Naval Facilities Engineering Command Northwest
Silverdale, WA

Final
Completion Report, Operable Unit B-2 (OU B-2), Non-Time Critical Removal Action (NTCRA), 2016 & 2017 Field Seasons

OU B-2
Remedial Action Areas -01 and -05
Former Naval Air Facility Adak
Adak, Alaska

March 2018

APTM-2005-JP01-0051

Naval Facilities Engineering Command Northwest
Silverdale, WA

Final
Completion Report, Operable Unit B-2 (OU B-2), Non-Time Critical Removal Action (NTCRA), 2016 & 2017 Field Seasons

OU B-2
Remedial Action Areas -01 and -05
Former Naval Air Facility Adak
Adak, Alaska

March 2018

Prepared for:

Department of the Navy
Naval Facilities Engineering Command Southwest
1101 Tautog Circle
Silverdale, WA 98315

Prepared by:

Aptim Federal Services, LLC
4696 Millennium Drive, Suite 320
Belcamp, MD 21017

Contract Number: N62473-12-D-2005
Task Order: JP01
Document Control Number: APTM-2005-JP01-0051

This page intentionally left blank.

Naval Facilities Engineering Command Northwest
Silverdale, WA

Final
Completion Report, Operable Unit B-2 (OU B-2), Non-Time Critical Removal Action (NTCRA), 2016 & 2017 Field Seasons

OU B-2
Remedial Action Areas -01 and -05
Former Naval Air Facility Adak
Adak, Alaska

March 2018

Timothy Leahy
Primary Author
Deputy Project Manager

3/8/2018
Date

Joe Stultz
Technical Reviewer
UXOQCS Supervisor

3/8/2018
Date

Douglas Schicho
Project Manager

3/8/2018
Date

Contract Number: N62473-12-D-2005
Task Order: JP01
Document Control Number: APTM-2005-JP01-0051

This page intentionally left blank.

DOCUMENT IDENTIFICATION

Revision Number	Final
Document Title:	Completion Report Non-Time Critical Removal Action (NTCRA) Operable Unit B-2 (OU B-2) Remedial Action Areas -01 and -05 2016 & 2017 Field Seasons
Site Name:	Former Naval Air Facility, Adak, Alaska
Contract Number:	N62473-12-D-2005, JP01
Report Coverage:	This report presents the results of the Removal Actions at Remedial Action Areas (RAAs) -01 and -05 OU B-2 during the 2016 & 2017 Field Seasons. These activities were conducted in accordance with the MEC QAPP and associated plans, dated March 2016.
Recipient Organization: **Address:**	Department of the Navy Naval Facilities Engineering Command Northwest 1101 Tautog Circle Silverdale, Washington 98315
Prime Contractor: **Address:**	Aptim Federal Services, LLC 4696 Millennium Drive, Suite 320 Belcamp, MD 21017
Navy Remedial Project Manager:	Mr. Justin Peach
APTIM Navy West Program Manager:	Ms. Ulrika Messer
APTIM Project Manager:	Mr. Doug Schicho

Document Approved for Release

Ms. Ulrika Messer
Program Manager

Date:

This page intentionally left blank.

EXECUTIVE SUMMARY

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Federal Facilities Agreement, the U.S. Navy (Navy) is required to complete all necessary Munitions and Explosives of Concern (MEC) removal actions for site areas within Operable Unit (OU) B-2 on Parcel 4 of the former Adak Naval Complex, located at Adak Island, Alaska. OU B-2 contains five Remedial Action Areas (RAAs). The Navy is performing the required removal activities under a Non-Time Critical Removal Action (NTCRA) to satisfy the Remedial Action Objectives identified as the preferred remedy from the September 2012 Proposed Plan (U.S. Navy, 2012). Upon completion, it is the Navy's intention to transfer the property to the Department of the Interior, if they will accept it. Otherwise, the property is held by the General Services Administration (GSA) until a willing agency or entity accepts it. Currently, OU B-2 is in the remedial investigation phase of the CERCLA process.

The Navy began conducting NTCRA activities in 2013. In years 2013 and 2014, the Navy completed, with regulatory approval, the removal actions in RAA-02, -03 (East), and -04. The three remaining in-process OU B-2 sites are RAA-01, RAA-03 (West), and RAA-05. The Navy continued NTCRA activities in the final three RAAs (RAA-01, -03W, and -05) during the 2015 season.

In 2015, the Navy awarded a new contract for the 2016 season to CB&I Federal Services LLC, currently Aptim Federal Services, LLC (APTIM). This report documents APTIM's results for the 2016 season and the continuation of the work in the 2017 field season. The scope of this work was to remove MEC and/or material potentially presenting an explosive hazard (MPPEH) by conducting mechanically assisted excavations of metal-saturated areas within the RAA-01 Open Burn (OB)/Open Detonation (OD) and the RAA-05 Andrew Lake Disposal Area (ALDA). APTIM used armored, long-reach excavators to remove material and spread it into lifts, which were subsequently inspected for MEC/MPPEH by teams of unexploded ordnance technicians using handheld electromagnetic metal detectors. APTIM also performed monthly seawall sweeps for MEC/MPPEH along the Andrew Lake Seawall (ALSW) during the months which the APTIM crews were working on Adak.

APTIM performed this work in accordance with plans developed for the 2016/2017 seasons using the 2015 plans as a template to facilitate consistency with previous work. The plans included a MEC Quality Assurance Project Plan (QAPP) (Naval Facilities Engineering Command Northwest [NAVFAC NW], 2016b); a MEC Accident Prevention Plan (APP; NAVFAC NW, 2016c); and an Explosives Safety Submission (ESS; Amendment 2, Correction 1) (NAVFAC NW, 2016a). The MEC APP was reviewed and updated prior to the 2017 season (NAVFAC NW, 2017).

All recovered MEC/MPPEH was properly disposed in accordance with the MEC QAPP and ESS. The work performed at RAA-01 and RAA-05 during the 2016 and 2017 seasons is summarized below and on Table ES-1.

RAA-01

RAA-01 is the former OB/OD range at which approximately 1.8 acres were determined to be too metallically saturated to identify individual target anomalies within the Phase I digital geophysical mapping (DGM) data. These metallically saturated areas were termed "High Amplitude Large Spatial Anomalies" (HALSAs) and were the focus of the original scope of work for RAA-01. However, the Phase II DGM survey conducted during the 2015 season resulted in an expansion of the HALSA areas to a total of approximately 2.6 acres and the identification of many additional discrete anomalies which could not be removed during 2015 as planned. Consequently, the scope for 2016 was updated to identify an equivalent area of approximately 2.02 acres as outlined in yellow on Figure ES-1. The remaining HALSAs and individual anomalies outside of the line will be remediated in a future season. This area represented a high concentration of HALSAs and also included some areas of individual anomalies that fell between the HALSAs, or along the access route needed to gain admittance to the area. The outline was subsequently revised in July 2016 (yellow shading on Figure ES-1) to allow sufficient room for two excavator teams to operate while still meeting required exclusion zone requirements between teams.

