OUB-2 within Parcel 4. The area encompasses approximately 18 acres, forming a trapezoid, with the wider end situated at the historical firing area on the east side of the range (also see Part II, Appendix A, Figures A-1 and A-2). RG-01 consists of a steep hillside with slopes ranging from five degrees to more than 30 degrees on over 60 percent of the range (see Figure 1-1). Based on previous decisions by the Adak Team, areas more than 30 degrees of slope (as measured by an inclinometer), obstacles such as rocks or earthen mounds, or having ponded/standing water deeper than 6 inches (see Figures 1-2 and 1-3), are excluded from investigations on Adak and are designated as exclusion areas. Two seasonal streams, each with a summer depth of approximately 6 inches, flow across the area to nearby Andrew Lake.

FIGURE 1-1: RG-01 LOOKING NORTHWEST

Currently under land use controls (LUCs), there is limited fencing and a locked gate at the south end of Andrew Lake. These LUCs are used as a deterrent to the public from entering the restricted former range areas west of the lake and also blocking vehicular access to the road leading out to RG-01.

FIGURE 1-2: STANDING WATER IN GRID CR-41

FIGURE 1-3: SOIL MOUND OBSTACLES AT RG-01

1.3 HISTORY

Based on the historical data collected, the specific types of munitions used at RG-01 had been considered very sensitive and extremely dangerous. In accordance with the findings in the *Draft Final Remedial Investigation/Feasibility Study (RI/FS) for Operating Unit (OU) B-2*, dated 18 June 2004, RG-01 was considered too hazardous to enter. Historically, EOD activity on the former Adak Naval Complex responded to reports of dud-fired 40mm grenades within this former range. On 10 July 1973, four dud-fired 40mm grenades were reported and not located. On 12 August 1980, one dud-fired 40mm grenade was reported, and again not located. On 20 August 1980, two dud-fired 40mm grenades were reported as part of the Marine training exercise. The report also indicated that three pounds of TNT was set off near the area where the grenades were thought to have fallen. On 31 October 1989, EOD personnel found one 60mm mortar and one 81mm mortar while clearing a path for target construction. It had been assumed that all MEC items encountered remained on the RG-01 site because their final dispositions were unknown or not reported. There was no clearance or entry to the site, other than target repair by military EOD, prior to the Non Time Critical Removal Action (NTCRA) in 2006.

1.4 REGULATORY HISTORY

Under CERCLA and the FFA, the U.S. Navy was required to complete all necessary remedial actions for site areas within OUB-2 on Parcel 4 of the former Adak Naval Complex, located at Adak Island, Alaska. Among these areas is the former Rifle Grenade Range-01, which has been designated as AOC RG-01. The objective of the accelerated response action for this site was to remove all MEC and MD from this site as necessary to support the reasonably anticipated future use of the site.

The current land use for AOC RG-01 is wildlife refuge/subsistence/recreation access in Parcel 4, Navy restricted. Because of the high degree of hazards associated with the types of munitions at this site, the Navy elected to accelerate the response action for this site in advance of completion of a Record of Decision (ROD) for all OU-B2 sites. The objective of the accelerated response action for this site is to remove all MEC from this site as necessary to support the reasonably anticipated future use of the site.

At such time that all MEC hazards have been removed from all ranges in the area known as Parcel 4, it is anticipated that the land will be transferred to the DOI for inclusion into the AMNWR.

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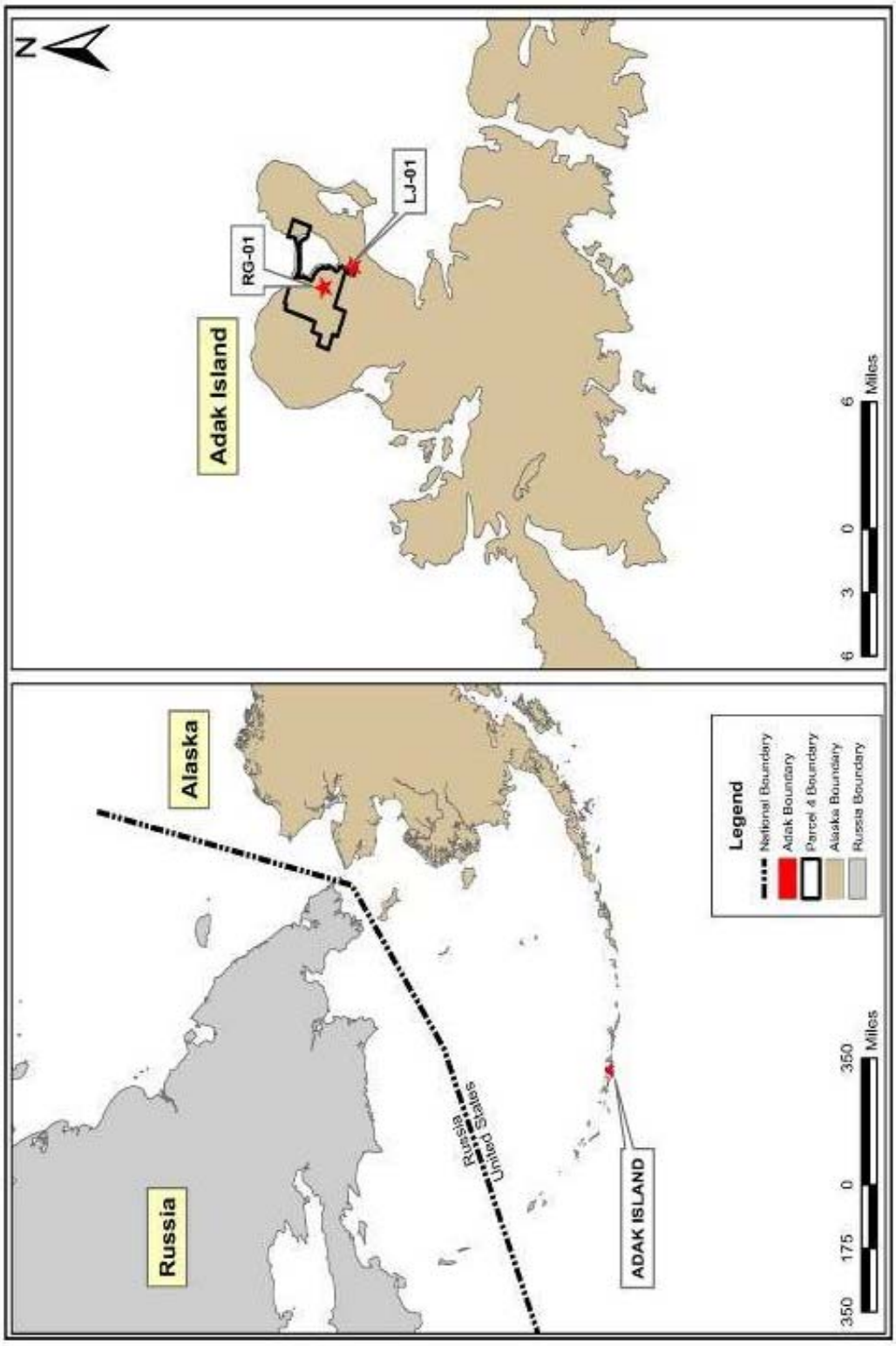

FIGURE 1-4: PROJECT LOCATION

1.5 SUMMARY OF PREVIOUS WORK AT THIS SITE

1.5.1 2006 FIELD SEASON

An Engineering Evaluation/Cost Analysis (EE/CA) and an Action Memorandum were completed in 2006. Alternative 4 (clearance to 2 ft below the mineral soil surface) was recommended in the EE/CA as a response action to reduce the potential MEC risks at the former RG-01. This response action included 100% surface and subsurface removal of MEC, down to maximum depth of detection, from the entire 16 acres (28 grids) of the RG-01 project site. Based on the Action Memorandum, the removal alternative selected for RG-01 was surface and subsurface removal of MEC and munitions debris to a depth of 2 ft below the mineral soil surface or bedrock, whichever was encountered first. As a result, a NTCRA analog clearance was performed on the site. During the 2006 field season, one grid (CU41) was expanded (stepped out) because MEC (40mm HE) was discovered within 15 m of the eastern boundary (Grid CU41) of the range. The CU41 step-out yielded six additional 40mm grenades; however, due to time constraints, the decision was made to delay the step-out of additional grids on the eastern boundary until the next season. An additional expansion of five grids (CU39, CU40, CU41, CU42, and CU43) on the eastern boundary was programmed for NTCRA analog and DGM clearance of all RG-01 accessible areas for the 2008 season.

During the 2006 field season, USAE QC consisted of a 15 percent check of each cleared grid in randomly selected 20- by 20-ft grids plus BSIs emplaced by USAE QC at a rate of two per acre. The failure criteria were as follows:

- A piece of ferrous metal equivalent in size to a 40mm grenade or larger is found.
- Any QC-emplaced BSI is not detected and recovered by the UXO team.
- Any UXO/MEC item is found at detectable depth, but not to exceed the depth of bedrock, or 2 ft bgs.

There were no QC failures during the 2006 NTCRA.

In 2006, during the NTCRA analog clearance on RG-01, USAE recovered and destroyed a total of 96 live MEC items (see Table 1-1 for a summary of MEC items removed in 2006). Of these, 87 were 40mm high explosive (HE) grenades. The other nine MEC items were seven live 40mm riot control tear gas (CS) grenades, a live bomb fuze, and one live cartridge-actuated device (CAD). The live bomb fuze and CAD were most likely “kick-outs” from a nearby demolition range during previous disposal operations. USAE personnel performed 19,002 investigations of surface and subsurface anomalies; recovered 771 lb of munitions debris (MD); and recovered 1,535 lb of scrap and other range residue during clearance operations. In addition to the live MEC items found, USAE also encountered an additional 49 munition items that were expended but could not be positively identified as completely inert; these items of Material Potentially Presenting an Explosive Hazard (MPPEH) were vented and/or demilitarized by detonation. Based on the amount of small arms and other target debris encountered on the eastern portion of the range, the area was also extensively used for firing of small arms up to and including .50 caliber weapons. Operations on site were not able to locate or identify a traditional firing point for the 40mm grenade launchers.

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TABLE 1-1: SUMMARY OF RG-01 2006 MEC REMOVAL

Items Identified	Number	Surface	Depth (bgs)			
			0 to 1 ft	1 to 2 ft	2 to 4 ft	> 4 ft
UXO[1/]	96	3	93	0	0	0
MPPEH[2/]	49	3	46	0	0	0
[1/] List of UXO finds: M433 40mm High Explosive Dual Purpose (HEDP) grenades, M651 40mm riot tear gas, 60 mm mortar, 81 mm mortar, 40mm HE, and CAD.						
[2/] List of MPPEH finds: M651 40 mm riot tear gas, fuze bomb, 37 mm armor-piercing tracer (APT), 40 mm antiaircraft (AA), flare candle.						

1.5.2 2008 FIELD SEASON

USAE personnel performed an NTCRA analog clearance on the five RG-01 expansion areas identified in the Statement of Work (SOW) for the 2008 season prior to DGM surveys and encountered a 40mm grenade in Grid CU41 that required a step-out (Grid CU41A). Then, the DGM survey identified another 40mm grenade that required a second analog step-out (CU41B). A 100 percent DGM survey of accessible areas was performed after completion of the analog clearances. All operations were performed in accordance with the requirements of the RG-01 Action Memorandum.

During the DGM clearance, MEC was encountered near boundaries of four of the five grids (see Part II, Appendix A, Figure A-4) and it was necessary to perform a step-out of the grids to maintain the 15-m buffer around MEC. All additional step-outs were first analog cleared and then DGM surveyed and cleared. During RG-01 NTCRA operations, USAE located and disposed of, by detonation, 71 MEC items, including 70 40mm grenades and one 3.5-inch rocket; six items of MPPEH including a projectile fuze, a bomb fuze, a 40mm projectile, a CAD, and two 40mm breached munitions (see Table 1-2 for a summary of MEC items removed in 2008).

The additional items of MEC/MPPEH were located using an EM61 DGM sensor in areas previously cleared using an analog sensor. The EM61 was shown to be a more effective instrument than the Whites, given the terrain of RG-01 and weather conditions on Adak.

Quality Control of the analog NTCRA consisted of the same procedures as in 2006 and in accordance with the approved WP (15% of a cleared grid); however, no BSIs were emplaced until the analog clearance was complete and prior to the DGM survey. Two grids failed analog QC and were re-worked by operations and then again checked by QC prior to DGM survey. After analog clearance, USAE QC personnel emplaced BSIs, all of which were located during the DGM survey. Once all DGM target investigations were complete and checked by USAE QC, the grid was submitted to the QA Contractor for verification. All grids passed QA inspections and, in addition, QA rechecked all target investigations (left open by USAE) to ensure the target location was clear of anomalies. Once the locations were checked by QA, USAE personnel backfilled the excavations.

Munitions Constituents (MC) sampling and testing was performed at the locations of the two breached munitions (see Part II, Appendix A, Figure A-39), in accordance with the approved MC QAPP. Disposal of MEC/MPPEH was performed by detonation using donor explosives shipped to Adak and stored in the Government's portable explosives magazine. Munitions debris was inspected by UXO technicians, certified as 5X by USAE, verified by the QA Contractor, and then flashed in a TFU prior to being sealed in barrels and shipped to a recycle facility for final disposal.

TABLE 1-2: SUMMARY OF RG-01 2008 MEC REMOVAL

Items Identified	Number	Surface	Depth (bgs)			
			0 to 1 ft	1 to 2 ft	2 to 4 ft	> 4 ft
UXO[1/]	71	2	57	11	1	0
MPPEH[2/]	4	3	1	0	0	0
Breached Munitions (MC)[3/]	2	1	1	0	0	0
[1/] List of UXO finds: M433 40mm High Explosive Dual Purpose (HEDP) grenades, M651 40mm riot tear gas, M397 40 mm HE grenades, M716 40mm Smoke grenades, and M28 3.5 inch HEAT rocket.						
[2/] List of MPPEH finds: M48 Series fuze, JAU-22b initiator (CAD), and MK 219-4, bomb fuze.						
[3/] List of Breached Munitions finds: MK2 40mm projectile, High Explosive w/tracer self destruct (HE-T/SD); M397A1 40mm, HE (half) Ball assembly.						

1.6 REPORT DATA USE

RG-01 is one of the AOCs included in the OUB-2 Remedial Investigation/Feasibility Study (RI/FS) and this report will provide data for evaluation to determine any required remedial actions, ICs, or NOFA of RG-01.

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2.0 REMOVAL ACTION OBJECTIVES

The objective of this project was to reduce MEC and MC risk to an acceptable level for the wildlife refuge land use and the eventual transfer to the USFWS. Another objective was completing the work to the satisfaction of the stakeholders (Navy, EPA, ADEC and USFWS).

2.1 REMOVAL ACTION REQUIREMENTS

Project requirements are presented in the EE/CA and the executed Action Memorandum. The requirements include:

- Removing vegetation to an acceptable height to aid instrument use.
- Clearing the surface of metallic items for safety reasons and to minimize interference for the geophysical survey.
- Completing an analog clearance to the depth of detection but not to exceed 2 ft below the mineral surface layer.
- Completing DGM on all accessible areas (i.e., not areas with slopes greater than 30 degrees, water areas, or areas with obstructions such as rocks or soil mounds).
- Completing an intrusive investigation of all identified targets.
- Creating a 15-m safety buffer free of all 40mm grenades.
- Properly managing and disposing of MEC and MD from the project.
- Sampling and analyzing soil from breached munitions via the MIS approach, and disposing of soil that is above the action criteria.

2.2 REMOVAL ACTION GOALS

For MEC, the goal of this work was to remove MEC (primarily 40mm grenades but including others) from RG-01 to a depth of 2 ft. For MC, the goal was to evaluate breached munitions sites to determine whether concentrations of COPC present in soil were below levels of concern so that NOFA is acceptable, or were levels high enough to pose a human health risk or impact to the environment and therefore require further evaluation.

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3.0 FIELD PROCEDURES

In contrast to the LJ-01/RG-01 common procedures presented in Part I of this report, the field procedures addressed here in Part II address only RG-01 site-specific procedure.

3.1 PROCEDURES FOR MUNITIONS AND EXPLOSIVES OF CONCERN

3.1.1 DETECT AND EXCAVATE ANOMALIES

Due to the safety considerations of the 40mm grenade, USAE performed an analog clearance at RG-01 prior to the DGM survey.

3.1.1.1 Procedures

FIGURE 3-1: ANALOG CLEARANCE

Prior to the DGM surveys, UXO Teams performed an analog clearance (see Figure 3-1) of the planned expansion grids from the 2006 season to establish a 15-m MEC (primarily the 40mm grenade) free safety buffer area boundary. The UXO Teams performed an all-metals detector-assisted search of the expansion grids. The clearance consisted of subsurface investigation to the depth of detection, but not to exceed the depth to bedrock or 2 ft bgs (top of the mineral soil layer). Any anomalies remaining after excavation to 2 ft bgs were annotated on the Analog Clearance Form. Each expansion grid was subdivided into individual search lanes. Individual search lanes consisted of approximately 5-ft-wide paths that ran parallel to one boundary of the operating grid. Search lanes were adjacent to each other and completely covered the entire expansion. (Documentation for analog clearance is in Part II, Appendix B, Folder 12, subfolder Analog Investigations.)