Due to slower than anticipated production rates, not all work was completed in 2016. A total of 58,049 square feet (sq ft; 1.33 acres) of the planned 2.02 acres was completed during the 2016 field season (Figure A-2 in Appendix A). The remaining area was completed in a second field season in 2017. A total

of 30,517 sq ft was cleared during the 2017 season, with a cumulative total of 88,566 sq ft for the two seasons, completing the contracted base area of 1.8 acres, as well as the awarded step-outs, which brings the total to 2.02 acres. In addition, 23 craters were remediated during the 2016 field effort.

RAA-05 (ALDA AND ALSW)

RAA-05 ALDA includes approximately 1.4 acres of dump area called the Shoreline Disposal Area (SDA). Due to debris being buried to deeper depths than expected and slower than anticipated production rates, not all work was completed in 2016. A total of 43,595 sq ft (1.00 acres) of the 1.4-acre SDA was completed during the 2016 field season (Figure ES-2). The deeper than expected material encountered in 2016 was evaluated and mapped prior to the 2017 field season. This "deep piles area" extends west out of the SDA and continues along the beach. The portion of the deep piles area that overlaps the SDA was de-scoped by the Navy. A total of 6,427 sq ft was cleared during the 2017 season. Four individual anomalies were incidentally removed during HALSA removal along the southern edge of the 2016/2017 work area and can be seen on Figure ES-2.

The dump area continues along the shore to the east and west of the SDA. In 2016, APTIM performed a series of nine test trenches in the Eastern Step-out Area, located across the Andrew Lake Spillway from the SDA (Figure A-16 in Appendix A). These test trenches were designed to assess whether MEC was present in the Eastern Step-out Area before proceeding with full clearance. The trenches were positioned approximately 15 meters apart and ran south from the cobble beach toward the access road and terminated when debris was no longer encountered in the trench. The test trenches verified that MEC was present within the debris and helped revise the clearance boundary. After completing the test trenches, APTIM transitioned to 100 percent removal and completed four additional trenches in 2016. APTIM returned in 2017 and cleared an additional 24,049 sq ft. The additional area cleared is shown on Figure A-16.

The approved work plans also required monthly surface sweeps of the ALSW (21 acres) to remove MEC that accumulated along the cobble beach. In 2016, seawall sweeps were conducted during the months of April, May, June, July, August, September, and October. In 2017, sweeps were performed in May, June, July, August and September.

Table ES-1: 2016/2017 Results

2016						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	37,271 sq ft (0.86 acres)	408	138	1	3,744	46,797
Crater	23 craters	23	2	0		
Anomalies	228 anomalies 20,880 sq ft (total area containing anomalies) (0.48 acres)	10	1	1		
RAA-05						
Shoreline Dump Area	43,505 sq ft (1.00 acres)	136	212	28	3,895	16,201
West Step-out	0 sq ft	0	0	0		
East Step-out	6,604 sq ft (0.15 acres)	7	6	1		
Seawall	21 Acres 7 events	0	13	0	93	0
Anomalies	4 anomalies	--	--	--	--	--
	Total	584	369	31	7,733	62,998

2017						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	30,992 sq ft (0.71 acres)	2,253	49	2	13,979	7,413
Crater	--	--	--	--		
Anomalies	6 anomalies	--	--	--		
RAA-05						
Shoreline Dump Area	7,567 sq ft (0.17 acres)	47	41	15	3,973	27,221
West Step-out	0 sq ft	0	0	0	--	--
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
East Step-out	24,049 sq ft (0.55 acres)	1	23	0	5,434	10,767
Seawall	21 Acres 5 events	0	4	0	0	0
	Total	**2,301**	**117**	**17**	**23,387**	**45,401**
Grand Total, 2016 & 2017						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	68,263 sq ft (1.57 acres)	2,661	187	3	17,724	54,210
Crater	23 craters	23	2	0		
Anomalies	234 anomalies 20,880 sq ft (0.48 acres)	10	1	1		
RAA-05						
Shoreline Dump Area	51,072 sq ft (1.17 acres)	183	253	43	13,303	54,189
West Step-out	0 sq ft	0	0	0		
East Step-out	30,653 sq ft (0.70 acres)	8	29	1		
Seawall	21 Acres 12 events	0	17	0	93	0
Anomalies	4 anomalies	--	--	--	--	--
	Total	**2,885**	**489**	**48**	**31,120**	**108,399**

Abbreviations and Acronyms:

DMM – discarded military munitions
HALSA – high amplitude large spatial anomaly
lbs – pounds
MDAS – material documented as safe
MEC – munitions and explosives of concern
MPPEH – material potentially presenting an explosive hazard
RAA – remedial action area
sq ft – square feet

This page intentionally left blank.

File Path:H:\MMRP\Adak\GIS_Documents\Project_Maps\Adak_103_FigES-1_RAA_01_Work_Areas_2017_Completion_rpt.mxd
Generated By: JCP Date: 01/29/18
Project Number: 500474

F2 (Complete)
F3 (Complete)
E1 (Complete)
E2
E3
E4
E5 (Isolated Targets Completed)
D1
D2
D3
D4
D5 (Isolated Targets Completed)
C1_SO
C1
C2
C3
C4
C5 (Complete)
B1
B2
B3
B4
B5
A1
A2
A3
A4
A5 (Complete)

Ch 1 mV
50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

N

0 120 240 Feet

Projection:
NAD 1983 StatePlane Alaska 10 FIPS 5010 Feet

LEGEND

- Reacquired DGM Target Anomaly Completed in 2016
- DGM Target Anomaly Completed via HALSA Trenching in 2016/2017
- DGM Target Anomaly to be Completed in 2018
- Road
- Inaccessible Pond/Crater
- Pond/Crater Completed in 2016
- Pond/Crater to be Completed in 2018
- Grid Boundary
- Original 2016 Clearance Boundary
- Revised 2016 Clearance Boundary Area (July, 2016)
- HALSA to be Completed in 2018

Note: The original 2016 contract included clearance of 1.8 acres of HALSAs and two (2) 15 meter by 30 meters step-out options, for a total of 2.02 acres.

NAVFAC Naval Facilities Engineering Command

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE NUMBER	RAA-01 MEC CLEARANCE AREAS ADAK NAVAL AIR STATION
ES-1	

This page intentionally left blank.

N

TR101
TR102
TR103
TR68
TR48
TR47
TR18
TR19
TR56
TR53
TR55
TR54
TR44
TR14
TR40
TR17
TR43
TR42
TR61
TR50
TR51
TR46
TR39
TR15
TR58
TR49
TR36
TR16
TR22
TR20
TR59
TR62
TR13
TR60
TR67
TR37
TR45
TR12
D3
TR63
TR38
TR64
TR66
TR35
TR23
TR65
TRUV46
TRUV48
D1
(Complete)
D2
TR41
TRW49
TR21
TR10
TR30
TR24
TR11
TR29
TR25
TR34
TR27
TR07
TR06
TR28
TR26
TR33
TR32
TR09
TR08
TR31
TR05
TR01
TR04
TR02
TR03
C3
(Complete)

1 " = 100 '

SOE103
SOE104
SOE101
SOE24
SOE16
SOE18
SOE25
SOE08
SOE10
SOE11
SOE15
SOE102
SOE07
SOE27
SOE12
SOE13
SOE04
SOE30
SOE06
SOE31
SOE23
SOE 20
SOE21
SOE 17
SOE05
SOE28
SOE14
SOE29
SOE19
SOE22
SOE09
SOE26

LEGEND

- DGM Target Anomaly Completed via HALSA Trenching in 2016
- DGM Target Anomaly to be Completed in 2018

MEC/MPPEH in Trench

- 1 - 20 items
- 21 - 60 items
- 61 - 90 items

- Road
- Grid Boundary
- Grid Area Completed Pre-2016
- Trench Completed in 2016
- Trench Completed in 2017
- Trench Incomplete

- Shoreline Dump Area (RAA-05/ALDA-01)
- Potential Step Out - West (RAA-05/ALDA-01)
- Potential Step Out - East (RAA-05/ALDA-01)
- Original Potential Step Out - East
- 2018 Work Area

- Original Deep Piles Area (Battelle, 1-6-2017)
- Revised Deep Piles Area (5-16-2017)
- Inacessible Area

0 40 80 Feet

Projection: NAD 1983 StatePlane Alaska 10 FIPS 5010 Feet

NAVFAC Naval Facilities Engineering Command

MILITARY MUNITIONS RESPONSE PROGRAM

FIGURE NUMBER ES-2

RAA-05/ALDA-01
2016 AND 2017 MEC CLEARANCE COMPLETION STATUS
ADAK NAVAL AIR STATION

This page intentionally left blank.

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

PAGE

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

LIST OF APPENDICES
(on CD)

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AAR	After Action Report
ADEC	Alaska Department of Environmental Conservation
AHA	activity hazard analysis
AHRS	Alaska Heritage Resources Survey
ALDA	Andrew Lake Disposal Area
ALSW	Andrew Lake Seawall
AMNWR	Alaska Maritime National Wildlife Refuge
AOC	area of concern
APP	Accident Prevention Plan
APTIM	Aptim Federal Services, LLC
asl	above sea level
BIP	blow-in-place
BRAC	Base Realignment and Closure
BSI	blind seed item
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQC	Contractor Quality Control
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
DVD	digital versatile disc
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ESS	Explosives Safety Submission
FCA	function check area
FCR	Field Change Request
FS	feasibility study
GIS	Geographic Information System
GPS	global positioning system
GSA	General Services Administration
HALSA	high amplitude large spatial anomaly
HE	high explosive
HFD	hazardous fragmentation distance
IVS	instrument verification strip
MDAS	material documented as safe
MEC	munitions and explosives of concern
MGFD	munition with the greatest fragmentation distance
MLLW	mean lower low water
mm	millimeter
MPC	measurement performance criteria

ACRONYMS AND ABBREVIATIONS
(Continued)

MPPEH	material potentially presenting an explosive hazard
MRA	munitions response area
MRS	munitions response site
MTDU	Mobile Thermal Destruction Unit
NAF	Naval Air Facility
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Navy
NCR	nonconformance report
NOSSA	Naval Ordnance Safety and Security Activity
NRHP	National Register of Historic Places
NTCRA	non-time critical removal action
NTR	Navy Technical Representative
NW	northwest
OB	open burn
OD	open detonation
OU	operable unit
pdf	portable document format
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAA	remedial action area
RI	remedial investigation
RTK	real time kinematic
SAERA	State-Adak Environmental Restoration Agreement
SDA	Shoreline Disposal Area
SOP	standard operating procedure
sq ft	square feet
SUXOS	Senior Unexploded Ordnance Supervisor
TAC	The Aleut Corporation
TtEC	Tetra Tech EC, Inc.
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

1.0 INTRODUCTION: DOCUMENT ORGANIZATION

1.1 DOCUMENT IDENTIFIER

This completion report details the activities of the 2016 and 2017 Field Seasons for the Non-Time Critical Removal Action (NTCRA) at Operable Unit (OU) B-2 on Adak, Alaska (see Figure 1-1).