After the establishment of the individual search lanes, the Team Leader (TL) directed personnel to begin searching each lane with the Whites detector. When a subsurface anomaly or metallic surface object was encountered, the individual immediately conducted subsurface investigation of the object. Throughout this operation, the UXO Technician III (UXOTIII) closely monitored individual performance to ensure that these procedures were being performed with due diligence and attention to detail. MEC and MPPEH encountered were handled in accordance with the WP procedures and as discussed in Section 4.1.7.

The MEC TLs used the Analog Clearance Form (Part II, Appendix B, Folder 12, subfolder Analog Investigations) to record any MEC found during the analog clearance of the five RG-01 expansion grids. The Analog Clearance Forms were uploaded to the data files and eventually added to the MEC Log.

3.1.1.2 Documentation

The MEC TLs used the Analog Clearance Form (Part II, Appendix B, Folder 12, subfolder Analog Investigations) to record any MEC found during the analog clearance of the five RG-01 expansion grids. The Analog Clearance Forms were uploaded to the data files and added to the MEC Log.

3.1.1.3 Quality Control

The QC staff verified the following tasks were accomplished during the conduct of this DFW.

- Each analog instrument was checked out at the ITS before being used for this clearance.
- Grid lanes were established in the grids before beginning the clearance.
- All targets were investigated.
- At least 10% of excavated holes were checked by the QC staff to ensure no metallic signatures remained.

FIGURE 3-2: INTRUSIVE INVESTIGATIONS

The UXOQCS conducted a random sampling of each expansion grid by dividing the grid into sub-grids of approximately 10 x 20 ft. The sub-grids were numbered sequentially and then entered into a random number generator to select approximately 15 percent of each expansion grid (and step-out grid) for a QC check of the analog clearance. Grids failing the QC check (e.g., a piece of metal equivalent in size to a 40mm grenade or larger detected by the UXOQCS) were returned to the SUXOS for rework (a Root Cause Analysis was conducted for failed grids; see Part II, Appendix L). Once the grid was reworked, an additional set of sub-grids (exclusive of the previously selected set and equal to at least 15% of the entire grid) were randomly selected for another QC check. The results of the grid checks were included on the Weekly QC Status Reports, located in Part II, Appendix E.

3.1.2 INTRUSIVE INVESTIGATION

During all intrusive investigations at RG-01 (analog and DGM), personnel used Kevlar helmets with ballistic shield, demining trousers, and body armor vests (see Figure 3-2). However, because of safety concerns during the 2006 season regarding operations conducted on steep, wet slopes and in high winds, the ensemble was modified in Amendment 2 (DDESB-approved 04/28/08) of the Explosives Safety Submission (ESS) depending on site conditions. The helmet and vest were worn at all times; however; the face shield was in the "up" position during search but lowered whenever performing intrusive investigations. On steep and slippery slopes, the demining trousers were omitted. The determination to wear or not wear the pants was made on a day-to-day basis after coordination and consensus by on-site USAE management, safety personnel, and the NTR.

FIGURE 3-3: RG-01 TARGET DEBRIS

3.1.3 DEBRIS REMOVAL

Due to the hazardous nature of 40mm grenades, all areas on RG-01 first received an analog clearance. Any surface MEC or debris (such as old tires, and barrels, or construction debris used as targets) was removed from the grid(s) during the clearance (see Figure 3-3). (This DFW was conducted in conjunction with the Analog Clearance DFW because of the inherent danger of the munitions of concern in this AOC (40mm grenades).

3.1.4 GEOPHYSICAL DATA COLLECTION

USAE surveyed the accessible area (see Part II, Appendix A, Figure A-41) of RG-01 with sets of overlapping survey lines spaced every 2.5 ft to completely cover the area within the site boundary (see Figure 3-4). Surveys began along the site's longest boundary to minimize turnaround time.

FIGURE 3-4: DGM SURVEY AND LANE FLAGGING

3.1.5 POST-INTRUSIVE INVESTIGATION

USAE's Site Geophysicist reviewed 100% of the RG-01 intrusive results. Anomalies that required rechecking were provided to the QCM, who passed the request to the SUXOS for execution. The intrusive teams logged the recheck results in the same manner as the original dig.

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4.0 RESULTS

During field operations on Adak, USAE generated documents that recorded all aspects of site operations. These documents included the GPO Certification; QC and Safety inspections, meeting reports, checklists in the WP for work elements and DFWs, TL's logbooks, and QC/Safety inspections and reports. Table 4-1 in Part I provides a crosswalk of these various documents.

4.1 RESULTS FOR MUNITIONS AND EXPLOSIVES OF CONCERN

4.1.1 SITE SETUP AND TRAINING

In May 2008, upon arrival of the barge, USAE mobilized two UXO personnel to accept, inventory, and store project explosives prior to the start of operations in June. On 15 and 16 May, 2008 the Type II Explosives Magazine (for MPPEH storage) was installed next to the existing Explosives Magazine and grounding checked for both magazines in accordance with the WP requirements (Figure A-3 in Part II, Appendix A depicts the explosives and MPPEH magazine locations). Grounding checks were within WP parameters. Explosives shipped on the barge were inventoried and stored in the Explosives Magazine (see Part II, Appendix I, for explosives documentation).

The Project Geophysicist mobilized to Adak on 4 and 5 June 2008 expressly to train USAE's two DGM teams and one survey team and to get them through the GPO Certification. DGM and Civil Survey training began on 6 June 2008. Each of the two DGM teams consisted of one Instrument Operator and two UXO Technicians, The survey team consisted of two UXO Technicians. The training included checking all EM61-MK2 and RTK DGPS equipment, setting up the EM61-MK2 stretcher handles, mounting the GPS rover, and running through a training grid established near the primary survey control point, BM18, on 6 and 7 June. Survey control was brought out to the 2006 radio repeater location and then to the GPO site on 9 June 2008.

On 10 June 2008, the DGM teams performed the 6-line tests and the daily instrument checks, and surveyed the GPO calibration grid. Following successful evaluation of the GPO calibration grid surveys, the DGM teams surveyed the GPO Blind grid on 11 June 2008, along with the daily instrument checks. The daily instrument checks and the blind GPO data for each DGM team was processed by USAE's Site Geophysicist and delivered to the QA Contractor on 12 June 2008. USAE's Project Geophysicist demobilized that same day. Training certifications are located in Part II, Appendix C, Folder 07.

During the first week of June 2008, upon arrival on Adak, USAE personnel completed a variety of activities to prepare the site, field personnel, and the public for MEC operations field work. Logistics activities on Adak Island included completing an inventory and inspection of equipment and establishing an administrative area in a leased set of quarters. In addition, the Site Manager and/or QC verified that all personnel had the proper training records and were under medical surveillance. USAE also performed site-specific training on topics including safety, WP procedures, and individual training on specific equipment such as analog sensors and demolition equipment.

Training and certification occurred during the first 10 days on site and all training files are included in Part II, Appendix C. Appendix C contains the following separate files/folders with the dates, topic, and personnel attending:

- # 02, Personnel qualifications verification
- # 03, Personnel training for
  - UXO awareness video training
  - EM61 training
  - DGM Reacquisition training

  - Ordnance training on the 40mm grenade
  - Remote demolition firing device training
  - Location survey training
  - Whites analog detector training.
- # 04, Plans training and signatures including SOPs
- # 05, First aid training
- # 06, Explosives Driver training.
- # 07, DGM and Survey Training Certifications.

4.1.2 GEOPHYSICAL PROVE-OUT CERTIFICATION

The Project and Site Geophysicists provided DGM refresher training to the two DGM survey teams during site preparation. Each DGM team consisted of three UXO-qualified personnel with prior experience operating an EM61. Both of USAE's DGM teams then surveyed the GPO grid for evaluation and certification by the QA Contractor. The data from both teams' surveys was processed on-site by the Site Geophysicist. All raw and processed data, including dig lists and target maps, were uploaded onto the QA Contractor's shared web site for review and evaluation. This resulted in successful DGM Survey Certifications for both DGM teams (see Section 5.0 for dates). The reviewed dig lists were used to demonstrate anomaly reacquisition at the GPO, resulting in successful DGM Reacquisition Certifications for both DGM teams. Copies of all GPO certifications are provided in Part II, Appendix F.

4.1.3 INSTALL INSTRUMENT TEST STRIP

In accordance with the WP, QC personnel established an ITS adjacent to RG-01 in approximately the same location as was used during the 2006 NTCRA for KR02 clearance operations. The ITS (as detailed in Table 4-1) was used to conduct daily instrument functional tests of the Whites prior to their use for MEC operations. During tests with the Whites, it was determined that three of the seed items (#5, #10, and #12) at 2 ft were not detectable by the instrument. However based on historical finds and expected penetration depth of the 40mm grenade, it was decided to vary the depth of these three seed items. USAE submitted and had approved a field change request (FCR-1) and modified the ITS.

TABLE 4-1: ITS SEED ITEM LAYOUT

	Seed ID	Local X (ft)	Local Y (ft)	Depth (ft)	Orientation	Inclination
1	Test Strip Start rebar	0	0	flush	NA	Vertical
2	40mm grenade (Aluminum Simulant)	5	0	0.3	Across-tack	45 degrees
3	40mm grenade (Actual item)	10	-1	0.3	Along-track	Horizontal
4	40mm grenade (Actual item)	20	2	0.3	Across-track	45 degrees
5	40mm grenade (Actual item)	30	-1	0.7	Across track	Horizontal
6	40mm grenade (Actual item)	40	0	0.3	Along-track	Vertical
7	40mm grenade (Aluminum Simulant)	50	-1	0.3	Along-track	Horizontal

	Seed ID	Local X (ft)	Local Y (ft)	Depth (ft)	Orientation	Inclination
8	81mmm Mortar (Ferrous Simulant)	60	0	0.2	Along-track	Horizontal
9	40mm grenade	70	2	0.2	Across-track	45 degrees
10	60mm Mortar (Ferrous Simulant)	80	2	1.0	Along-track	Horizontal
11	40mm grenade (Aluminum Simulant)	90	0	Surface	Along-track	Horizontal
12	81mm Mortar (Ferrous Simulant)	100	-1	1.5	Across-track	Horizontal
13	40mm grenade (QC BSI/Galvanized Steel)	105	0	0.3	Across-track	Horizontal
14	Test Strip End rebar	110	0	flush	NA	Vertical

4.1.4 LOCATION SURVEY

Prior to 2008 operations, USAE installed the five expansion grid (CU39, CU40, CU41, CU42, CU43) boundaries and grid corners at RG-01 using a Trimble RTK-DGPS (see Figure 4-1). As a result of finding MEC near boundary borders, USAE stepped out five additional grids (CU41A, CU41B, CU42A, CU43A, CT43A) during 2008 operations (see Part II, Appendix A, Figure A-2). The survey team consisted of two UXO technicians who were experienced in the use of the RTK-DGPS. They established a base station at a known benchmark on Adak (see the Survey Logbook, Part II, Appendix G) and then navigated to points determined by the use of the Adak Island GIS database. They marked the AOC boundaries to include the limits of 30 degree slopes (as measured by an inclinometer) and other obstacles and installed search grid corners (see Part II, Appendix B, Folder 00, Inaccessible Areas and Part II, Appendix B, Folder 09). The survey team used MEC avoidance procedures consisting of the use of the Whites to detect and avoid metallic anomalies. These procedures were used for all movement throughout the site to avoid any contact with possible surface MEC or MPPEH. Prior to installing grid and boundary markers, the location was checked with a metal detector to preclude possibly driving stakes into subsurface MEC.

FIGURE 4-1: LOCATION SURVEYS

The 2006 RG-01 boundary was 16.37 acres. The 2008 expansion grids totaled 1.6 acres plus 0.34 acres of step-outs. The total acreage survey in 2008 was 9.78 acres plus 8.52 acres of inaccessible >30 degree slopes and 0.01 acres of standing water. The location survey and DGM teams performed reoccupation checks whenever the GPS was used and these test results are located in Part II, Appendix J, Folder 03.

4.1.4.1 Grid/Transect Construction

The NTCRA included 100% clearance of accessible areas and only grids were constructed. There were a total of 30 grids established including the five step-outs for DGM surveying and clearance. These grids were established during Analog clearance and DGM surveying (see paragraph 4.1.7 below).

4.1.5 SURFACE CLEARANCE

Surface clearance at RG-01 was conducted concurrently with vegetation clearance and debris removal, and along with analog clearance, as further discussed in Subsection 4.1.6, below. The majority of surface debris encountered was the remains of targets consisting of 55-gallon drums (see Figure 4-2) and tires. This debris (approximately 300 lb; see Table 4-2) was removed from the internal grids, stacked outside the RG-01 southern boundary, and left in place (see Part II, Appendix K, Grid Tracking Log, for a tabulation of all non-munitions debris).

FIGURE 4-2: RG-01 TARGET DEBRIS REMOVAL

4.1.6 VEGETATION CLEARANCE

Vegetation at RG-01 was minimal and most of the grids did not require cutting, with the exception of grid CU41. The MEC Team 3 conducted analog clearance on grid CU41 on June 18 and 19 and submitted the grid over to QC for inspection. The UXOQCS went to the grid on June 25 to begin the QC check of the clearance, but returned the grid to production without action because the vegetation on the grid was such that the UXOQCS felt a complete analog clearance was not performed on the grid. The SUXOS directed the team to ensure the grass was cut to the SOP-required criterion of no closer than 6 inches and to resurvey the grid. The UXO team performed vegetation removal when necessary and performed another analog clearance in the grid. No additional items on CU41 were encountered by the clearance team or the follow-on QC. The UXOQCS treated this as an on-the-spot correction and did not issue a deficiency notice.

Vegetation was also cleared around the magazine area when the magazines were sited and periodically throughout the field season.

4.1.7 ANALOG CLEARANCE

An analog clearance was conducted on the five expansion grids (CU39 through CU43) and all step-out grids (CU41A, CU41B, CU42A, CU43A and CT43A) to ensure all surface and near surface MEC and MPPEH were removed prior to conducting the DGM surveys over these grids. The MEC teams conducted the analog clearance using the Whites. Table 4-2 below and Part II, Appendices H (Ordnance Accountability) and K (Grid Tracking Data) provide additional details.

TABLE 4-2: ANALOG CLEARANCE RESULTS

Grid #	Mag & Dig Anomalies	MD (lb)	Non-MD (lb)	# UXO	# MPPEH	Date Complete
CT43A	170	6.8	0	0	0	8/19/2008
CU39	380	2.3	0	0	0	6/21/2008
CU40	2758	30.0	140.0	2	0	7/4/2008
CU41	1216	3.0		0	0	6/28/2008
CU41A	625	24.0	0	1	0	8/18/2008
CU41B	480	11.9	159.2	0	0	8/19/2008
CU42	2899	3.1	0	0	1	6/18/2008
CU42A	355	20.6	0	0	0	8/18/2008
CU43	1917	5.3	0	0	0	6/28/2008
CU43A	400	59.0	0	0	0	8/19/2008
Totals	11200	166.0	299.2	3	1	

4.1.7.1 Check Instruments at the ITS

All UXO technicians using a Whites processed through the ITS daily to demonstrate their ability and the instruments' capability to detect 40mm grenades and other seed items such as the 60mm and 81mm mortars. The ITS (see Figure 4-3) checks were only performed on days when intrusive or UXO avoidance was performed. During checks of the Whites at the ITS beginning on June 6, 2008, the instruments were found incapable of detecting the seed items buried at 2 ft bgs. A RCA was initiated to determine the possible causes and solutions. As a result of the analysis, an FCR (FCR-1, see Part II, Appendix L, Folder 03) was submitted to the NTR on June 9, 2008 requesting to move the items buried at 2 ft bgs to 18 inches bgs. The FCR was approved on June 9, 2008 and the ITS was reconfigured accordingly. The Whites operators were successful in locating all items in the reconfigured ITS. The depth changes of the seed items had no impact on the effectiveness of the analog clearance in the grids since the objective of the analog clearance was to detect surface and near-surface MEC and MPPEH to prepare the grids for the DGM surveys. The checks were monitored by QC personnel and the results documented (see Part II, Appendix B, Folder 07).

FIGURE 4-3: ITS TRAINING AND INSTRUMENT CHECKS

4.1.7.2 Detect and Excavate Anomalies
4.1.7.2.1 Procedures

All intrusive investigations at RG-01 were hand dug. When investigating anomalies during mag & dig all targets were cleared of all metallic anomalies to a depth of 2 ft bgs, checked by QC and verified by QA (see Part II, Appendix B, Folder 00).. During all intrusive investigations at RG-01 (analog and DGM) personnel wore Kevlar helmets with ballistic shield, demining trousers, and body armor vests. However,

because of safety concerns that arose during the 2006 season regarding operations conducted on steep, wet slopes and in high winds, the ensemble was modified, under certain circumstances, for use in 2008. The helmet and vest were worn at all times; however, depending on field conditions, operators were not required to don the demining trousers, which were heavy and contributed to the potential for slips on wet slopes. Another modification concerned the face shield: To help the operator hear audible indications from the equipment during search, the face shield was worn in the "up" position, during search but was lowered for safety when an operator was performing intrusive investigations.