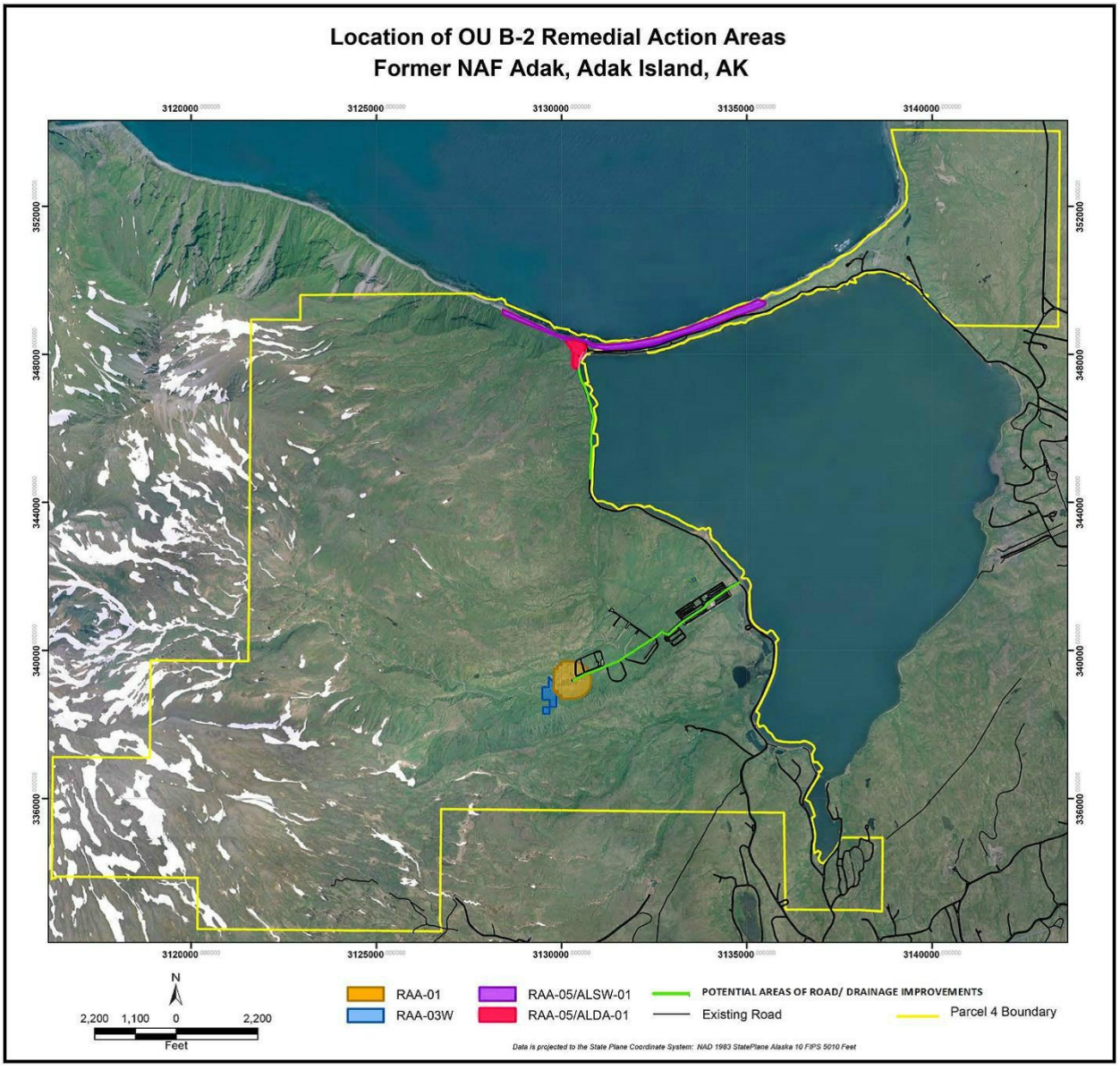

Figure 1-1: Location of OU B-2 Remedial Action Areas

1.2 REPORT OVERVIEW

This report is composed of an Executive Summary and the following sections, which cover the required elements for the 2016 and 2017 field seasons:

- Section 1.0 – Introduction: Document Organization
- Section 2.0 – Project Objectives

- Section 3.0 – Preparatory Operations
- Section 4.0 – Field Procedures
- Section 5.0 – Project Quality Control (QC) and Quality Assurance (QA) Results
- Section 6.0 – Naval Ordnance Safety and Security Activity (NOSSA) and Alaska Department of Environmental Conservation (ADEC) Audits
- Section 7.0 – NTCRA Results Summary
- Section 8.0 – Remedial Action Area (RAA) Certification Summary
- Section 9.0 – NOSSA Crosswalk
- Section 10.0 – Conclusions and Recommendations
- Section 11.0 – References

The appendices are provided in an electronic portable document format (pdf) on a digital versatile disc (DVD) located in the back of this binder. The appendices are bookmarked for ease of navigation. Some of the appendices, such as Appendix I, Munitions Accountability Log, and Appendix L, Intrusive Results Log, have native Microsoft Excel® files that can be sorted and searched by RAA or by other desired fields for specific data.

Figures and tables referenced in the text are provided in the body of the report. Documentation required by the Munitions and Explosives of Concern (MEC) Quality Assurance Project Plan (QAPP) to verify completion of the NTCRA removal actions is located in the following appendices:

- Appendix A – Maps and Drawings
- Appendix B – RAA Certification Packages
- Appendix C – Definable Features of Work
- Appendix D – Site-Specific Training Records
- Appendix E – Production and QC Reports
- Appendix F – Weekly Contractor Quality Control (CQC) Meetings
- Appendix G – Field Memos
- Appendix H – Team Logbooks/Journals
- Appendix I – Munitions Accountability Log
- Appendix J – Explosives and Material Documented as Safe (MDAS) Documentation
- Appendix K – Reserved
- Appendix L – Intrusive Results Log
- Appendix M – Field Change Request (FCR) and Nonconformance Report (NCR) Reports
- Appendix N – NOSSA and ADEC Audit Results
- Appendix O – OU B-2 Geographic Information System (GIS) Database
- Appendix P – Reserved
- Appendix Q – Site Photographs
- Appendix R – Responses to Comments

1.3 ADAK CHARACTERISTICS

OU B-2 is located on the Former Naval Air Facility (NAF) Adak Parcel 4, Adak Island, Alaska. Adak Island is located approximately 1,200 air miles southwest of Anchorage, Alaska, in the Aleutian Island chain. Its geographic position is latitude 51°45' North and longitude 176°45' West.

1.3.1 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 temperatures throughout the year. The monthly temperatures range from a low of 32.9 degrees Fahrenheit (°F) in February to a high of 51.3°F in August. The highest recorded temperature for Adak Island is 75°F (recorded in August 1956), and the lowest recorded temperature is 3°F (recorded in January 1963 and again in February 1964).

Adak is located in the region of the polar front, the zone of convergence between temperate westerly winds (which 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 localized, with fog, low ceilings, precipitation, and clear weather occurring simultaneously within a range of a few miles. 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 60 inches, most of which falls as rain in the lower elevations. Average monthly precipitation varies from a low of about 3 inches during June and July to a high of 7 to 8 inches during November and December.

Snowfall averages over 100 inches a year at sea level, but because of the relatively warm temperatures, snow depth rarely exceeds 1 to 2 feet. 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 1,000 feet above mean lower low water (MLLW). At elevations greater than 1,000 feet 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 present in the 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. In November 2014, the lowest surface level pressure ever recorded in the Bering Sea was associated with Super Typhoon Nuri, which passed through Adak creating extremely high sustained winds and gusts. A similar storm in January 2016 was associated with recorded gusts on Adak of 122 miles per hour.

1.3.2 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 Mount 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.