Subsurface anomalies were investigated as they were encountered (mag & dig). A total of 11,200 analog anomalies were investigated. All analog excavations were cleared of detected anomalies to a depth of 2 ft bgs. Anomalies present at the 2-ft depth were annotated as abandoned dig and noted on the grid dig sheet for inclusion in the site database intrusive results.

One 40mm grenade was encountered during analog clearance of the expansion grid CU41 which required a step-out to CU41A and a follow-on analog clearance. During DGM investigation of CU41A, another 40mm grenade was located which required a step-out to CU41B and another analog clearance and DGM survey to establish the 15-m safety buffer (see Part II, Appendix A, Figures A-31, A-32, and A-33).

During the QC inspections and checks of the analog clearance, two of the expansion grids failed: grid CU40 and grid CU43. In grid CU40, an expended light anti-tank weapon (LAW) rocket motor was found 3 inches bgs and in grid CU43 an empty 40mm illumination canister was found 2 inches bgs. The project Quality Control Manager (QCM) performed a RCA of both failures. The RCAs were attached to Deficiency Notices (DNs) 001-08 and 002-08 respectively, posted to the Deficiency Notice Log (DNL) and provided to the Site Manager (SM) for rework. After rework was completed, both grids underwent a QC re-inspection that resulted in both grids passing the acceptance criteria. See Part II, Appendix L, Folder 02, for the DNs and the DNL.

The analog clearance of grid CU43 was conducted on June 17, 2008. The clearance team recovered 4 empty 40mm illumination canisters and several small projectiles. During the random QC inspection of the grid on June 24, 2008, the UXOQCS detected another empty 40mm illumination canister 2 inches bgs, resulting in a grid failure in accordance with pass / fail criteria established in the WP.

Through the RCA process, the Project QCM concluded that a number of contributing factors led to the grid failure, including the first-time use of the required body armor, helmets and face shields by this team; however, the principal root cause stemmed from the team moving the lane markers before completing the lane/grid and not marking their stop point within the grid prior to taking a break, which resulted in the item being missed.

Grid CU43 was reworked by the analog clearance team on June 26, 2008; three more empty 40mm illumination canisters were located, as well as additional small arms projectiles. On June 27, 2008, the Project QCM conducted a randomized 15% QC inspection of grid CU43, distinct and independent from the area inspected during the initial QC inspection, with no discrepancies found.

The analog clearance of grid CU40 was conducted on June 23, 2008. The clearance team recovered 1.5 lb of munitions debris. During the random QC inspection of the grid on June 25, the UXOQCS detected an expended light anti-tank rocket motor 3 inches bgs, resulting in a grid failure.

Through the RCA, the Project QCM concluded that a number of contributing factors led to the grid failure, including the weather (rain, fog, and wind whistling through the helmets) and battery power level for the Whites during the afternoon; however, the principal root cause stemmed from the difficulty of maintaining acceptable positioning of the instrument detector head throughout the lane sweep while wearing demining trousers. Given the footing and weather conditions, the demining trousers restricted the wearers' movements due in part to the stiffness and weight of the trousers.

Grid CU40 was reworked on July 4, 2008; some additional small arms projectiles were removed. On July 5, 2008, the Project QCM conducted a randomized 15% QC inspection of grid CU40, distinct and independent from the area inspected during the initial QC inspection, with no discrepancies found.

See Part I, Subsection 3.1.11.1 for a discussion of the instrument checks at the ITS and battery voltage checks performed in the field throughout the afternoon.

4.1.8 DGM SURVEY

A 100 percent DGM survey of 9.78 acres at RG-01 was performed after completion of the analog clearance expansion of five grids from 2006 and five additional 15-m step-outs identified during DGM operations conducted in 2008.

Prior to DGM surveys, the QC staff emplaced BSIs at a rate of one per 200- x 200-ft survey grid for a total of 17 BSIs (see Part II, Appendix A, Figure A-40 for locations). All BSIs were detected and recovered (see Part II, Appendix B, Folder 00, QC BSI Locations, and Appendix K, Intrusive Results). A 100 percent DGM survey and investigations of selected targets in accessible areas at RG-01 were performed after completion of all analog clearance (see Part II, Appendix K). Inaccessible areas were marked and recorded by the Global Positioning System (GPS) Team, and then verified by QA personnel (see Part II, Appendix B, Folder 00, AOC Certification).

USAE performed the geophysical data collection and initial processing for AOC RG-01 during the period of 19 June 2008 through 16 July 2008. Prior to the beginning of data collection, a survey team used an inclinometer to measure slope gradient in AOCs

Based on early intrusive results, USAE requested raising the intrusive investigation threshold from 3 mV to 7 mV. After an evaluation by the QA Contractor and a discussion via teleconference with regulators and NOSSA, the Navy approved the new intrusive investigation threshold (refer to the “Increased Intrusive Investigation Threshold” section within Part II, Appendix L for copies of the memorandums that provide rationale for this request and subsequent formal approval of it).

This change in intrusive investigation threshold did change the list of targets included and delivered on the intrusive dig lists. The list included targets 7 mV and greater plus the 10% QC picks between 3 and 7 mV, and any additional anomalies identified by the QA Contractor. Each of the anomalies selected by Geosoft as a target was analyzed by the Site Geophysicist, and evaluated as to its validity and position. Targets found to be invalid or incorrectly located were removed or relocated (e.g., multiple picks on large anomalies were consolidated into single picks). Additionally, anomalies that were not automatically selected by UX-Detect, yet deemed to represent a potential UXO target, were manually selected.

During the period of 19 June 2008 through 16 July 2008, USAE performed the geophysical data collection and processing for RG-01. During this effort, daily quality control tests and survey production data collection were carried out in accordance with the WP to ensure high-quality geophysical data. The results of these daily instrument checks, raw and processed production data, and QC data from the production DGM survey work were documented daily and uploaded to the QA Contractor’s shared web site as “completed” (see Part II, Appendix J, Folder 04).

These daily and weekly submittals of QC and production data by USAE’s Site Geophysicist to the QA Contractor were utilized as an alternative to written daily and weekly report submittals. The production and QC submittals were available to all parties during the 2008 field season, and copies can be found in Part II, Appendix J. All daily and weekly production data progress was conveyed to the Site Manager, UXOQCS, and QA Contractor and was discussed during the weekly on-site conference call between USAE and stakeholders.

4.1.9 DGM DATA PROCESSING

4.1.9.1 Data Interpretation

The DGM raw and processed data, including dig lists and target maps, were delivered to the QA Contractor for review. USAE analysis of the RG-01 DGM data from the 2008 field season resulted in 5,894 anomalies selected at the 3-mV threshold, with an additional 141 anomalies added by the QA Contractor for a total of 6,035 anomalies selected for intrusive investigation. When the intrusive investigation threshold was increased from 3 to 7 mV, the actual number of anomalies investigated, and documented in Part II, Appendix K, was 5,170, a reduction of 865 anomalies. This total included the 10% QC sampling of anomalies between 3 and 7 mV in each grid. No MEC was discovered at the 10% QC sample locations, adding confidence in the decision to raise the intrusive investigation threshold.

An anomaly selection threshold of 3 mV was utilized for this AOC based on results from the GPO qualification grid. Originally, all selected anomalies were reported and used for intrusive investigations. However, a high percentage of intrusively investigated anomalies, and all anomalies below 7 mV on this AOC, were small arms and metallic scrap. Based on these initial intrusive results, USAE's Project Geophysicist recommended that the intrusive investigation threshold be increased to 7 mV. The QA Contractor concurred with this change and it was implemented on 24 July 2008. The increase from 3 to 7 mV included a QC sampling of the anomalies down to the original intrusive investigation threshold of 3 mV to validate the decision. The correspondence documenting the reasons for this increase, and approving it, is provided in Part II, Appendix L: Field Change Requests, Design Change Notices, Deficiency Notices, and Non-Conformance Reports. *Note that this did not change the anomaly analysis threshold of 3 mV on the leveled EM61 Time Gate 1, but did affect the anomalies delivered for intrusive investigation [(e.g., all anomalies 7 mV and greater and a 10% sampling of anomalies between 3 and 7 mV)* (see Part II, Appendix K, Grid Status)]. All 40mm grenades were encountered from zero to 1.5 ft below the mineral soil surface. A 3.5-inch rocket was recovered at 0.2 ft.

4.1.10 TARGET REACQUISITION

4.1.10.1 Anomaly Reacquisition

USAE used the EM61 to reacquire 5,170 anomalies (see paragraph 4.1.8 above) and mark them for investigation. All target locations reacquired were compared to target data locations and any offsets or no finds were evaluated by the Site Geophysicist and when necessary reported to the SUXOS for a back check (see Part II, Appendix J, Folder 04, Dig Lists by Grid/reacquisition comparisons).

4.1.11 INTRUSIVE INVESTIGATION

4.1.11.1 Intrusive Investigation

During RG-01 clearance operations, USAE located seventy-one MEC items, including seventy 40mm grenades and one 3.5-inch rocket; four items of MPPEH, including a projectile fuze, a bomb fuze, a 40mm projectile, and a CAD. Refer to Table 4-3 for a summary of MEC distribution.

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TABLE 4-3: MEC/MPPEH/MC/MD SUMMARY

Ordnance-Related Items	Total	Depth Range Below Ground Surface (bgs)				
		Surface	0- 0.5 ft	.5-1 ft	1-1.5 ft	1.5-2 ft
UXO	71	4	43	13	10	1
MPPEH	5	1	3		1	0
DMM	0	0	0	0	0	0
MD	144	0	99	24	19	2
Total	**220**	**5**	**145**	**37**	**30**	**3**

In 2008 USAE Intrusive teams performed a total of 5,170 DGM target investigations. The final boundary of RG-01 includes 18.31 acres, all of which included an analog clearance plus a DGM clearance of 9.78 accessible acres.

The SUXOS and UXOSO monitored operations on RG-01 to ensure the appropriate Team Separation Distance (TSD) was maintained at all times. Initially, the TSD was 17 ft, based on the Munition with the Greatest Fragmentation Distance (MGFD), the 40mm grenade; however, on 8 August 2008, a 3.5-inch rocket was encountered in Grid CU42. In accordance with the ESS and the WP, intrusive operations ceased until the ESS and WP were amended. To respond to and incorporate this new information, USAE drafted and submitted the following documents/revisions: (1) Amendment 3 to the ESS and (2) FCR-11, changing the MGFD to the 3.5-inch rocket and expanding the EZ and the TSD to 56 ft. The Amendment was approved by NOSSA on 2 September 2008 and approved by the DDESB on 24 September 2008 (see Part II, Appendix L).

During the DGM clearance, MEC was encountered near the boundaries of four other grids, and therefore it was necessary to perform a step-out of these grids also, to maintain the 15-m buffer around MEC. One of the four grid step-outs (CU41A) was stepped out during DGM clearance an additional time, for a total of five step-outs (CU41A, CU41B, CU42A, CU43A, CT43A); see Part II, Appendix A, Figure A-2. The additional step-outs were first analog cleared and then DGM surveyed and cleared. During RG-01 clearance operations, USAE located and disposed of, by detonation, seventy-one MEC items, including seventy 40mm grenades and one 3.5-inch rocket; four items of MPPEH, including a projectile fuze, a bomb fuze, a 40mm projectile, and a CAD.

The QA Contractor requested that, during DGM intrusive operations, USAE leave all target excavations open, pending QA check. Once the QA Contractor inspected these target locations, they notified USAE, who then backfilled and restored the area. This procedure did not follow MEC QAPP, SOP 5 – Intrusive Operations. An FCR was not prepared to address this change (refer to Part II Section 5.2 and Section 6.0 for additional discussion). All clearance operations at RG-01 were inspected and approved by QA and the Navy (see Part II, Appendix B, 00-AOC Certification, Final QA RG-01).

DGM surveys identified a total of 6,035 anomalies selected for intrusive investigation; however, the actual number of anomalies investigated was reduced to 5,170 because the investigation criteria were changed from 3 mV to 7 mV. There were a total of 24 “no finds” and one dig abandoned below 2 ft depth [target 160, barrel, Grid CU40, (see Part II, Appendix K, Intrusive Results and Appendix B, Grid QC to QA Submittals)]. The no finds were reviewed by the Site Geophysicist and passed to the QCM for inspection. The QCM re-visited the target locations and reported back to the Site Geophysicist his findings. All no finds were resolved as no anomalies and most likely data spikes and reported to QA on the QC Submittal Report by grid (see Part II, Appendix B, 00-AOC Certification, Grid QC to QA Submittals).

4.1.11.2 Post-Intrusive Target Validation

A total of 24 anomalies were rechecked. The final anomaly resolution results are provided in the intrusive results in Part II, Appendix K. No MEC or MD was recovered in any of the anomaly rechecks. All DGM intrusive review documentation is included in Part II, Appendix J.

FIGURE 4-4: EXPLOSIVES MAGAZINE

4.1.12 MEC/MPPEH DISPOSAL

Disposal of MEC/MPPEH was performed by detonation, using donor explosives shipped to Adak and stored in the Government's portable explosives magazine (see Figure 4-4).

During RG-01 clearance operations, USAE located and disposed of, by detonation, seventy-one MEC items, including seventy 40mm grenades and one 3.5-inch rocket; four items of MPPEH, including a projectile fuze, a bomb fuze, a 40mm projectile, and a CAD. All 40mm grenades were BIP and other DMM (from LJ-01) and MPPEH were detonated in consolidated shots. Due to the large number of MEC encountered and explosives being shared by the Lake Jean and OUB-2 projects, it was necessary to replenish donor explosives by delivery from the explosives supplier in Anchorage by chartered aircraft. Documentation of the location, date, depth, etc., and explosives documentation is provided in Part II, Appendices H and I.

In addition to the items above, USAE disposed of 22 MPPEH items (see Part II, Appendix H, Historical items) that were placed in the explosives magazine by the QA Contractor and/or the Navy EOD Technical Detachment for possible seed items for the GPO. Because these items could not be positively certified as inert, they were treated by demolition using jet perforators prior to final inspection, flashing, and disposal.

TABLE 4-4: RG-01 MEC/MPPEH/MC SUMMARY

UXO	MPPEH	Nomenclature
	1	Projectile, 40mm, HE, w/SD tracer (broken)
	1	Ball Assembly, 40mm, M381, HE (breached)
5		Projectile, 40mm HE, M406
3		Projectile, 40mm, CS M651
1		Projectile, 40mm, HE, M381
14		Projectile, 40mm, HE, M397
41		Projectile, 40mm, HEDP, M433
1		Projectile, 40mm, Practice, M407A1 (MEC)
5		Projectile, 40mm, Smoke, M716
1		Rocket, 3.5 inch, HEAT, M28
	1	Fuze, Projectile, PD, M48 Series
	1	Projectile, 40mm, SD. Model Unknown
	1	Fuze, Bomb, Impact, MK 219-4

UXO	MPPEH	Nomenclature
	1	Initiator, JAU-22B
71	6	**77-Total**

4.1.13 MANAGEMENT OF WASTE FROM MUNITIONS OPERATIONS

In accordance with the requirements of NAVSEA OP 5, the NAVFAC Commander authorized USAE's SUXOS and the QA Contractor to certify MPPEH as safe for shipment (see Part II, Appendix I, Folders 11 and 12).

4.1.13.1 Thermal Flashing

Munitions debris was inspected by UXO technicians, certified by USAE, verified by the QA Contractor, and then flashed in a TFU (see Figure 4-5) prior to being sealed in barrels and shipped to a recycle facility for final disposal. Due to the TFU limitation of no explosives, class 1.1, only items that were certified as 5X safe and small arms were flashed. Between June 3 and August 16, 2008, USAE operated the TFU eight days and flashed 1,761.5 lb of munitions debris in accordance with SOP 6 procedures.

FIGURE 4-5: THERMAL FLASHING MUNITIONS DEBRIS

4.1.13.2 Containerizing and Documenting MPPEH for Shipment

USAE shipped 1,761.5 lb of munitions debris to the recycle facility, (Timberline Environmental Services) for final processing. Timberline processed the debris in accordance with the WP requirements and issued destruct certificates upon final processing (see Part II, Appendix I, Folders 14 and 15). During transportation on the barge from Adak to Seattle, a seal on one of the barrels was inadvertently broken. To ensure no material was introduced into the barrel, it was held at the Samson Tug and Barge warehouse until two of the NAVFAC-authorized USAE personnel could re-inspect the contents and reseal the barrel. The two USAE Navy-authorized SUXOS' inspected the contents and resealed the barrel on December 2, 2008, and then shipped it to the recycler.

4.1.14 MUNITIONS CONSTITUENTS SAMPLING

Breached munitions were found in RG-01 during UXO clearance activities and soil samples were collected for MC analysis at the breached munitions locations in accordance with the MC QAPP. Follow-up sampling was conducted at one MIS soil sample location because the concentration of RDX in the sample exceeded the screening level established in the MC QAPP. This section describes the sampling activities and presents a summary of the analytical results for the samples.