Adak Island is lushly vegetated from sea level to about 1,000 feet in elevation. Upland vegetation varies with environmental factors, including the presence of wetlands, altitude, and shelter from wind. The native vegetation is that of a terrestrial-maritime tundra ecosystem. Creek beds are covered with sedge-dominated plants intermixed with wet area plants such as red fescue and hairgrass. Figure 1-2 provides a typical view of the topography. There are essentially no trees of value to wildlife in either the developed or undeveloped areas.

Where present, vegetation consists of hummocky tundra that ranges from several inches to up to 4 feet tall. Longer grassy tundra is prevalent in the lower areas and cut drainages. Typically, the tundra growth becomes shorter as elevation increases. The tundra, vegetation, and soil dissipate as elevation increases and are replaced with exposed rock and then bedrock.

Figure 1-2: Adak Topography

Because of its harsh climate conditions and relative lack of vegetative structure, the wildlife diversity on Adak Island is relatively low. Species on-island include caribou and eagles. The Aleutian Canada goose, which was recently delisted from the list of threatened and endangered species, does not nest on Adak Island but is an occasional visitor. The U.S. Fish and Wildlife Service (USFWS) is monitoring both the Marbled and Kittlitz's Murrelet. The federally endangered Short-tailed Albatross may be found offshore occasionally, but is unlikely to be found in nearshore waters.

1.4 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. Army Air Corps and U.S. Navy [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 Adak under control of the Navy. Naval Air Station Adak was re-designated as the 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 population of Adak Island has fluctuated between 50 and 300 people. Currently, approximately 60 to 150 people reside on Adak Island, depending on the time of the year.

The majority of ordnance contamination at the RAAs is believed to have been associated with World War II-era training exercises when as many as 100,000 military and civilian personnel were stationed on the island. During this time, Adak was used as a training and staging area for planned invasions of Attu and Kiska Islands, which were then occupied by the Japanese. Among the personnel stationed on Adak were soldiers who conducted combat and proficiency training on the island. Ordnance activities throughout Adak's 50-year military history included training in small arms and the use of mortars, artillery, rockets, and hand grenades, as well as other ordnance. Activities also included ordnance storage and disposal by open burn (OB) and/or open detonation (OD).

The developed portion of the island is limited to the northern half, which was historically designated as the military reservation. The USFWS manages the southern portion (117,265 acres) of the island, which is designated wilderness area within the Alaska Maritime National Wildlife Refuge (AMNWR) system. The military reservation on Adak Island occupied approximately 76,800 acres. Most of the development on the military reservation was within the downtown core area, adjacent to the shore of Kuluk Bay and Sweeper Cove. The former Naval Base, which was situated in the developed area on Adak Island, ceased operation and was closed in March 1997. All but approximately 5,600 acres (Parcel 4) were relinquished to the Department of the Interior in March 2004. This land was subsequently transferred to The Aleut Corporation, the City of Adak, the State of Alaska Department of Transportation, and the USFWS. Current land uses at the former Navy base include an airfield, port operations, light industry, and administrative, commercial, recreational, and residential areas. The airfield is owned by the State of Alaska Department of Transportation. The 5,600-acre area that was not relinquished is referred to as Parcel 4, and remains under Navy control. OU B-2 sites are located in Parcel 4.

1.5 ADAK REGULATORY HISTORY

In October 1992, the former Adak Naval Complex was proposed for the National Priorities List, and was officially placed on the list in May 1994. The Federal Facilities Agreement, an agreement among the Navy (as Lead Agency), the U.S. 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 Federal Facilities Agreement initiated a series of studies; i.e., Preliminary Source Evaluations of non-petroleum sites and studies of petroleum sites under the State-Adak Environmental Restoration Agreement (SAERA).

1.6 PREVIOUS INVESTIGATIONS

OU-B was created to manage the investigation and remediation of MEC contamination in the areas warranting response. A Remedial Investigation (RI)/Feasibility Study (FS) Work Plan (Foster Wheeler Environmental, 2000) was developed to facilitate a consistent investigation of the identified areas of concern (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 the RI/FS Work Plan in 2000. By the end of the first field season, the Navy recognized that certain areas of the military reservation (primarily those in Land Transfer Parcel 4) would require an extended period of time for assessment and remediation based on the nature of the contamination and/or the lack of an effective technical approach for remediation. 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 B-1 and OU B-2. OU B-1 contained the AOCs 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.

OU B-2 sites were defined as those lying within the original boundaries of Parcel 4 and it is the Navy's intention to transfer the property to the Department of the Interior, if they will accept it. Otherwise, the property is held by the General Services Administration (GSA) until a willing agency or entity accepts it. OU B-2 is currently in the RI phase of the CERCLA process (RI/FS Summary of Study Reports for OU B-2 Sites, USA Environmental, 2012).

In 2013 and 2014, USA Environmental completed intrusive operations in RAA-02, RAA-03 (except for seven grids), and RAA-04. Phase I digital geophysical mapping (DGM) data were collected over 100 percent of the accessible areas of the RAAs. Targets selected from the DGM data were investigated in RAA-03 and RAA-04. In RAA-05, approximately 0.38 acres of the northern cobble area was investigated using a tracked backhoe to excavate down to an anomaly free depth.

In 2015, Tetra Tech EC, Inc. (TtEC) continued work in RAAs -01, -03W, and -05 (Andrew Lake Disposal Area [ALDA] -01), as a continuation of work begun in 2013. The 2015 field season consisted of a surface clearance, Phase II DGM, and discrete anomaly investigations at those three sites, as well as the monthly RAA-05/Andrew Lake Seawall (ALSW) sweeps (NAVFAC NW, 2016d).

This page intentionally left blank.

2.0 PROJECT OBJECTIVES

2.1 NTCRA OBJECTIVES

The overall Remedial Action Objectives for the OU B-2 NTCRA are:

> *"Provide protection to human health and the environment by reducing and/or mitigating the risk associated with MEC exposure during future use of the area for wildlife management, subsistence, and recreational activities."* (U.S. Navy, 2012).

The purpose of the 2016 and 2017 field seasons was to remove metallically saturated areas for two OU B-2 RAAs, and conduct monthly seawall sweeps in RAA-05, ALSW-01 (see Figure A-1 in Appendix A) while unexploded ordnance (UXO) crews were on-island. This report summarizes only the work performed during both the 2016 and 2017 field seasons. Details for the work requirements for these seasons are defined in the Final OU B-2 NTCRA MEC QAPP, dated March 2016. Work was performed following applicable and appropriate Department of Defense guidance and policy for Munitions Response Program response actions and took into consideration the available site documentation and reports to date.