Breached Munitions: Breached munitions were found at two locations in RG-01 (Flag CU41-313 and Flag CS41-146) during UXO clearance activities (see Part II, Appendix H, for information on the items and Part II, Appendix A, Figure A-39 for the locations). CU41-313 was half of a fragmentation ball from a 40mm M381 HE grenade and CS41-146 was the rear half (including the tracer) of a 40mm projectile. The 40mm projectile was recovered on 15 June 2008, and the 40mm grenade fragmentation ball on 1 August 2008. USAE tested the items and soil beneath to confirm the presence of HE using an EXPRAY (see Figure 4-6). The test on the 40mm ball was positive for explosives; however, the 40mm projectile test was inconclusive so both were categorized as breached munitions. The soil beneath each item was tested prior to sampling with EXPRAY and showed negative results for HE (see Field notes in Part II, Appendix N). However, the actual soil sampling for these items was delayed until 9 September 2008, pending approval of the MC QAPP for LJ-01 and RG-01.

FIGURE 4-6: POSITIVE EXPRAY TEST OF CU41-313

MIS Soil Sampling: MIS soil samples RG-01-SL-01 and RG-01-SL-02 were collected in accordance with the MC QAPP by constructing 10-foot by 10-foot, 5- by 6-unit MIS sample grids centered on the former locations of the breached items. Each MIS soil sample was created from approximately equal volumes of soil from each of 30 subsample locations within the MIS grid. A clean, disposable stainless steel spoon was used to collect the subsamples. Once collected, the soil samples were placed in a double-bagged, sealed, 1-gallon Ziploc bag and then delivered to the designated analytical laboratory [Agriculture & Priority Pollutants Laboratories, Inc., Fresno, CA (APPL, Inc.)] for analysis of MC and perchlorate by EPA Method 8330B and Method 6850, respectively. The samples were further processed (air-drying, grinding, sieving) and sub-sampled and composited again at the laboratory, as required under Method 8330B. The Project Chemist completed the packaging and chain of custody documentation for the soil samples.

Soil sample locations are shown in Part II, Appendix N, Folder 05 and Appendix A, Figure A-39. Information about each sample is summarized in Table 4-5 and described below.

- RG-01-SL-01. The MIS sample grid at Target CU41-313 was oriented with the top of the grid facing north. The southeastern quadrant of each grid cell was randomly selected for collection of subsamples using a random number generator. The soil collected at RG-01-SL-01 was observed to be dark gray and brown, soft, moist, fine organic silt.
- RG-01-SL-02. The MIS soil sample grid at Target CS41-146 was oriented with the top of the grid facing north. The southwestern quadrant of each grid cell was randomly selected for collection of subsamples using a random number generator. Duplicate and triplicate samples (RG-01-SL-102 and RG-01-SL-202) were taken from the southeastern and northwestern quadrants of the cells. The soil collected at SA93-01-SL-02 was observed to be a dark gray and brown, soft, moist, fine organic silt.

Additional information about sample collection and analysis, including sampling records, field notes, photographs, laboratory reports for the samples, and other relevant sample documentation, is provided in Part II, Appendix N. Munitions Constituents Sampling Lab Results.

MIS Soil Sample Results: The analytical results for the MIS samples are presented in Table 4-6. HMX and RDX were detected in the MIS sample collected at RG-01-SL-01. No MC were detected in the MIS samples collected at RG-01-SL-02. As described in the MC QAPP, if the concentrations of all constituents in a MIS sample collected at a breached munitions location are less than the action levels identified in MC QAPP WS #15, then no further action is necessary to address MC at that location. If concentrations of one or more constituent in the MIS sample exceed the action levels, then the potential risks posed by the constituents to human health and the environment are to be evaluated to determine if further action is required. As indicated in Table 4-6, the concentration of RDX in RG-01-SL-01 exceeded its action level.

Follow-up Sampling. The MC QAPP did not provide procedures for evaluating risk or conducting follow-up sampling in the event of an action level exceedance. Due to limited time remaining in the field season, concerns about the RDX exceedance affecting the completeness of the NTCRA, and the need to evaluate risk posed by RDX in the soil, the contractor conducted follow up sampling based on knowledge of ADEC risk assessment guidelines. An FCR (FCR-12) that detailed the design and sampling procedures was developed, sampling personnel were re-mobilized, and the additional sampling was performed during the week of October 6 - 12, 2008.

The follow-up samples (SL-01A through J) consisted of 10 discrete soil samples (nine normal and one field duplicate) obtained from the 10-ft by 10-ft MIS sample grid for RG-01-SL-01. Soil samples RG-01-SL-01A through RG-01-SL-01J were collected by reconstructing the 10-ft by 10-ft former MIS sample grid and dividing it into nine cells. FCR-12 (see Part II, Appendix L) provides more detail concerning the need for and design components of the follow-up sampling effort. Individual samples were collected from the upper 3 inches of soil in the center of each grid cell using disposable plastic spoons. The soil was placed directly into clean glass sampling jars, with each jar representing a single discrete sample. The sample jars were then sealed, wrapped in bubble wrap, and delivered to the designated analytical laboratory (APPL, Inc.) for analysis. The samples were analyzed for RDX using EPA Method 8330B because RDX was the only analyte detected above its screening level in the original SL-01 MIS sample.

The sample locations are shown in Part II, Appendix N, Folder 03. Information about each sample is summarized in Table 4-5. Additional information about sample collection and analysis, including sampling records, field notes, photographs, laboratory reports for the samples, and other relevant sample documentation, is provided in Part II, Appendix N, Munitions Constituents Sampling Lab Results.

Follow-up Sample Results: The analytical results for the follow-up samples are presented in Table 4-6. RDX was detected in three samples (SL-01A, SL-01B, and SL-01E) and all concentrations were below the action level. The analytical results for the MIS and follow-up samples collected at RG-01 will be included in the MC risk screening evaluation being conducted as part of the Remedial Investigation (RI) for OUB-2. The risk screening evaluation will determine if the presence of MC in soil at RG-01 requires additional remedial action, or if MC at RG-01 can be assigned NOFA status. The results of the risk screening evaluation will be presented in the RI Report.

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TABLE 4-5: MC SAMPLING AT RG-01 BREACHED MUNITIONS LOCATIONS

Northing	Easting	Sample ID	Medium	Sample Type	Sample Date	QA/QC
340532.500	3130693.500	RG-01-SL-01	Soil	MIS (10 x 10 ft grid)	9/9/2008	
340503.000	3130278.000	RG-01-SL-02	Soil	MIS (10 x 10 ft grid)	9/9/2008	
340503.000	3130278.000	RG-01-SL-102	Soil	MIS (10 x 10 ft grid)	9/9/2008	Duplicate of RG-01-SL-02
340503.000	3130278.000	RG-01-SL-202	Soil	MIS (10 x 10 ft grid)	9/9/2008	Triplicate of RG-01-SL-02
340532.500	3130693.500	RG-01-SL-01A	Soil	Discrete	10/7/08	
340536.880	3130688.265	RG-01-SL-01B	Soil	Discrete	10/7/08	
340537.344	3130693.261	RG-01-SL-01C	Soil	Discrete	10/7/08	
340537.183	3130698.021	RG-01-SL-01D	Soil	Discrete	10/7/08	
340532.588	3130688.813	RG-01-SL-01E	Soil	Discrete	10/7/08	
340532.793	3130698.428	RG-01-SL-01F	Soil	Discrete	10/7/08	
340527.123	3130688.922	RG-01-SL-01G	Soil	Discrete	10/7/08	
340527.779	3130693.550	RG-01-SL01H	Soil	Discrete	10/7/08	
340528.059	3130698.171	RG-01-SL-01I	Soil	Discrete	10/7/08	
340532.500	3130693.500	RG-01-SL-01J	Soil	Discrete	10/7/08	Field duplicate of RG-01-SL-01A

NOTE: MIS = multi-increment sample, a single soil sample made up of 30 discrete sub-samples obtained within a specified decision area.

TABLE 4-6: SUMMARY OF ANALYTICAL RESULTS

Sample ID	Medium	Sample Type	Summary of Results
RG-01-SL-01	Soil	MIS	RDX (6.4 mg/kg) and HMX (1.3 mg/kg) detected
RG-01-SL-02	Soil	MIS	No detected target analytes
RG-01-SL-102	Soil	MIS	No detected target analytes
RG-01-SL-202	Soil	MIS	No detected target analytes
RG-01-SL-01A	Soil	Discrete	RDX (0.46 mg/kg)
RG-01-SL-01B	Soil	Discrete	RDX (0.2 mg/kg)
RG-01-SL-01C	Soil	Discrete	RDX (non-detect)
RG-01-SL-01D	Soil	Discrete	RDX (non-detect)
RG-01-SL-01E	Soil	Discrete	RDX (0.42 mg/kg)
RG-01-SL-01F	Soil	Discrete	RDX (non-detect)
RG-01-SL-01G	Soil	Discrete	RDX (non-detect)
RG-01-SL01H	Soil	Discrete	RDX (non-detect)
RG-01-SL-01I	Soil	Discrete	RDX (non-detect)
RG-01-SL-01J	Soil	Discrete	RDX (non-detect)

4.1.15 REPORTING AND DOCUMENTATION

USAE began operations on Adak on June 2, 2008 and completed all RG-01 operations on August 26, 2008. Throughout operations site management and supervisors completed checklists, logs, and reports to include:

- Daily operations, general safety, and daily QC reports (see Part II, Appendix D
- Maintained logbooks (see Part II, Appendix G)
- Performed tailgate safety briefings and inspections on project vehicles and equipment (See Part II, Appendix I)
- Tracked grid clearance and MEC encountered (see Part II, Appendices H and K).

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5.0 PROJECT QC/QA RESULTS
5.1 AUDIT FINDINGS

During 2008 site operations ADEC and NOSSA conducted site visits to audit the field procedures for compliance with the approved plans.

5.1.1 ADEC

ADEC performed an audit on Adak from 26-28 June 2008 and had one minor observation about signage at LJ-01, noting that it was too small for easy recognition. The sign was replaced. ADEC also visited for an audit of another Adak contractor during the period from 14-21 August 2008; however, ADEC representatives did not visit the Lake Jean\Rifle Grenade Range project because all operations were complete.

5.1.2 NOSSA

NOSSA performed a site audit of Lake Jean KR02 operations on from Adak 28-29 July 2008. Overall the project was found compliant with explosives safety and environmental criteria. There were 10 NOSSA findings, none of which were major deficiencies. The following NOSSA findings and USAE responses are summarized:

Para 8a FINDING – Project QC personnel installed in the Instrument Test Strip (ITS) three iron pipes to serve as surrogates for the aluminum 40-mm rifle grenade instead of the prescribed "Aluminum Simulant" objects. Paragraph 1.12.1 of reference (d) and Table 2-1 of Standard Operating Procedure (SOP) 12 of Appendix B of reference (e) pertain.

Para 8a RESPONSE – The instrument test site was built in accordance with Table 2-1: Examples of Instrument Test Site Seed Item Layout, of SOP 12. The UXO Quality Control Specialist (UXOQCS) established the ITS in accordance with the Work Plan using aluminum simulants for the 40mm grenades; however the Site Manager and the Quality Control Manger (QCM) erroneously assumed simulants from previous years (ferrous metal) were emplaced by the UXOQCS. The UXOQCS was not present during the conversation with the inspector when this issue was discussed during the audit. The simulants were verified by the QCM to be aluminum by actually digging them up.

Para 8b FINDING – Not all project personnel had acknowledged in writing that they reviewed the project SOPs prior to use. Paragraph 11a of reference (f) pertains.

Para 8b RESPONSE – Initially teams were structured according to assigned tasks and prior to the task all personnel on the team signed the applicable SOP. USAE structured operations on two separate projects on Adak to share some resources between the projects. In addition both projects had identical SOPs and when a team member moved from one project and task to another, they lost sight of which project they were working and whether they had signed both sets of SOPs. All personnel have been briefed and signed acknowledgements on all SOPs.

Para 8c FINDING – Neither of the two explosive vehicle operators certified by the contractor as being qualified to operate the explosive conveyance vehicles were medically certified to transport ammunition and explosives on Navy property. And the one individual who was medically certified was not certified by the contractor. Section 2-2 of reference (g) pertains.

Para 8c RESPONSE – The vehicle operators all had a Commercial Driver License (CDL) with a Hazardous Material Endorsement; however, two did not have the Department of Transportation (DOT) medical certification. All USAE personnel have a current Occupational Safety and Health

Administration (OSHA) medical clearance, which is more stringent than the DOT medical certification. Based on previous experience, USAE assumed the OSHA certification was sufficient.

All of the Explosive vehicle operator's medical clearances have been evaluated by USAE's medical subcontractor and medically certified to operate explosive conveyance vehicles. All have been certified by the contractor to transport explosive conveyance vehicles.

Para 8d FINDING – The Senior UXO Supervisor had not received the required 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training mandated by the Occupational Safety and Health Administration. Section 1910.120(e)(3) of reference (h) pertains.

Para 8d RESPONSE – The report indicates the SUXOS does not have the required 40 hour HAZWOPER course. In fact the SUXOS has the 40 hour HAZWOPER course. The issue was with the Site Manager. The Site Manager had completed a "Defense Hazardous Materials/Waste Handling Course" from the military in 1995 that was believed to meet the requirements for the initial course. The interpretation was that this course does not meet the requirements; however, his documented military training and experience did meet the requirements of 29 CFR 1910.120(e)(9) and a 40 hour certificate was issued by USAE.

Para 8e FINDING – From 16 through 22 June 2008 team leaders failed to inspect equipment used for intrusive operations. Paragraph 5 of SOP 5 of Appendix B of reference (e) pertains.

Para 8e RESPONSE – The team leaders mistakenly believed this was a one-time requirement. This mistake had been caught by the UXOQCS and corrected previous to the audit. After instructions by the UXOQCS, the teams began the daily inspections as required.

Para 8f FINDING – The quantity of explosive jet perforators marked on the magazine data card did not match the quantities in stock. Additionally, the partially-filled explosive jet perforator package was not specifically marked as a "LIGHT BOX" in the largest practical letters using a contrasting orange color scheme (for example, black letters on an orange background, or orange letters on a white background) on the tops, sides, and ends of the container. Paragraph 7.2 of SOP 8 of reference (e) and paragraph 11-2.6.4 of reference (c) pertain.

Para 8f RESPONSE – Partially concur. The magazine data card did match the quantity on hand. The temporary quantity marked on the "LIGHT BOX" had not been changed after the last issue and was inaccurate and did not match the quantity on hand. The quantity was corrected and more attention to detail was begun. The words "Light Box" in blaze orange lettering were placed on all light boxes.

Para 8g FINDING – The emergency notification lists were not affixed to the inside of either the demolition explosives magazine door or the detonator box. Paragraph 7.1.4 of SOP 8 of Appendix B of reference (e) pertains.

Para 8g RESPONSE – The emergency notification list had blown off the inside door of the magazine and had been folded and placed inside the magazine. The list was again affixed to the inside door and instruction to reaffix the list should it again come off has been communicated to all personnel that enter the magazine.

Para 8h FINDING – None of the White's XLT detectors were validated in the Geophysical Prove Out, nor did operators test the capabilities of the EM61s in the ITS in order to validate their capabilities to detect items of interest. Paragraphs 1.12 and 1.12.1 of reference (d) pertain.

Para 8h RESPONSE – This finding was caused by an administrative error in the ESS. The last sentence of the second paragraph of paragraph 1.12 of the ESS should have stated that the White's would be validated at the instrument test site (ITS) instead of the GPO. The GPO is not an appropriate test area for the White's detector. Due to the length of time necessary to change the ESS and the minor nature of this change no action was taken on this finding. As the change would not affect the effectiveness of the instruments, no revision to the ESS has been made.

Para 8i FINDING – One UXO Technician whose White's XLT detector failed the ITS on 2 July 2008 did not annotate on the Equipment Checkout Form if any corrective action or preventive maintenance was undertaken before resuming use of the instrument the next day. Paragraph 8.3 of reference (e) pertains.

Para 8i RESPONSE – After the initial testing of the White's XLT metal detectors in the Instrument Test Strip (ITS), failures began to occur with the instruments in subsequent ITS checks. Analysis of the problem identified the root cause to be moisture build-up in the instrument cases. The problem was solved by bringing the instruments into a controlled environment overnight (personnel's quarters), opening the case and allowing them to dry inside before being placed back into operation. USAE has subsequently ensured that this corrective action was documented on the inspection sheet.

Para 8j FINDING – The NAVFAC Northwest Commanding Officer has not designated in writing any person to verify MPPEH as safe. Paragraph 13-15.7 of reference (c) pertains.

Para 8j RESPONSE – Battelle and NAVFAC NW had not completed this activity before the audit. USAE's personnel were designated in writing by the NAVFAC Northwest Commanding Officer to certify MPPEH as safe and documentation was on hand. The finding was for the QA contractor's personnel for verification and that is also now approved and on hand.

The audit reports and USAE's corrective actions responses are located in Part II, Appendix M.

5.2 DEVIATIONS FROM THE PROJECT PLANS

Prior to mobilization to Adak, USAE submitted Amendment 2 to the ESS for an additional MPPEH magazine and a TFU. This amendment was approved by the DDESB on 29 April 2008. The Amendment 3 changed the MGFD to the 3.5-inch rocket and extended the EZ. Because RG-01 is within the Navy-restricted Parcel 4, no formal request was submitted to NOSSA to remove the EZ that had been established originally in the ESS.

During site operations, it was necessary to modify procedures, forms, etc., because of inconsistencies in the plans and/or site conditions that were different than anticipated. As issues were encountered, USAE's field management team identified deviations from the approved plans and procedures. Once identified, the management team generated an FCR and submitted it through the on-site NTR and the RPM. Once approved, USAE generated a change to the plans and posted the change via the FCR to the QA Contractor's shared web site. As draft FCRs were generated, they were included in the Weekly QC/Status teleconferences to ensure all stakeholders were aware of changes and to provide a platform for possible stakeholder issues or concerns.

In total, the following 12 FCRs were generated for the RG-01 Project during site operations (copies of each of these FCRs are provided in Part II, Appendix L):

- FCR-1: Changed the depth of three seed items in the analog ITS to stay within detection capability of the Whites.
- FCR-2: Moved the location of the TFU and flashing operations to the parking area near the storage bunker at the former Modified Advanced Underwater Weapons Compound (MAUW).
- FCR-3: Added two more explosive magazine checks to MEC QAPP WS #34.

- FCR-4: Defined WS #35 “Per Occurrence” as opposed to every day work is done.
- FCR-5: Changed WS #35 form requirement for Definable Feature of Work (DFW) of Geophysical Data Processing Form to QC Surveillance Form.
- FCR-6: Changed SOP 12 Intrusive team structure to a Team Leader and up to six UXO Technicians.
- FCR-7: Changed SOP 1 Debris Removal team structure to a Team Leader and up to six UXO Technicians.
- FCR-8: Removed wording of 30 degrees or steeper for wearing full PPE ensemble to allow adjustment of ensemble due to site conditions rather than slope.
- FCR-9: NA to RG-01. Changed the number of historical targets on LJ-01 from 102 to 101.
- FCR-10: Changed SOP 1, Munitions Accountability Log, to capture necessary data to support NEDDS reporting.
- FCR-11: Changed RG-01 MGFD and EZ based on discovery of a 3.5-inch rocket.
- FCR-12: Added follow-up discrete sampling of one breached munition location.

Two of the FCRs (FCR-1 and FCR-12) were due to unexpected results when implementing site operations.

- FCR-1 changed Table 2-1 in SOP 12 to reflect depth of simulants that are within capabilities of detection of the Whites. Specifically, three items, items 5 (40mm), 10 (60mm), and 12 (81mm) were buried so deep (2 ft) that they exceeded the capability of the Whites to detect them. This change did not affect operations, since the Whites will detect munitions within the first 18 inches (where most items were expected) and the EM61 detected deeper items.
- FCR-12 added discrete sampling to further characterize MC based on: MIS results exceeding RDX screening levels for MC sampling (see paragraph 6.2.8, above); RG-01 is to be evaluated as part of the OUB-2 RI/FS; and available time was running out during the field season.

No Non Conformance Reports (NCRs) were issued by the QA Contractor or the Navy for site operations. However, during comment resolution on this document, it was noted that target excavations were not backfilled until QA was done. This was a deviation from the MEC QAPP, SOP5, Intrusive Operations. An FCR should have been prepared and submitted to the stakeholders during field work so this procedural change could have been approved or disapproved before it was implemented. Because no FCR was submitted, a NCR has been prepared. This NCR and a Root Cause Analysis have been added to Part II, Appendix L and a discussion of the Root Cause Analysis process is below.

The corporate QC Manager conducted a Root Cause Analysis to determine if the failure was the result of the process, procedures, equipment, and/or personnel. He provided his findings to the PQCM, and PM with suggested corrective actions. Once the corrective actions were reviewed and approved by management, the contractor implemented them.

5.3 AOC CERTIFICATION

An AOC certification packet for the 2008 RG-01 clearance was reviewed by USAE’s AOC certification team, who certified by the transmittal signature sheet (inside cover of Certification Letter, Part II, Appendix B, Folder 00) that all work was performed in accordance with the approved WP, and was checked using the procedures outlined in the MEC QAPP, WS #36. Individual certifications are included in the Certification Letter as attachments. The AOC certification consists of the QC-generated data, including but not limited to the DFW three-phase QC inspection forms, QC daily and weekly reports, QC grid reports, and QA certification reports. The AOC certification team completed the following actions:

- The Site Geophysicist ensured the accuracy and completeness of the GPO data and all DGM data collected during the field effort. This included processing, analyzing and reporting all instrument check

results (RTK DGPS Reoccupation checks, static DGM checks, and latency checks – included in Part II, Appendix J – 02 – Instrument Checks) to ensure that the instruments were performing normally and within project metrics each DGM survey day. He also assessed all production data to ensure sample separation, survey speed, and survey line spacing were within project metrics each day new production was added to the DGM database. The Site Geophysicist analyzed the production data for potential MEC anomalies in accordance with the data analysis established at the approved GPO (see Part II, Appendix F- 02 – Draft Lake Jean GPO Summary Report) and that the data, including dig lists and target maps were ready for delivery to the QA Contractor (see Part II, Appendix J – 01 – Adak Data Tracking Form) when each grid was complete. The Site Geophysicist worked with the UXOQCS to review all anomaly reacquisition and intrusive results, ensuring all investigations were complete and acceptable each day that the intrusive results database was updated. Anomalies that were unacceptable were rechecked. When the Site Geophysicist and UXOQCS were satisfied with the intrusive results for each grid, the UXOQCS forwarded them to the QA Contractor (see Part II, Appendix B – 00 AOC Certification – Grid QC to QA Submittals).

- The field QC team (the UXOQCS and Project QCM) conducted the QC procedures called out in the MEC QAPP. The Project QCM checked all of the three-phase QC inspection forms for the 28 DFWs and the QC to QA submittal folders for each grid for completeness and corrected any omissions found. The Project QCM verified that a final QA report was received from the QA contractor and was on file for each grid. The Project QCM compiled all of these documents for the AOC certification packet (see Part II, Appendix B, Folder 00, for the AOC certification packet contents) and forwarded it to the SUXOS, SM and the PQCM for further review.
- The SUXOS and SM reviewed the certification data for completeness and compliance with the approved plans, and forwarded the packet to the PM and Program Manager for review.
- The PQCM evaluated the packet for completeness, accuracy, and compliance with the approved plans and the SOW. The PM and Program Manager reviewed the packet for compliance with the SOW and incorporated it into the AAR for submission to the Navy for approval and acceptance.

5.4 INDEPENDENT NAVY QUALITY ASSURANCE

5.4.1 GPO CERTIFICATION

USAE conducted DGM surveys on the OU B-2 GPO grid with DGM Teams 1 and 2 on June 11, 2008. Preliminary GPO survey certifications for both teams were issued by the QA Contractor on June 13, and final GPO survey Certifications were issued on June 16. Although there were changes to the target picking threshold during the field season, the DGM teams did not physically re-run the GPO again for these changes and new GPO certifications were not issued. The teams acquired data on June 17 and 18, and received final reacquisition certification on June 20. The teams utilized the EM61-MK2 as the detector sensor.

5.4.2 DIGITAL GEOPHYSICAL MAPPING AND TARGET PICKS

USAE submitted 44 target data packets to the QA Contractor, plus raw data for evaluation. The QA Contractor certified the target selections plus added 141 additional targets. In July USAE evaluated the intrusive results and requested to raise the target investigation threshold to 7 mV.

The initial QA Certifications were based on a (USAE) target picking threshold of 3 mV on EM61 Channel 1. Note that this procedure is the same provided in the Calibration Grid contractor deliverables. On July 18, the USAE requested a change in target picking threshold to 12 mV based on the UXO targets found in the study areas (primarily RG-01) from intrusive investigations to that date. The QA Contractor responded via e-mail on July 21 to USAE indicating that the change was likely too large and would need to be tested against the GPO.

After subsequent teleconferences with the USAE and Navy, the QA Contractor provided a memo with an

analysis of the intrusive data to determine an optimum threshold that would still pass the GPO. Based on this memo, USAE obtained approval from the QA Contractor, the Navy and the regulators to increase the target picking threshold to 7 mV (with 10% QC sampling of targets between 3 and 7 mV) on July 24. The DGM data in grid CR39 was processed in two QA certification reports (CR39 and CR39A). At the end of the QA DGM processing, a total of 30 QA certification reports were submitted: 15 grids were finalized at the 3-mV threshold, and 16 grids were finalized at the 7-mV threshold.

5.4.3 DIGITAL GEOPHYSICAL MAPPING SURVEILLANCES

All USAE geophysical system tests and DGM data submitted to the QA Contractor were found to be in compliance with project DQOs and contractor SOPs. Thus, they did not flag any USAE geophysical system tests or DGM data. There were significant areas in RG-01 where DGM data could not be acquired (inaccessible). Due to the large amount of inaccessible terrain in RG-01, the DGM field data acquisition was not done in a grid basis; instead, the following procedure was used.

(1) DGM field data were acquired by both USAE teams in accessible areas in a general region of the AOC.

(2) The DGM data were parsed (or windowed) to the local grid boundaries.

(3) The separate grids were provided to the QA Contractor.

In RG-01 almost half of the AOC was considered inaccessible. The USAE mapped out these inaccessible areas in RG-01 and provided these coordinates to the QA Contractor. To help ensure that USAE obtained DGM data over all accessible areas the QA Contractor performed field surveillances to check these areas.

QA seeds (14 each) were installed in RG-01 to validate the QA target concurrence.

Many of these seeds (nine of 14) were installed in areas considered “inaccessible” by USAE and thus were not detected in the USAE DGM data. Several of these seeds (2, 3, 4, 5, 7, 8 and 13) were installed on the edge of hillsides to test if USAE was able to map relatively steep terrain. USAE was generally able to acquire DGM data close to these locations, but not able to acquire sufficient data to detect these seeds. The QA Contractor visited these seed locations and concluded that USAE met the minimum DQOs in terms of DGM coverage, considering the safety of the field crews.

5.4.4 INTRUSIVE INVESTIGATION SURVEILLANCES

The UXO intrusive teams were observed by the QA Contractor on a daily basis and a formal surveillance was completed weekly. The initial operations centered on debris removal analog clearance of step out grids remaining from the 2006 field season in RG-01. Whites were used for the surface clearance, analog and DGM target clearances. In RG-01, personal protective equipment Level 4 was required with the addition of a helmet with face shield, flack vest and demining trousers because of the presence of 40mm grenades. QA surveillances comprised observation of:

- Debris removal and surface clearance
- DGM survey
- Target reacquisition
- Intrusive operations
- TFU operations
- Explosive demolition for disposal of munitions

- Vegetation removal
- Analog clearance.

During QA surveillances, the teams were checked for compliance with WP specifications outlined in their respective SOPs and QC checklists.

The initial effort was directed at conducting the analog survey of the step out grids remaining from the 2006 field season. The QC staff checked the grids between the completion of the analog sweeps and the beginning of DGM operation. The QA Contractor chose to wait to QA the grids after DGM operations, intrusive investigations and QC inspection. Following analog clearance, the area was DGM surveyed, targets reacquired and intrusively investigated. During the first grid QA certification, (CR39), an area to the north and northeast of the grid appeared to be less than a 30-degree slope. After using an inclinometer, it was determined that it was less and required DGM survey. The QA Contractor continued completion of grid CR39 and designated the discovered area grid CR39A. Following this find, USAE checked the rest of RG-01 and discovered additional areas that were originally identified as greater that 30 degree slopes (inaccessible) but were not. Those areas were resurveyed, DGM mapped, and investigated. According to the approved WP, USAE was required to submit only an AOC completion package for this area instead of a grid-by-grid QC package. This proved unworkable and USAE worked with the QA Contractor to develop QC packages for each grid. The QC staff and the QA Contractor worked to revise the first few QC reports to ensure all pertinent information was captured.

5.4.5 Quality Assurance Digital Geophysical Mapping

As part of the final QA Certification of USAE's DGM and intrusive work in RG-01, a subset of the QC approved grids was selected for QA DGM Remapping. All DGM and intrusive work scheduled for the 2008 field season in RG-01 was completed and certified by the QA Contractor.

The QA DGM remapping grids were semi-randomly located and of variable size, and often positioned to cover locations where UXO had been discovered by USAE. The QA DGM team was able to obtain DGM data into the inaccessible areas. This overlap into inaccessible areas was mainly accomplished to assure that remapping data coverage was adequate to check targets at or near the inaccessible boundaries. QA DGM overlap into the inaccessible areas was possible with very careful and time-consuming field procedures that are not practical (or safe) for production surveys. The QA DGM remapping targets were windowed to the accessible areas and investigated by QA. None of these targets were MEC or of sufficient size to fail the AOC.

5.4.6 MEC Destruction and Certification and Verification of Material Potentially Presenting an Explosive Hazard

During the course of the season, USAE conducted several BIP operations in RG-01 where 40mm HE grenades were discovered. Most of these operations involved multiple ordnance finds in several grids. When items could be moved, the former OB/OD area was used for demolition. During intrusive investigations in grid CU42, a 3.5 inch HE rocket was discovered and the EZ safety distance requirements were required to be increased. USAE exercised the protocol to get approval and conducted appropriate disposal of the item. USAE had two portable magazines located next to the access road leading to the RG-01 site. USAE stored demolition material in one and MEC that could be moved awaiting disposal and MPPEH awaiting inspection consolidated in the other. There were suspected live 20mm HE projectiles and MPPEH from the previous season discovered in one magazine along with BSIs used in GPO construction.

The suspected 20mm projectiles were painted and marked to resemble live item, but further investigation revealed they were manufactured to appear live but in fact were inert and used for training. To eliminate

any further confusion, the 20mms and MPPEH were destroyed with the first MEC disposal operation of the season. USAE's UXO intrusive team members inspected all debris immediately when discovered. A second inspection was conducted by the team leader prior to transporting the items out of the AOC. This ensured munitions debris and non-munitions debris were separated and live MEC or MPPEH was not present. The UXO teams then transported their munitions debris and non-munitions debris items to an area near RG-01 where they were stored in an explosives storage magazine used for temporary storage. The SUXOS, Safety or QC inspected all items removed from operational areas, segregated it and locked it in the magazine.

During TFU operations, the munitions debris was transported to the TFU site. The QA Contractor then observed the TFU operations, which included:

- Verify no MEC was placed in the TFU
- Observe the flashing process
- Verify explosive test spray kit results
- Conduct joint inspection of processed munitions debris and place into a 55-gal drum
- Verify drum sealing and record seal number
- Ensure only authorized personnel inspected processed materials.

The QA Contractor then signed shipping documentation stating that all thermally flashed material was inspected 100% by USAE personnel and verified by the QA Contractor and then sealed in 55 gal drums. The seal and container numbers were recorded on the document. The seal number was also documented on the QA surveillance report. These procedures continued throughout the field season for the LJ/RG site. Filled drums were marked and sealed with numbered seals and segregated from empty drums, and placed inside a locked maintenance bay at the MAUW.

5.4.7 Quality Assurance Studies and Analyses

The QA Contractor provided an evaluation of the DGM target picking threshold to be used in production work in RG-01. At the beginning of the field season the USAE utilized a 3-mV (Channel 1) threshold, the same threshold and procedure suggested in the OUB-2 GPO calibration grid handout. Ultimately, USAE raised the target picking threshold to 7 mV (with 10% QC sampling of targets between 3 and 7 mV) based on results from the QA DGM target picking threshold analysis document. The QA Contractor utilized the same threshold and methodology as USAE to pick QA targets. For RG-01, 15 grids were finalized at the 3 mV threshold and 16 grids were finalized at the 7-mV threshold. There were no False Positives found using the 7-mV threshold and thus the False Alarm Rate is remarkably equal to 0. There were very few QA DGM targets added to the USAE target lists. At the 3-mV threshold, the QA Contractor added 134 targets or about 3.5% of the total target list. At the 7-mV threshold, the QA Contractor added only eight targets, or about 0.4% of the total target list.

There was about two times the number of total DGM targets picked using the 3-mV threshold compared to the 7-mV thresholds. Since the number of grids for each threshold is similar this appears to be a valid estimate. Indeed, evaluation of the grids picked at both 3 mV and 7 mV shows that the exact ratio is 1.97. The total number of False Positives using the 3-mV threshold is 27 (of a total of 3785 DGM targets), resulting in an extremely low False Alarm Rate (defined as: No. of False Positives/Other Contacts) of 0.007.

5.4.8 Non-Conformance Reports

The QA Contractor did not issue any non-conformance reports to USAE for RG-01.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The documentation provided in this AAR supports the conclusion that all 2008 analog and DGM detected MEC in accessible areas of RG-01 was removed to a depth of up to 2 ft below the mineral soil surface in accordance with the requirements of the Action Memorandum and project planning documents. The goal of this work was to remove MEC (primarily 40mm grenades but included others) from RG-01 to a depth of 2 ft. For MC, the goal was to evaluate breached munitions sites to determine whether concentrations of COPC present in soil were below levels of concern so that no further action is acceptable, or whether levels were high enough to pose a human health risk or impact to the environment and therefore require further evaluation.