The primary activities conducted for the 2016/2017 field seasons consisted of the following:

- Drafting and submitting the OU B-2 NTCRA MEC QAPP, including obtaining Navy and regulatory concurrence
- Conducting field mobilization and site preparation in April 2016, and remobilizing to the island in April 2017
- Conducting mechanically-assisted intrusive investigations of metallically saturated disposal areas potentially contaminated with MEC/material potentially presenting an explosive hazard (MPPEH)
- Performing intrusive investigation of target anomalies developed from previous DGM data (e.g., excavation, identification, and management of the anomaly source)
- Removing MEC and MPPEH from the excavations
- Performing inspection and certification of MPPEH
- Performing off-site disposal of MDAS and other metal debris
- Performing on-site disposal of MEC
- Conducting site restoration activities
- Conducting a partial demobilization during the fall of 2016 and a full demobilization, in accordance with the approved plans, in the fall of 2017

2.2 RAA DESCRIPTIONS AND CHARACTERISTICS

2.2.1 RAA-01

RAA-01 comprises approximately 19.4 acres, is located centrally in Moffett Valley, and is surrounded by RAA-03. Some of the RAA is inaccessible as a result of standing water and steep slopes along Moffett Creek. The site is located at the terminus of the Andrew Lake Range Complex access road. The elevation in this RAA ranges from about 110 to 130 feet above sea level (asl). Portions of the area are inaccessible due to the presence of Moffett Creek and water-filled craters in this area. The area was used for disposal of munitions from military training activities and MEC removal operations (from the 1940s to the present). The OB/OD area has Resource Conservation and Recovery Act interim status as a hazardous waste treatment unit area. Based on site history and previous MEC finds, the Munition with the Greatest Fragmentation Distance (MGFD) for RAA-01 is the 5-inch MK 10 Rocket Motor, with a Hazardous Fragmentation Distance (HFD) of 427 feet.

Figure 2-1: Gate Access to RAA-01 and RAA-03

Access is indirect via the gravel range entry road, which branches from the main access road along the west side of Andrew Lake. This main road is gated (by means of a locked steel gate, as shown in Figure 2-1) near the south end of the lake to deter general access. A locked cable barrier also deters access to the range entry road. RAA-01 is relatively flat, but hummocky in some locations and marshy in others. Previous disposal events have resulted in several craters. It is generally covered in knee-high, grassy tundra; however, relatively barren areas surround some of the disposal craters. Moffett Creek runs from west to northeast through the northwestern portion. The center and southern portions of RAA-01 are occupied by wetlands.

2.2.2 RAA-05

RAA-05 consists of the northern portion of OU B-2 that borders Andrew Bay. Two AOCs are located within the RAA: ALDA-01 and ALSW-01. ALDA-01 is a 4.7-acre disposal area located at the terminus of the western Andrew Lake Road. ALDA-01 is further subdivided into two areas. The northern portion is a former dump identified for mass excavation and is the portion of the site where field work was performed in 2016 and 2017. DGM surveys were performed over the remaining southern part of the site in 1999 and 2015. Extensive geophysical anomalies were detected in those surveys. This area is the subject of a future field season and no field work was performed in the southern portion of the site in 2016 or 2017. Based on site history and previous MEC finds, the MGFD for RAA-05 is the 81 millimeter (mm) M56 HE, high capacity mortar, with an HFD of 240 feet.

Figure 2-2: ALSW-01 Seawall Spillway

ALDA-01 is located at the northwest corner of Andrew Lake. The AOC boundary is dog-legged and is wider at the north end of the site near Andrew Bay. Most of the AOC lies at elevations ranging from about 20 to 40 feet asl; however, a steep slope on the western side of the AOC rises to heights of over 200 feet asl. Wetland vegetation and soil are present in the southern portion of ALDA-01. Access to RAA-05 is through the Andrew Lake main gate and follows the existing dirt/gravel road north until the road ends.

ALSW-01 is the seawall at the northern portion of RAA-05 separating Andrew Lake and the bay. As shown on Figure 2-2, there is a manmade main drainage (spillway) at ALSW-01 from Andrew Lake to the bay

located near the southern end of the seawall at the end of the main access road. The main drainage is improved by Navy Explosive Ordnance Disposal one to two times per year. The investigation area of ALSW-01 for surface sweeps along the shoreline and seawall is approximately 21 acres.

2.2.3 2016/2017 Scope of Activities

Table 2-1 summarizes the contractual scope of work for the 2016/2017 field seasons, and the paragraphs below describe the changes that occurred, revising the area to be cleared, during the 2016 and 2017 field seasons.

In RAA-01, the scope of work for the 2016 field season required excavation and removal of areas deemed too metallically saturated to identify individual target anomalies. These areas were termed “High Amplitude Large Spatial Anomalies” (HALSAs). Based on the Phase I DGM data collected in 2013, approximately 1.8 acres of HALSAs were identified, forming the original scope of work for RAA-01 in Aptim Federal Services, LLC’s (APTIM’s) contract. Additionally, the scope included dewatering, clearing, and backfilling approximately 0.4 acres of craters which could not be DGM surveyed. The Phase II DGM survey conducted during the 2015 season resulted in an increase of the HALSA areas to a total of approximately 2.6 acres. Additionally, the Phase II DGM identified many additional discrete anomalies which could not be removed during 2015 as planned. Consequently, the scope was modified to outline a specific area of approximately 2 acres of the interior of RAA-01 where APTIM could excavate HALSAs without first removing the surrounding discrete anomalies. This area, as outlined in yellow on Figure ES-1, represented the greatest concentration of HALSAs and also included some areas of individual anomalies that fell between the HALSAs or along the access route needed to gain admittance to the area. In July 2016, the project area was modified a second time to maximize the available work areas so that APTIM could utilize two excavators while still meeting the large exclusion zone requirements for each excavator.