A NCR was prepared post field operations detailing a deviation from the Work Plan SOP 5 (see Part II, Section 5.2 for discussion) leaving excavations open until QA inspection however the deviation had no impact on the final outcome of meeting the project objectives.

There were a total of 24 “no finds” and one dig abandoned below 2 ft depth (see Part II, Section 4.1.11.1). The abandoned dig was the lower half of a buried barrel target that was below the 2- foot clearance require and was left in place. The no finds were resolved as most likely data spikes and the remnants of a barrel were left in place. The “no finds” and abandoned dig did not impact the final outcome of meeting the project objectives.

All site work met the Removal Action (RA) Requirements as discussed in Section 4.0 and documented in Appendices detailing procedures, results, QC checks and verifications, and third party QA verification of operations per the approved plans and validation of data generated. All data contained in this report and appendices documents the completion of the following RA requirements:

- Removing vegetation to an acceptable height to aid instrument use.
- Clearing the surface of metallic items for safety reasons and to minimize interference for the geophysical survey.
- Completing an analog clearance to the depth of detection but not to exceed 2 ft below the mineral surface layer.
- Completing DGM on all accessible areas (i.e., not areas with slopes greater than 30 degrees, water areas, in areas with obstructions such as rocks).
- Completing an intrusive investigation of all selected targets.
- Creating a 15-m safety buffer free of all 40mm grenades.
- Properly managing and disposing of MEC, MPPEH, and MD from the project.
- Sampling and analyzing soil from breached munitions via the MIS approach, and disposing of soil that is above the action criteria.

The current established RG-01 boundary meets the criteria of no detectable MEC (in the accessible areas of the AOC) within 15 m (see Part II, Appendix A, Figure A-4). All site performance criteria were completed and verified in accordance with WS #10, #11, #12, and #37 of the MEC QAPP and MC QAPP with no exceptions or exceedances. Supporting backup data is contained in Part II, Appendices B and N.

The DQOs and PQOs listed in WS #10 and #11 were met as documented in the final QA Report for each grid (see Part II, Appendix B, Folder 00, Final QA RG-01). The Site Geophysicist verified the performance measurements of WS #12 for the DGM survey met the performance criteria as described in Section 4.3 above. The Draft RG-01 AOC Certification (Part II, Appendix B, Folder 00) proposes that the MEC data usability assessment listed in WS #37 criteria were met and that the data is sufficient to support decision making about this AOC.

Two breached munitions, RG-01-SL-01 (a partial 40mm projectile) and RG-01-SL-02 (half of a HE ball from a 40mm grenade), were encountered and the locations were sampled. Based on their condition, these two breached munitions were, like the other non-40mm grenades, most likely “kick-outs” from the nearby OB/OD range.

Based on the distribution of MEC from the 2006 and 2008 clearances (see Part II, Appendix A, Figure A-4), the likely range firing was towards the northeast portion of the range, which is consistent with remnants of targets removed in 2006 and 2008 from the eastern section of the range. Only one 40mm grenade was located in the central portion (Grid CS41) by DGM survey which confirms the conclusion of the direction of the firing fan. Much of the western portions of the range is steeply sloped (greater than 30 degrees) and thus is inaccessible to DGM surveys, although these portions did undergo an analog NTCRA in 2006. These portions of the range could still contain subsurface MEC however the risk is low.

6.1 EVALUATION OF NTCRA EFFECTIVENESS

The NTCRA at RG-01 successfully and effectively removed MEC, defined the boundary of the range, and used the most current QC and QA procedures as verification. The analog clearance was an effective approach for detecting and removing MEC from the surface and near surface of the tundra mat. This method enhanced the safety of DGM and survey team personnel who could possibly have encountered 40mm grenades on or near the top of the tundra.

However, because of the bulky PPE and helmets, the weather (including high winds and rain), steep terrain, and the wet tundra grass, the analog detectors were not as effective as the EM61 used during the DGM survey. The EM61 equipment was able to locate and detect additional MEC items not detected by mag & dig analog clearance and analog QC operations.

6.2 EVALUATION OF THE NEED FOR FURTHER ACTION

The RG-01 NTCRA met all requirements of the Action Memorandum and the approved ESS. The MEC clearance, including the analog and follow-up DGM clearances, meets the remediation requirement of the Action Memorandum of a clearance to 2 ft below the mineral soil surface and no further clearance should be necessary. Although the NTCRA cleared RG-01 to the Action Memorandum requirements, the final remedy has not been determined and therefore the results of this work will be brought forward to the OUB-2 RI/FS for further evaluation.

6.3 RECOMMENDATIONS

NOFA is recommended for additional MEC clearance within the depth of 2 ft within the boundaries established for RG-01.

NOFA is recommended for MC of breached munition RG-01-SL-02; however, breached munition RG-01-SL-01 will require further review in the OUB-2 RI/FS.

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FINAL

AFTER ACTION REPORT FOR 2008 FIELD SEASON FOR LAKE JEAN LJ-01 AND RIFLE GRENADE RANGE RG-01

PART III: DOCUMENTATION SPECIFIC TO LAKE JEAN LJ-01 ADAK ISLAND, ALASKA

26 April 2010

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Contract Number N62742-05-D-1868, CTO KR02

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Appendix C. Site Specific Training Records

All Site Operations on LJ-01 were performed concurrently with RG-01. All training records are located in Part II, RG-01 Appendices, Appendix C, on the CD.

Appendix D. Daily Production and QC Reports

All Site Operations on LJ-01 were performed concurrently with RG-01. All daily reports are located in Part II, RG-01 Appendices, Appendix D, on the CD.

Appendix E. Weekly Quality Control Status Meetings

All Site Operations on LJ-01 were performed concurrently with RG-01. All weekly reports are located in Part II, RG-01 Appendices, Appendix E, on the CD.

Appendix F. GPO Report with QA Certification Approval

All Site Operations on LJ-01 were performed concurrently with RG-01. All GPO Documentation is located in Part II, RG-01 Appendices, Appendix F, on the CD.

Appendix G. Geophysical and UXO Team Logbooks

All Site Operations on LJ-01 were performed concurrently with RG-01. All logbooks and team journals are located in Part II, RG-01 Appendices, Appendix G, on the CD.

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02-LJ-01 MEC Log and Photos

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All Site Operations on LJ-01 were performed concurrently with RG-01. All explosives and MD disposal documentation are located in Part II, RG-01 Appendices, Appendix G, on the CD.

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- 01-LJ-01 Diglist.xls
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02-LJ-Grid_Status_8-23-08.pdf
03-LJ01_Historic_Targets_Intrusive_Results.xls
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05-BSI REPORT LJ-01.pdf

Appendix L. FCR, DCN, DN, NCR Reports

All Site Operations on LJ-01 were performed concurrently with RG-01. All FCRs and other applicable documentation are located in Part II, RG-01 Appendices, Appendix L, on the CD.

Appendix M. NOSSA and ADEC Audit Reports

All Site Operations on LJ-01 were performed concurrently with RG-01. All applicable audit reports and responses are located in Part II, RG-01 Appendices, Appendix M, on the CD.

Appendix N. Munitions Constituent Sampling Lab Reports

There were no breached munitions encountered on LJ-01 and no MC Sampling performed.

Appendix O. OUB-1 ROD
02-Adak OUB-1 ROD Amendment.pdf
03-Adak OUB-1 ROD.pdf

LJ-01 MAPS & DRAWINGS

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1.0 INTRODUCTION

This Part III of the AAR addresses the work that USAE performed at LJ-01, Former Naval Air Facility (NAF) Adak, Alaska, during the 2008 field season. USAE conducted this work under the Munitions Response Contract (MRC) for Worldwide Sites, Contract Number N62742-05-D-1868, Contract Task Order (CTO) KR02.

1.1 ORGANIZATION

This Part III is composed of the following sections, which cover an introduction, major work activities, technical approach, field procedures and documentation, data management, QC, and a compilation of the clearance findings and results based on field work and data collected during the field season:

- Section 1.0 – Introduction
- Section 2.0 – Remedial Action Objectives
- Section 3.0 – Field Procedures
- Section 4.0 – Results
- Section 5.0 – Project QC\QA Results
- Section 6.0 – Conclusions and Recommendations

Other site data from the clearance operations are contained in Appendices A through O on a compact disk (CD). These appendices are referenced throughout this AAR. When applicable, references herein direct the reader to sections of Part I for general operations and procedures and to Part II for documentation.

1.2 CHARACTERISTICS

This AOC sits within a north-south trending valley with steep walls (>30 degrees) on each side. The valley floor contained standing water (see Figure 1-1), which complicated intrusive operations. The entire historical LJ-01 site is about three acres including areas investigated previously. AOC LJ-01 is situated in the southeast portion of Parcel 4 in OUB-1 south of Andrew Lake and adjacent to the southeast portion of Lake Jean (see Figure 1-2).

The base of the site, accessible by truck, consists of thick, tall grass up to 4 ft high and low-lying tundra. Because the site was heavily vegetated, there was extensive vegetation removal required in order to provide access for surface clearance, debris removal, and DGM clearance operations.

FIGURE 1-1: STEEP SLOPES AND STANDING WATER

The AOC for the 2008 effort was 1.33 acres and included UoP 7 and 7A (1.28 acres) plus the exception area (0.05 acres) remaining from the 2004 Remedial Investigation (RI) (see Part III, Appendix A, Figure A-3).

1.3 HISTORY

The AOC was part of a larger military area, approximately 30 acres, known as the Lake Jean Ammunition Complex. There remain remnants of structures throughout the complex area. Evidence of abandoned ordnance supports the use of the overall area as an ammunition storage area. Additional evidence indicates the area may have been used as an ammunition distribution point and disposal through burial.

1.4 REGULATORY HISTORY

In accordance with CERCLA and the FFA, the U.S. Navy was required to complete all necessary remedial actions for site areas within OUB-1 on Parcel 4 of the former Adak Naval Complex, located at Adak Island, Alaska. Among these areas is the former Lake Jean-01 disposal area, which has been designated as AOC LJ-01. The objective of the accelerated response action for this site was to remove all MEC and munitions debris from this site as necessary to support the reasonably anticipated future use of the site.

The current land use for AOC LJ-01 is Navy restricted access area in Parcel 4. A Record of Decision (ROD) was signed in 2001 for OUB-1, which included the LJ-01 site (Part III, Appendix O, contains a copy of this ROD).

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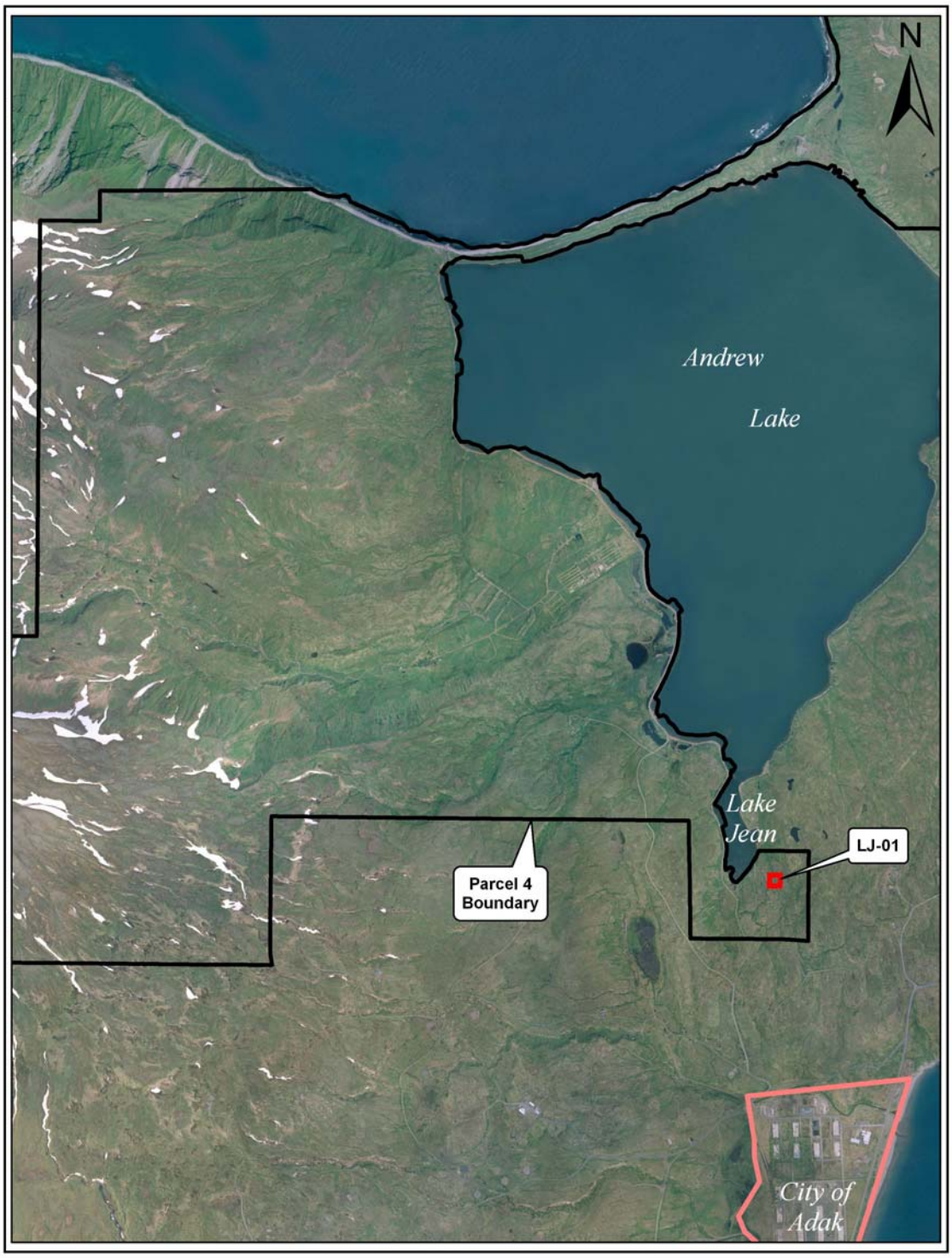

FIGURE 1-2: PROJECT LOCATION

1.5 SUMMARY OF PREVIOUS WORK AT THIS SITE

Geophysical investigation and munitions clearance at LJ-01 took place in 1999, 2000, 2001, and 2004.

This area was investigated in 1999. Discarded Military Munitions (DMM) (flares) was found, along with a single piece of UXO (hand grenade). This area was investigated a second time during the 2000 Remedial Investigation (RI). Two hundred and five targets were identified and intrusively investigated. Twenty-one targets were identified as UXO, primarily MK2 hand grenades. Seventy-two targets were identified as DMM, including small arms ammunition, projectile fuzes, 37mm projectiles, 60mm mortars, rockets, flares, and practice ordnance. Several UXO and DMM items were located near the AOC boundaries. Based on documentation, the condition of the hand grenades was that the safety pins were rusted, making them sensitive for handling, and they therefore were classified UXO rather than DMM.

The remaining targets were classified as metal waste; there were no finds or potential targets at depths greater than 4 ft. The goal of the 2000 field work was to establish the final boundaries for the area. The technique used was 100 percent survey of the subject boundary. One hundred and nineteen targets were investigated in 2000, and of these, 42 targets were DMM. Further expansion of the site boundary was planned for the 2002 field season but no work at LJ-01 was performed in 2002.

During the 2004 field season, this area was defined as three different UoPs: UoP 7 was the 2000 work area, UoP 7A was the 2001 work area, and UoP 9 was the 2004 work area. In each of these areas, expansion grids were completed to ensure that all MEC items had a 15-m ordnance-free buffer around them. Because this site was classified for RI, all geophysical mapping was performed to 100 percent coverage in order to comply with the Remedial Action Design Work Plan (RADWP), July 2004.

During 2004 field work, an area with construction debris was identified and designated as an “exception area.” This area was not completed during the 2004 field season because the equipment and time were not available to complete clearance. As work proceeded in 2004, problems were identified with the 2000 and 2001 field work during AOC Certification. The discovery of a 20mm projectile and a hand grenade during QC Step V (Intrusive Investigation), and the large number of MEC items found during QC Step III, caused the entire UoP (LJ-01 all 2000, 2001, and 2004) to fail the certification process and it was turned back over to production for rework. As a result, the geophysical anomalies identified in the earlier field work were re-investigated and additional ordnance was identified. However, this additional work was not completed during the 2004 field season. Therefore, additional work was necessary in 2008.

Investigations at LJ-01 consisted of 211 target anomalies in 2004. At the beginning of the 2004 field season, it was known that 40 targets left over from the 2001 field season remained to be excavated due to time constraints. During intrusive operations, it was discovered that a large area to the north of LJ-01 had a significant amount of construction debris. This area was bounded and designated an exception area (see Figure 1-3). Once the 40 remaining targets were intrusively investigated, multiple step-outs were geophysically surveyed until all MEC items had a 15-m ordnance-free buffer around them. After completion of the intrusive investigation at LJ-01, the QC team attempted to certify the entire LJ-01 area through an AOC Certification process.

FIGURE 1-3: 2004 CONSTRUCTION DEBRIS

During QC Step III [Pre-Intrusive Investigation (UXO Clearance) and QC Geophysical Sampling], the contractor’s Geophysical Quality Control Manager (GEOQCM) identified 13 additional targets. Upon further investigation, the UXO Quality Control (UXOQC) team found additional

MEC items. During QC Step V (Intrusive Investigation), the UXOQC team found the following in their first QC excavation:

- Two 20mm projectiles w/casing (DMM)
- Two hand grenades (Type MK2) (DMM)
- One signal cartridge (Type M11) (DMM)

To document this UoP failure, the QCM generated an NCR Number 1 (for a copy of this NCR, refer to Adak Final Draft RI/FS for OU B-1 Sites, January 2005, revised September 2006). Because all of the MEC items were found in the area that was investigated during the 2000 field season, the QC team divided LJ-01 into the following three areas:

- 2000 area: (UoP7)
- 2001 area: (UoP7a)
- 2004 area: (UoP9).

Once it was determined that the data was suspect and that the area investigated during the 2000 field season would require rework, there was a need for the establishment of areas to be used for the consolidation of nearby building debris. Debris Collection Area No. 1 was located in the northwestern corner of LJ-01 in an area that was surveyed during the 2004 field season. Items located in Debris Collection Area No. 1 included only metal waste items (buried drum and nails). Debris Collection Area No. 2 was on the southern boundary in what looked to be a geophysically clear area according to the 2000 and 2001 geophysical data. These debris collection areas were geophysically surveyed as a separate data set to verify that they were indeed clear prior to the stacking of debris.

During the 2004 field season, 69 targets, in total, were labeled as ordnance-related items. Six of these items were UXO, four were practice ordnance (MD), and the remaining 59 targets were classified as "Abandoned Ordnance (AO)" (DMM). It should be noted that these 59 remaining targets were actually comprised of a total of 229 individual DMM items. It should also be noted that if a target contained multiple similar DMM items, the entire target was labeled as AO and the number of DMM items was recorded in the quantity column of the database.

During the 2004 field season, 81 of the 148 targets in LJ-01 [2000 area (UoP7)] (see Table 1-1) were investigated and produced 57 AO targets (229 individual AO items), 48 OE scrap, three fragmentation, 36 bullet related, 42 metal waste, and nine no-finds. LJ-01 (2000 area) was not finished during the 2004 field season due to time constraints; because of this, future work was required in LJ-01 (2000 area) in order to meet the clearance criteria specified in the RADWP.

The high number of DMM items suggests that LJ-01 was used as a disposal area. Sixty-four pieces of Ordnance and Explosives (OE) scrap (refer to Table 1-1) (now referred to as munitions debris using current terminology) were recovered, along with 89 bullet-related items (munitions debris), six pieces of fragmentation (munitions debris), and 349 pieces of metal waste (non-munitions debris). Ten targets were attributed to hot geology, 23 were listed as "other," 18 were abandoned digs, and 219 were listed as no-finds. Statistics for this area, particularly the number of no-finds, were complicated by the fact that many of these targets were revisited multiple times as part of the rework effort. The large number of metal waste, "other," and dig abandons was attributed to the large amount of construction debris in LJ-01. Table 1-2 provides a summary of the items found at LJ-01 in 2004.

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TABLE 1-1: SUMMARY OF ITEMS FOUND AT LJ-01 DURING 2004 FIELD SEASON

Ordnance-Related Items	Total	Depth Range Below Ground Surface (bgs)				
		Surface	0-1 ft	1-2 ft	2-3 ft	3-4 ft
UXO	6	1	5	0	0	0
Abandoned OE	59	3	54	2	0	0
Practice Ord.	4	0	4	0	0	0
OE Scrap	64	0	61	1	2	0
Fragmentation	6	1	5	0	0	0
Bullet Related	89	4	75	10	0	0
Metal Waste	349	29	299	18	2	1
Hot Geology	10	6	4	0	0	0
Other	23	8	13	2	0	0
No-find	219	0	0	0	0	0
Dig Abandoned	18	2	6	7	2	1
Total	847	54	526	40	6	2

Note: Terminology extracted from previous investigation reports.

TABLE 1-2: SUMMARY OF MEC ITEMS FOUND IN 2004 IN LJ-01

Item	Quantity
Night Drift Signal, AN-MK	1
M46 Fuze	14
MK2 Grenade	7
40-mm Cartridge Case Base w/Live Primer	1
Fuze, Antitank, M1A1 used with M1A1 antitank mine	1
40-mm Flare	1
Non-electric blasting cap	1
20-mm HEI Projectile with casing	1
Cartridge, Flare w/residue	1
Fuze, Projectile PD M46	6
Striker Release Grenade Fuze	63
Fuze, Grenade	95
Casing, 37-mm w/propellant	1
20-mm projectile, HEI, w/ casing; 120 grains of propellant	2
Signal Flare Green Star M19	2
20-mm Projectile	3
1 ea M8 Aircraft Parachute Flare Broken Open	1

Note: Terminology extracted from previous investigation reports.

During the conduct of the geophysical survey, a practice grenade and a M46 point detonating fuze were found in Debris Collection Area No. 2. When reprocessed by the GEOQCM, the 2000 and 2001 geophysical data that were collected over this same area (Debris Collection Area No. 2) did not indicate that anomalies existed at the location where the practice grenade and fuze were found. The fact that the 2004 geophysical data set showed anomalies, whereas the 2001 geophysical data set did not, resulted in all the geophysical data collected in the LJ-01 (2000 and 2001 area) becoming suspect. Due to the finding of ordnance items in areas that were shown to be geophysically clear in previously collected data, the QCM generated NCR No. 2 and NCR No. 3.

During excavation of LJ-01 (2004 area), it was discovered that the northwestern area contained trash, as evidenced by the numerous amounts of construction debris that were found, including wooden planks and metal debris such as nails. Thus, the boundary of this proposed exception area was staked and these boundary points were recorded with a GPS. Although all targets within the proposed excavation area were investigated in accordance with established procedures, targets on which confirmation sampling methodologies were conducted were not remediated. Rather, the UXO teams performed "confirmation sampling" to verify that the anomaly was a continuation of the construction debris that surrounded the area in question. During confirmation sampling, once the target was confirmed to be construction debris, the investigation of that particular target ceased.

Geophysical work in LJ-01 in 2004 involved completing 100 percent geophysical mapping around previously identified OE-related items in order to establish a 15-m ordnance-free buffer around DMM. This resulted in 1.64 acres of new geophysical data coverage during the 2004 field season. Geophysical operations were completed at this site on 25 September 2004. Intrusive operations were completed on 29 September 2004. Within LJ-01 (2004 area), 211 geophysical targets were investigated.

Based on the QC data for the 2004 portion of LJ-01 (UoP 9) the Six-Step QC process was completed for this portion of AOC LJ-01. In 2008, further work was required in the 2000 and 2001 portions of LJ-01 (UoP 7 and 7a), including the 2004 exception area and the 101 targets remaining from 2004 (see Part III, Appendix A) in order to meet the criteria specified in the OUB-1 ROD. It is anticipated that AOC LJ-01 will be designated for NOFA in the future, when all UoPs that make up the LJ-01 AOC have successfully achieved completion of the AOC Certification process.

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2.0 REMEDIAL ACTION OBJECTIVES

The objective of this project was to reduce MEC and MC risk to an acceptable level for the wildlife refuge land use and the eventual transfer to the USFWS. Another objective was completing the work to the satisfaction of the stakeholders (Navy, EPA, ADEC and USFWS).

2.1 REMEDIAL ACTION REQUIREMENTS

USAE was to complete the LJ-01 work in accordance with the requirements of the OU-B1 ROD, the 2004 AAR, including clearance to 4 ft below the top of the mineral surface. In addition, requirements included:

- Clearing the remaining construction debris in the "exception area" and investigating all geophysical anomalies in this area
- Removing vegetation to an acceptable height to aid instrument use
- Clearing the surface of metallic items for safety reasons and to minimize interference for the geophysical survey
- Conducting intrusive investigations of the remaining 101 targets from 2004
- Performing a 100 percent DGM survey of the entire UoP 7 and UoP 7A areas, mapping on all accessible areas (i.e., not areas with slopes greater than 30 degrees, water areas, in areas with obstructions such as rocks) and investigating all anomalies and completing intrusive investigation of all identified targets from the DGM survey
- Creating a 15-m safety buffer
- Properly managing and disposing of MEC and MD from the project
- Sampling and analyzing soil from breached munitions via the MIS approach, and disposing of soil that is above the action criteria

2.2 REMEDIAL ACTION GOALS

For MEC, the goal of this work was to remove MEC from LJ-01 to a depth of 4 ft. For Munitions Constituents (MC), the goal was to evaluate breached munitions sites to determine whether concentrations of COPC present in soil were below levels of concern so that no further action is acceptable, or whether levels were high enough to pose a human health risk or impact to the environment and therefore require further evaluation.

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3.0 FIELD PROCEDURES

The field procedures contained in this section address only LJ-01 site-specific or procedures different than the common procedures detailed in Part I of the report. Field procedures and results are organized by Work Element (and DFW when applicable to provide clarity) and only addressed if specific different or specific to LJ-01 than those Work Elements and/or DFWs in Part I.

FIGURE 3-1: AOC LJ-01

3.1 PROCEDURES FOR MUNITIONS AND EXPLOSIVES OF CONCERN

3.1.1 CHECK INSTRUMENT AT ITS

Personnel used the Whites during location surveys, vegetation clearance, and debris removal/surface clearance. The Whites was also used by personnel during excavations of DGM targets reacquired with the EM61 to aid in the investigation. See Part I, Section 3.1.11.

3.1.2 GEODETIC SURVEYING

USAE mapped LJ-01 using a Real-Time Kinematic Differential Global Positioning System (RTK-DGPS) in accordance with SOP 2 of the WP, including the AOC boundary, the limits of 30-degree slopes (as measured by an inclinometer) and exception areas such as obstacles and standing water deeper than 6 inches. In addition, the survey team located and marked the 101 historical targets from the 2004 effort for investigation by the intrusive team. See Part I, Section 3.1.7.

3.1.3 DEBRIS REMOVAL

The primary purpose of debris removal on LJ-01 was to first remove construction debris remaining at the site and then perform a surface clearance prior to DGM operations.

Surface clearance occurred over the entire LJ-01 site during the 2000, 2001, and 2004 clearance operations. The exception area noted during 2004 (see Part III, Appendix A, Figures A-01 to A-03) included construction debris and areas of standing water that are included in the LJ-01 2008 clearance operations. However, other debris piles were generated during site work and metal may have been located below the piles. UXO technicians performed an additional surface clearance operation to ensure no MEC, MPPEH; or non-munitions metal debris remained underneath where the piles were located.

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3.1.4 VEGETATION CLEARANCE

Based on a site visit in 2007, grass was expected to be as high as 3 to 4 ft. Grass this high would impede worker access, and could affect the depth to which metallic objects were detected during DGM and handheld geophysical instrument operation. Therefore, grass clearance was necessary (see Figures 3-2 and 4-3) to assist in visual observation of the tundra surface.

FIGURE 3-2: BEFORE VEGETATION CLEARANCE

3.1.5 SURFACE CLEARANCE

As stated above, surface clearance of LJ-01 was completed during the debris removal and vegetation clearance. See Part I, Section 3.1.9.

3.1.6 GEOPHYSICAL DATA COLLECTION

At LJ-01, previous work identified 101 additional targets in UoP 7 that remained for intrusive investigation. QC issues identified during past work indicated there may be additional munitions-related items remaining at this site. Prior to conducting DGM surveys, the 101 targets were located and marked by the location survey team and then intrusively investigated.

A 100 percent DGM survey of accessible areas at LJ-01 was performed after completion of the debris removal, surface clearance and removal of the 101 targets previously identified. USAE surveyed LJ-01, UoP 7 & 7A with sets of overlapping survey lines spaced every 2.5 ft to completely cover the area within the site boundary. Surveys began along the site's longest boundary to minimize turnaround time. Areas of the site that remained inaccessible to the DGM team [e.g., obstacles, slopes greater than 30 degrees, and pockets of standing water deeper than 6 inches (see Figure 3-3)] were documented in the positioned sensor data maps (see Part III, Appendix A, inaccessible areas). The DGM team avoided areas of standing water but attempted to extend portions of the sensor over these areas to provide coverage that was as complete as possible (see Part II, Appendix A, Figure A-02). See Part I, Section 3.1.12.

FIGURE 3-3: LJ-01 STANDING WATER

3.1.7 GEOPHYSICAL DATA PROCESSING

Daily, USAE's Site Geophysicist performed data processing, in accordance with WP procedures, resulting from the DGM surveys. While target investigation thresholds based on the GPO were changed from 3 mV to 7 mV at RG-01, the intrusive investigation of targets at LJ-01 remained at 3 mV. See Part I, Section 3.1.13.

3.1.8 MC SAMPLING

No breached munitions were encountered at LJ-01. See procedures for sampling in Part I, Section 3.2.

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4.0 RESULTS

This section includes results of the work performed during this project. It includes a discussion of the 13 work elements at the second work breakdown structure (WBS) level (4.1.x). If a particular section was lengthy or it was difficult to understand the results for each definable feature of work, additional subsections were added at the fourth WBS level (4.1.x.x) to provide clarity. During field operations on Adak, USAE generated documents that recorded all aspects of site operations. Table 4-1 in Part I provides a crosswalk of these various documents.

4.1 RESULTS FOR MUNITIONS AND EXPLOSIVES OF CONCERN

4.1.1 SITE SETUP AND TRAINING

Site preparation and training was performed concurrently for both LJ-01 and RG-01.) Therefore, see Part II, Section 4.1.1, for a discussion.

FIGURE 4-1: CONSTRUCTION DEBRIS REMOVAL

4.1.2 GEOPHYSICAL PROVE-OUT CERTIFICATION

The GPO certification was performed once for both LJ-01 and RG-01; the same two DGM survey teams performed the DGM surveys for LJ-01 and RG-01. See Part II, Section 4.1.2 for a discussion. Copies of all GPO certifications are provided in Part II, Appendix F.

4.1.3 LOCATION SURVEY

Location surveys were performed concurrently for both LJ-01 and RG-01 (see Part II, Section 4.1.4). Prior to beginning operations, the location survey team established the boundaries of UoP 7 & 7A and the exception area (see Part III, Appendix A; Figure A-1).

FIGURE 4-2: DEBRIS REMOVAL

4.1.4 DEBRIS REMOVAL

Several hundred pounds of construction debris (primarily wooden boards) remaining from the 2004 clearance effort was moved outside of the planned clearance area (see Figures 4-1 and 4-2). The areas below the debris piles were inspected for surface MEC, MPPEH, and/or non-munitions debris in accordance with SOP 1 and two hand grenade fuzes, M204 were located under the debris. Additional areas of construction debris were also encountered and removed during the surface clearance. The debris was moved outside the 2008 clearance area and left in place at the conclusion of site operations. No other surface MEC or MPPEH was encountered during the operation.

4.1.5 VEGETATION CLEARANCE

The vegetation growth was extensive at LJ-01, requiring vegetation cutting over more than 60% of AOC. The vegetation ranged from tundra grass requiring no cutting to grasses as high as 3 to 4 ft. Prior to vegetation removal operations, a visual search/survey was conducted to determine the hazards that might be encountered (see Figure 4-4), which included surface MEC/MPPEH, terrain, slope, vegetation, wildlife, and environmental concerns. The TLs performed a visual search for MEC/MPPEH, surface debris, and any other obstruction/object that could pose a hazard to team personnel. Impassable terrain, or standing water that might have affected operations, was marked and team personnel were briefed on the hazards. No surface MEC or MPPEH was encountered during the operation. Three 4-person teams cut vegetation for two days at LJ-01. The vegetation clearance team cut the grasses to a 6-inch height as required by the SOP, to facilitate the DGM survey.

FIGURE 4-3: AFTER VEGETATION CLEARANCE

Upon completion of the vegetation clearance, the Location Survey Team used the Navy-provided coordinates to locate and mark the 101 remaining targets from the 2004 season. The intrusive team excavated all targets and recovered various DMM (see Part III, Appendix K, Folders 03 and 03a) including: 126 small arm rounds of various calibers; 11 grenade fuzes; 13 projectile fuzes; and a 20mm projectile.

4.1.6 DGM SURVEY

After completion of the debris removal, vegetation clearance, and investigations of the 101 targets from 2004, USAE performed 100 percent DGM survey of the 1.18 accessible acres of LJ-01 (UoP 7, UoP 7A, and the exception area). Prior to DGM surveys, QC emplaced two BSIs (one in the south central portion and one in the northwest quadrant of the AOC. See Appendix B, BSI Report for exact northern and eastern positions). During the period of 1 July 2008 through 5 July 2008 USAE conducted the DGM survey of the accessible area of LJ-01.