Table 2-1: Scope of Work for the 2016/2017 Season

RAA	AOCs	Overall Size of RAA (acres)	Removal Depth	Site Preparation		Excavation of HALSAs/ Landfill (acres)	Crater Dewatering and Surface Clearance (acres)	Scrap Metal/MPPEH/ MEC/MD Handling and Disposal	Temp Road and Drainage Installation/ Improvements/ Site Restoration
				Vegetation Removal	Surface Clearance				
-01	OB/OD-01	19	Depth of Detection	Yes	Yes	2.02	~0.4	Yes	Yes
-05	ALDA-01	4.7	Depth of Detection	Yes	Yes	1.4 plus optional step-out areas	None	Yes	Yes
-05	ALSW-01	21	Surface / Near Surface	No	Yes (monthly seawall sweeps)	None	None	Yes	Shared Access Road with ALDA-01

Abbreviations and Acronyms:
ALDA – Andrew Lake Disposal Area
ALSW – Andrew Lake Seawall
AOC – Area of Concern
HALSA – high amplitude large spatial anomaly
MD – munitions debris
MEC – munitions and explosives of concern
MPPEH – material potentially presenting an explosive hazard
OB/OD – open burn/open detonation
RAA – Remedial Action Area

The re-defined work effectively swapped HALSAs from the center of RAA-01 with HALSAs further out so that both excavators could operate simultaneously (Figure A-2 in Appendix A).

In RAA-05, the scope of work was revised to remove the deep piles area, reducing the overall size of the Shoreline Disposal Area (SDA) to 51,072 square feet (sq ft). No work was performed in the southern portion of ALDA-01 in 2016 or 2017.

2.3 PROJECT PLAN DEVIATIONS/REVISIONS

FCRs were used to request and document changes identified as a result of unanticipated field conditions and to facilitate changes in the MEC QAPP. Changes to plans or procedures were documented using the FCR Form. The UXO Quality Control Specialist (UXOQCS) Supervisor maintained an FCR Log to track FCRs through the submittal and approval process. The Navy Remedial Project Manager or Navy Technical Representative (NTR) and QA contractor reviewed the FCRs for acknowledgement following consultation with EPA and ADEC. Table 2-2 below lists the FCRs generated and approved. Several FCRs were proposed near the end of the 2016 field season and subsequently withdrawn, leading to the gap in numbering between the 2016 and 2017 field seasons. Copies of the FCRs can be found in Appendix M.

Table 2-2: Field Change Requests

FCR #	Description of Change	Date Initiated	Status
2005JPO1-FCR-20160411-001	Substitution of daily use forms in the UXO QAPP with forms tailored for Adak site use.	4/11/2016	Navy acknowledged 4/21/16
2005JPO1-FCR-20160411-003	Substitution of forms in the UXO QAPP for use in UXO demolition with forms tailored for Adak site use.	4/11/2016	Acknowledged by Navy, with comments.
2005JPO1-FCR-20160419-006	Recommend including the use of DropEx explosive identification field kits as well as EXPRAY field kits in the UXO QAPP.	4/19/2016	Navy acknowledged 4/27/16
2005JP01-FCR-20160419-007	Recommend approving the use of UXO Sweep Personnel that are not UXO qualified, consistent with EM 385-1-97 and Technical Publication 18. Not discussed in the UXO QAPP.	4/19/2016	Navy acknowledged 4/25/16
2005JP01-FCR-20160419-008	Recommend revising the FCR form in the UXO QAPP to remove the reference to a contractor other than APTIM.	4/19/2016	Navy acknowledged 4/21/16
2005JP01-FCR-20160419-009	Change 1–2 foot lift thickness to <1 foot in QAPP.	4/19/2016	Navy acknowledged 4/25/16
2005JP01-FCR-20160425-010 rev 1	Use mats instead of 2 foot subsurface clearance.	4/25/2016	Navy acknowledged 5/17/16
2005JP01-FCR-20160428-011	Revise distance of blast shield to 70 feet.	4/28/2016	Navy acknowledged 4/29/16
2005JP01-FCR-20160429-12	Remove 30-pound minimum on MTDU.	4/29/2016	Navy acknowledged 5/5/16

FCR #	Description of Change	Date Initiated	Status
2005JP01-FCR-20160430-13 rev1	Clarifies conflicting info in the QAPP on number of follow-up inspections. Standardized to one follow-up/week/team/DFW performed. Rev 1 changed it from "per day" to "per week."	4/29/2016	Navy acknowledged with notes 5/6/16
2005JP01-FCR-20160509-14	Removes the term "instrument aided" from Crater dewatering inspection process in Section 11.14.2.3 to make that section consistent with the remainder of the QAPP. Crater inspection will be visual.	5/9/2016	Navy acknowledged 5/11/16
2005JP01-FCR-20160510-15	Removes backfilling from Crater dewatering SOP. Requirement to backfill craters is included in SOP 15 (Crater clearance) and is also covered under site restoration (Sec 11.12). This FCR removes the backfill requirement from the dewatering SOP so that QC paperwork can be completed and backfilling can occur when surrounding HALSAs are backfilled.	5/10/2016	Navy acknowledged 5/11/16. Revised based on EPA concerns and resubmitted on 5/13/16. Rev 1 Navy acknowledged on 5/23/16.
2005JP01-FCR-20160511-16	Removes the requirement that RAA-05 be excavated by grids and allows for the same type of trench/lift operation that is being used at RAA-01.	5/11/2016	Navy acknowledged with notes on 5/19/16
2005JP01-FCR-20160512-17	Revises the Final Trench QC Record to eliminate trench coordinates; change IVS to FCA, and split some numbered items into separate lines to allow sufficient room to answer all the questions.	5/12/2016	Navy acknowledged with notes on 5/19/16
2005JP01-FCR-20160513-18	Applies the MEC QAPP standards to a series of test trenches within the southern portion of RAA-05 outlined in the provided drawing (Attachment 1 in FCR-18) to check the area previously excavated to ensure completeness.	5/13/2016	Navy acknowledged 5/17
2005JP01-FCR-20160513-19 Rev 1	Proposes an approach to clearing the cultural features identified at RAA-01.	5/17/2016	Revised to incorporate Field Memo process. Re-sent on 6/14/16. Navy acknowledged on 6/22.
2005JP01-FCR-20160603-20 Rev 1	Adds a field SUXOS position to act as alternate to the SUXOS.	6/3/2016	Navy acknowledged 6/20/16
2005JP01-FCR-20160614-21	Allows the excavator to be re-positioned to more efficiently complete the trench and lift operations.	6/14/2016	Navy acknowledged 6/21/16

FCR #	Description of Change	Date Initiated	Status
2005JP01-FCR-20160706-22	Combines several similar inspection forms and checklists into a single form that will be completed daily.	7/6/2016	Navy acknowledged 7/6/16
2005JP01-FCR-20160727-23	Provides an SOP and an AHA to utilize a power screener to assist in MEC clearance at RAA-01.	7/28/2016	Withdrawn – will not impact 2016 operations
2005JP01-FCR-20160727-24	Defines changes to the QC/blind seed program resulting from use of the power screener.	7/28/2016	Withdrawn – will not impact 2016 operations
2005JP01-FCR-20160811-25	Switches the "yellow line" defining 2016 work area to incorporate the orange area allowing two teams to work for the remainder of the season.	8/11/2016	Navy acknowledged 8/22/16
2005JP01-FCR-20170527-33	Change the requirement for an "air horn" to a requirement for an equivalent audible signal if an air horn is not available	5/27/2017	Navy acknowledged 5/29/2017
2005JP01-FCR-20170527-34	Change out personnel during home leaves	7/8/2017	Navy acknowledged 7/13/17