FIGURE 4-4: LJ-01 SURFACE CLEARANCE

During this DGM survey effort, daily QC tests and survey production data collection were carried out in accordance with the WP to ensure high-quality geophysical data. The results of these daily instrument checks, raw and processed production data, and QC data from the production DGM survey work were documented daily and uploaded to the QA Contractor's shared web site as "completed" (see Part II, Appendix J, Folder 04).

These daily and weekly submittals of QC and production data by USAE's Site Geophysicist to the QA Contractor were utilized as an alternative to written daily and weekly report submittals. The production and QC submittals were available to all parties during the 2008 field season, and copies can be found in Part II, Appendix J. All daily and weekly production data progress was conveyed to the Site Manager,

UXOQCS, and QA Contractor and was discussed during the weekly on-site conference call between USAE and stakeholders.

4.1.7 DGM DATA PROCESSING

USAE performed the initial data processing for AOC LJ-01 during the same period for the data collection as stated above. USAE selected targets for investigation based on the 3 mV target criterion established at the GPO and, after review by QA, 360 targets were identified for investigation.

The DGM raw and processed data, including dig lists and target maps were delivered to the QA Contractor for review. The QA Contractor approved the target selections and added 31 additional targets for QA validation.

4.1.8 TARGET REACQUISITION

USAE reacquired the 391 targets using the EM61, and flagged them for investigation by the intrusive investigation teams. All target locations reacquired were compared to target data locations for offsets by the Site Geophysicist, all targets were within the positional data precision and accuracy measurement criteria (2.5 ft ± 0.25 ft) (see Part III, Appendix J, Folder 04, Dig Lists). There were no "no finds" encountered during target reacquisition.

4.1.9 INTRUSIVE INVESTIGATION

All targets selected for investigation were resolved to the maximum depth of 4 ft bgs except for four targets that were determined to be non-MEC-related and left in place (refer to the discussion provided below, in Section 6.1). The team separation distance of 17 ft (based on the K40 distance for the 20mm HE M56A4 projectile) was maintained throughout the intrusive investigation. Disposal of MEC and MD from LJ-01 was completed in conjunction with RG-01 disposal operations at the RG-01 AOC (see Part I, Section 3.1.18). UXO Teams performed 468 DGM anomaly investigations (77 targets had multiple anomalies for a total of 468 anomalies) in addition to the 101 historical targets from 2004. All MEC was encountered at a depth of 1 ft or less below the mineral soil surface. A total of 48 MEC items, as listed in Table 4-1, were recovered; for detailed descriptions of the items, see Part III, Appendix H. In addition, some assorted small arms ammunition and munitions debris such as cartridge cases, small arms projectiles, etc., were recovered and disposed of with munitions debris scrap after certification and flashing. No MEC was encountered within a 15-m buffer of the site; therefore, no step-outs were required.

The QA Contractor requested that, during DGM intrusive operations, USAE leave all target excavations open, pending QA check. Once the QA personnel inspected these target locations, they notified USAE, who then backfilled and restored the area. All LJ-01 areas cleared were inspected by USAE QC staff and then QA checked by the QA Contractor. All cleared target locations at LJ-01 were inspected and approved by the QA Contractor (see Appendix B for QA acceptance). No QC or QA failures occurred for the clearance of UoP 7, UoP 7A, and the exception area.

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TABLE 4-1: TOTAL 2008 MEC ENCOUNTERED

Depth (ft)	UXO	MPPEH	DMM	Remarks
0.5			1	Cartridge, 20mm, HE, MK 2, w/fuze MK 26
0.1			1	Cartridge, 20mm, HE, Model Unknown
0.5			1	Fuze, Hand Grenade, Pyro delay, M10A1
Surface			2	Fuze, Hand Grenade, Pyro delay, M204
0.2 - 0.5			24	Fuze, Hand Grenade, Pyro Delay, M10A2
0.5			12	Fuze, Projectile, PD, M46
0.1 - 0.5			3	Fuze, Projectile, PD, M47
0.5			1	Fuze, Projectile, PD, M56
1.0			1	Projectile, 20mm, HE, MK 3 w/fuze MK 26
1.0			1	Projectile, 20mm, HE, Model Unknown
0.2		1		Flare, Model Unknown

On LJ-01, metal objects were left in place on target numbers 280, 297, 329, and 338 (see Figure 4-5). Additionally, target number 25, a large rock with a 4.2-mV reading was left in place. Target 280 was a large metal bracket attached to a heavy wooden beam; the team dug underneath the bracket and the areas around and under the large beam, checked with the Whites; no additional anomalies were detected. Targets 297 and 329 were nails in the bottom side of a large beam. The team dug underneath the beam and checked with the Whites; no additional anomalies were detected. Target 338 was a corner of concrete foundation with a wooden beam and a single large nail. The team was unable to dig underneath the concrete. The team removed all of the nails from the beams to ensure the anomalies were resolved. The team intrusively investigated around target number 25 and could not find any metal that would account for the reading. The QA Contractor also checked the anomaly locations with a Vallon metal detector and no additional anomalies were detected at the four locations. The QA Contractor and the NTR agreed that the beams and concrete would not require excavation with a backhoe since nothing else was found at the locations (see Part III, Appendix B, Resolution of four Targets and Part III; Appendix A, Figure A-04). The issue was discussed during the weekly status teleconference and all stakeholders agreed that the five targets were resolved.

FIGURE 4-5: BURIED DEBRIS

4.1.9.1 Post-Intrusive Target Validation

USAE's Site Geophysicist reviewed 100% of the LJ-01 intrusive results. Anomalies that required rechecking were reinvestigated (see Part III, Appendix B, Grid QC Submittals). The intrusive teams logged the recheck results in the same manner as the original dig. A total of four targets [numbers 26

(3.2 mV), 33 (3.2 mV), 40 (3.2 mV) and 349 (10.2 mV)] were rechecked and recorded as false positives, nothing was found at any of the locations to account for the mV readings in the collected data. All DGM intrusive review documentation is included in Part II, Appendix J, Folder 04 and Part III, Appendix B, Folder 00.

4.1.10 MEC/MPPEH Disposal

No demolition was performed at LJ-01. The 48 items described in Table 4-1 were disposed in a consolidated shot at the former OB/OD area adjacent to the RG-01 site.

4.1.11 Management of Waste from Munitions Operations

Munitions debris was managed concurrently with RG-01 and LJ-01 operations (see Part II, Section 4.1.13 and Part II, Appendix I, Folders 11 and 12).

4.1.12 Munitions Constituents Sampling

No breached munitions were encountered at LJ-01 and therefore there are no results presented.

4.1.13 Reporting and Documentation

Operations at LJ-01 and RG-01 were ongoing concurrently. See Part II, Section 4.1.15 and Part II, Appendices H and K.

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5.0 PROJECT QC/QA RESULTS
5.1 AUDIT FINDINGS

During 2008 site operations ADEC and NOSSA conducted site visits to audit the field procedures for compliance with the approved plans. See Part II, Sections 5.1.1 and 5.1.2 for the discussion of the audit findings (see Part II, Appendix M for the audit reports and USAE's corrective actions responses).

5.2 DEVIATIONS FROM THE PROJECT PLANS

USAE generated 12 FCRs to make changes to project plans during the project season, see Part II, Section 5.2 for details of the FCRs. Copies of the FCRs and the FCR Log are located in Part II, Appendix L.

5.3 AOC CERTIFICATION

An AOC certification packet for the 2008 LJ-01 clearance was reviewed by USAE's AOC certification team, who certified by the transmittal signature sheet (inside cover of Certification Letter, Part III, Appendix B, Folder 00) that all work was performed in accordance with the approved WP, and was checked using the procedures outlined in the MEC QAPP, WS # 36. Individual certifications are included in the Certification Letter as attachments. The AOC certification consists of the QC-generated data, including but not limited to the DFW three-phase QC inspection forms, QC daily and weekly reports, QC grid reports, and QA certification reports. The AOC certification team completed the following actions:

- The Site Geophysicist ensured the accuracy and completeness of the GPO data and all DGM data collected during the field effort. This included processing, analyzing and reporting all instrument check results (RTK DGPS Reoccupation checks, static DGM checks, and latency checks – included in Part II, Appendix J – 02 – Instrument Checks) to ensure that the instruments were performing normally and within project metrics each DGM survey day. He also assessed all production data to ensure sample separation, survey speed, and survey line spacing were within project metrics each day new production was added to the DGM database. The Site Geophysicist analyzed the production data for potential MEC anomalies in accordance with the data analysis established at the approved GPO (see Part II, Appendix F- 02 – Draft Lake Jean GPO Summary Report) and that the data, including dig lists and target maps were ready for delivery to the QA Contractor (see Part III, Appendix J – 01 – Dig List) when the survey was complete. The Site Geophysicist worked with the UXOQCS to review all anomaly reacquisition and intrusive results, ensuring all investigations were complete and acceptable each day that the intrusive results database was updated. Anomalies that were unacceptable were rechecked. When the Site Geophysicist and UXOQCS were satisfied with the intrusive results for each grid, the UXOQCS forwarded them to the QA Contractor (see Appendix B – 00 AOC Certification – Grid QC to QA Submittals).
- The field QC team (the UXOQCS and Project QCM) conducted the QC procedures called out in the MEC QAPP. The Project QCM checked all of the three-phase QC inspection forms for the 26 DFWs applicable to LJ-01 (see Part II, Appendix B) and the QC submittal folder for completeness and corrected any omissions found. The Project QCM verified that a final QA Report was received from the QA Contractor and was on file. The Project QCM compiled all of these documents for the AOC certification packet (see Part III, Appendix B, for the AOC certification packet contents) and forwarded it to the SUXOS, SM and the PQCM for further review.
- The SUXOS and SM reviewed the certification data for completeness and compliance with the approved plans, and forwarded the packet to the PM and Program Manager for review.
- The PQCM evaluated the packet for completeness, accuracy, and compliance with the approved plans and the SOW. The PM and Program Manager reviewed the packet for compliance with the SOW and incorporated it into the AAR for submission to the Navy for approval and acceptance.

5.4 INDEPENDENT NAVY QUALITY ASSURANCE

5.4.1 GPO CERTIFICATION

The same two DGM Teams certified for the RG-01 DGM survey and reacquisition tasks conducted the LJ-01 DGM survey and reacquisition tasks. See Part II, Section 5.4.1 for the discussion of the GPO Certification.

5.4.2 DIGITAL GEOPHYSICAL MAPPING AND TARGET PICKS

USAE submitted one target data packet to the QA Contractor plus the raw data for evaluation. The QA Contractor certified the target selections and added 31 additional targets for QA validation. The target selection was based on the 3 mV threshold established at the GPO during the certification process.

5.4.3 DIGITAL GEOPHYSICAL MAPPING SURVEILLANCES

The QA DGM data tracking form shows that the DGM data were acquired by USAE from June 20 to July 15. USAE accumulated DGM data and provided QC'ed data to the QA Contractor over 6 days. All USAE geophysical system tests and DGM data submitted to the QA Contractor were found to be in compliance with project DQOs and SOPs. Thus, the QA Contractor did not flag any USAE geophysical system tests or DGM data. There were significant areas in both LJ-01 and RG-01 where DGM data could not be acquired (inaccessible).

The DGM data coverage for LJ-01 is shown on Part III, Appendix A, Figure A-2. To help ensure that the USAE obtained DGM data over all accessible areas the QA Contractor performed field surveillances to check these areas. Note, however that the QA Contractor could not verify all inaccessible areas.

One QA seed (target number 238) was installed in northeast quadrant LJ-01 to validate the QA target concurrence and this seed was successfully detected by USAE.

5.4.4 INTRUSIVE INVESTIGATION SURVEILLANCES

The UXO intrusive teams were observed by the QA Contractor on a daily basis and a formal surveillance was completed weekly. The initial operations centered on the construction debris removal, reacquisition and investigation of the 101 historical targets. The QA surveillances were comprised of:

- Debris removal and surface clearance
- Vegetation removal
- DGM survey
- Target reacquisition
- Intrusive operations
- TFU operations
- Explosive demolition for disposal of munitions.

The QA Contractor randomly selected 50 of the 486 anomalies for checks; and found that all were cleared of the anomalies. The QA Contractor checked the five targets left in place (see Section 4.1.9 for a discussion of the targets) with the Vallon all metals detector and agreed the items should be left in place.

The QA Contractor checked the four targets classified as false positives and concurred with USAE's assessment. On 14 August 2008, the QA Contractor concurred with the results of the Intrusive results for LJ-01 and accepted it as complete.

5.4.5 Quality Assurance Digital Geophysical Mapping

The QA Contractor mapped and reacquired three 20 ft by 20 ft mini-grids and intrusively investigated 18 targets. Fifteen of the targets were construction-related debris (nails, wire or pieces of wood with nails), three were munitions debris and two were small arms rounds. None of these items met the failure criteria for the AOC, USAE processed the munitions debris and small arms in the TFU with the other collected items.

5.4.6 MEC Destruction, Certification and Verification of Material potentially Presenting an Explosive Hazard

The MPPEH and DMM recovered at LJ-01 were disposed of in a consolidated shot at the former OB/OD area adjacent to the RG-01 site. The certification and verification of the MPPEH was done concurrently with the RG-01 items; see Part II, Section 5.4.6 for a discussion of the results.

5.4.7 Quality Assurance Studies and Analyses

The QA Contractor provided an evaluation of the DGM target picking threshold to be used in production work in LJ-01 and RG-01. USAE utilized a 3-mV (Channel 1) threshold, the same threshold and procedure suggested in the OUB-2 GPO calibration grid handout to survey LJ-01. The QA Contractor utilized the same threshold and methodology as USAE to pick QA targets. The QA Contractor mapped and reacquired three 20 ft by 20 ft mini-grids as discussed in Section 5.4.5 above.

5.4.8 Non-Conformance Reports

The QA Contractor did not issue any NCRs to USAE for their work on LJ-01.

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6.0 CONCLUSIONS AND RECOMMENDATIONS

The documentation provided in this AAR supports the conclusion that all detected MEC in accessible areas of UoP 7, UoP 7A, and the 2004 exception area was removed to a depth of 4 ft below the mineral soil surface in accordance with the requirements of the OUB-1 ROD and project planning documents. All site performance criteria were completed and verified in accordance with WS #10 and WS #12 of the MEC QAPP with no exceptions or exceedances. All detected MEC was removed from accessible areas and a 15-m MEC-free buffer was established. Supporting backup data is contained in Part III, Appendix B. There were no failures or discrepancies of non-conformance issues during LJ-01 remedial action.

The 4-ft depth of clearance at LJ-01 differed from the 2-ft depth required at RG-01. The reason for this difference is that the OUB-1 ROD specified a clearance depth of 4 ft for LJ-01.

A NCR was prepared post field operations detailing a deviation from the Work Plan SOP 5 (see Part II, Section 5.2 for discussion) leaving excavations open until QA inspection however the deviation had no impact on the final outcome of meeting the project objectives.

All site work met the RA Requirements as discussed in Section 4.0 and documented in Appendices detailing procedures, results, QC checks and verifications, and third party QA verification of operations per the approved plans and validation of data generated. All data contained in this report and Appendices documents the completion of the following RA requirements:

- Removing the construction debris outside of the AOC.
- Removing vegetation to an acceptable height to aid instrument use.
- Prosecuting the 101 historical targets.
- Clearing the surface of metallic items for safety reasons and to minimize interference for the geophysical survey.
- Completing digital geophysical mapping on all accessible areas (i.e. areas except the standing water areas, and areas with obstructions such as rocks).
- Completing an intrusive investigation of all identified targets.
- Creating a 15-meter safety buffer free of all MEC around the AOC.
- Properly managing and disposing of MEC and munitions debris from the project.

Site conditions at AOC LJ-01 did not suggest the area had been used for anything other than as a disposal area for debris and scrap. There was no physical evidence of the site being a firing point or impact area.

6.1 EVALUATION OF REMEDIAL ACTION EFFECTIVENESS

An effective QC process was employed at the site. All BSIs that were emplaced were detected and recovered by the DGM and intrusive teams demonstrating effective coverage of the site. DGM target selection was reviewed and approved by the QA Contractor; all target investigations were left open for QA checks and then backfilled when checked and accepted by the QA Contractor (see Part III, Appendix B, 00-AOC Certification, Final QA LJ-01). USAE completed the AOC Certification in accordance with the WP (see Part III, Appendix B) and all requirements for final closeout of the site were completed.

6.2 EVALUATION OF THE NEED FOR FURTHER ACTION

USAE completed all clearance activities in the areas remaining from the 2004 season and met all the requirements of the OUB-1 ROD and NOSSAINST 8020.15A. The Final Draft 2004 AAR for OUB-1 sites completed the AOC certification for LJ-01 UoP 9, and that certification, plus this 2008 AOC Certification (see Part III, Appendix B) for UoP 7, UoP 7A, plus the exception area, completes the Remedial Action for LJ-01 required in the OUB-1 ROD.

6.3 RECOMMENDATIONS

Based on the AOC Certifications in the Final Draft OUB-1 2004 AAR and the 2008 Remedial Action, NOFA and close-out is recommended for AOC LJ-01. Information from this AAR will be added to a future Remedial Action Completion Report (RACR) for all OUB-1 sites.

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