Abbreviations and Acronyms:

AHA – activity hazard analysis
DFW – definable feature of work
FCA – function check area
FCR – Field Change Request
HALSA – high amplitude large spatial anomaly
IVS – instrument verification strip
MEC – munitions and explosives of concern
MTDU – Mobile Thermal Destruction Unit
QAPP – Quality Assurance Project Plan
QC – quality control
RAA – Remedial Action Area
SOP – standard operating procedure
SUXOS – Senior Unexploded Ordnance Supervisor
UXO – unexploded ordnance

This page intentionally left blank.

3.0 PREPARATORY OPERATIONS

The Navy provided the previous field season's (i.e., 2015) version of the MEC QAPP for APTIM to finalize and include the required sub-plans (standard operating procedures [SOPs], Construction Work Plan, Project Forms, etc.). In February 2016, APTIM submitted the draft final version for the Navy and regulatory agency review. APTIM incorporated the Navy and regulator comments and finalized the MEC QAPP in March 2016. The MEC QAPP is the primary operations document for the NTCRA. The MEC QAPP was prepared in accordance with the requirements of the Uniform Federal Policy for Quality Assurance Project Plans (EPA, 2005), and the Naval Facilities Engineering Command (NAVFAC) MEC QAPP Template dated May 2009. MEC QAPP Worksheets were streamlined in accordance with planning document review meeting held with the Navy and regulatory agencies in December 2014. The MEC QAPP integrated all technical and quality objectives for the project, including planning, implementation, and assessment. It documented how QC was applied to measure the performance of the project objectives against a defined set of standard measurement performance criteria (MPC). The MEC QAPP consists of a series of worksheets that contain both general and specific information pertaining to planning, implementation, and assessment of the NTCRA at OU B-2.

A field team planning and scoping conference was held in the Battelle Seattle, Washington, office in February 2016. During this session, planning documents were reviewed, mobilization planning was performed and field materials were identified, ordered and scheduled for phased delivery to the site. Data collection and management devices were tested and adjustments were made to the collection forms to optimize user input, recording and upload. On March 12, a Pre-Construction meeting was held to discuss the 2016 season and any general information for the remedial action. It was attended by teleconference by personnel from NAVFAC Northwest (NW), APTIM, and the Navy QA Contractor (Battelle). The list of the attendees and minutes of the meeting are included in Appendix F.

3.1 MOBILIZATION

3.1.1 MOBILIZATION – FIELD SEASON 01 (2016)

Mobilization for the 2016 field season began with organizing all equipment and material needed for the entire field season in Seattle, Washington, and loading it onto a barge in late March 2016. APTIM shipped equipment and vehicles by air freight and barge in March and April 2016. Personnel mobilized in phases to allow for the anticipated learning curve, with the first group arriving on April 3, 2016. They set up the project office, prepared for the barge offload, started staging equipment for teams, began setting up global positioning system (GPS)/communications, reviewed plans, and stored explosives in the sited Type II magazine. Immediately after arriving on the island, the advance team received training from local Adak staff on island culture and operations. In addition, the following training was provided to all personnel as they arrived on the island:

- The MEC QAPP and Accident Prevention Plan (APP)
- Reporting requirements including on-site and contract deliverables procedures, site forms, etc.
- Administrative procedures and APTIM points of contact

Personnel completed a full site assessment of both RAAs and coordinated with local resources to facilitate the planning of the actual field work during the upcoming season.

The remaining project personnel (demolition teams, UXO intrusive teams, etc.) mobilized in stages as work progressed through April, May, and June 2016. APTIM assembled four teams that each consisted of one heavy equipment operator, one UXO Technician III, and five UXO Technician II/Is. In addition, there was an Oversight Team and a Demolition Team:

- The Oversight Team consisted of the Project Superintendent, Senior Unexploded Ordnance Supervisor (SUXOS), Unexploded Ordnance Safety Officer (UXOSO), UXOQCS Supervisor, and two (three from late July until October) UXOQCSs.
- The Demolition Team consisted of one UXO Technician III and one UXO Technician II.

A support crew of field scientists, equipment operators, laborers, mechanics, and a paramedic brought the total site presence up to 50 personnel.

The following Navy and QA representatives were also on-site during this preliminary effort:

- NAVFAC NW Technical Representative
- Battelle QA Specialists (3)

3.1.2 MOBILIZATION – FIELD SEASON 02 (2017)

Mobilization for the 2017 field season was simplified by leaving the majority of heavy equipment and vehicles, as well as explosives for demolition shots, on-island over the 2016/2017 winter season. Vehicles and the explosives magazine were inspected weekly during the offseason. Inspection Reports can be found in Appendix J. A limited amount of equipment was barged up to the island in May 2017; however, this equipment was not essential to begin field operations. Personnel mobilized in phases with the field management team arriving on April 13, 2017. The learning curve was minimized by using many of the same staff from the 2016 season including the entire supervisory staff. The teams began by inspecting the office, communications, and GPS infrastructure left from 2016. New arrivals to Adak were given an orientation on island culture and operations. Immediately after arriving on the island, the advance team received training from local Adak staff on island culture and operations. In addition, the following training was provided to all personnel as they arrived on the island:

- The MEC QAPP and APP
- Reporting requirements including on-site and contract deliverables procedures, site forms, etc.
- Administrative procedures and APTIM points of contact

Personnel completed a full site assessment of both RAAs and coordinated with local resources to facilitate the planning of the actual field work during the upcoming season.

The remaining project personnel (demolition teams, UXO intrusive teams, etc.) mobilized in stages as work progressed through April, May, and June 2017. APTIM assembled three teams that each consisted of one heavy equipment operator, one UXO Technician III, and five UXO Technician II/Is. In addition, there was an Oversight Team and a Demolition Team:

- The Oversight Team consisted of the Project Superintendent, SUXOS, UXOSO, UXOQCS Supervisor, and three UXOQCSs.
- The Demolition Team consisted of one UXO Technician III and one UXO Technician II.

A support crew of equipment operators, laborers, mechanics, and a paramedic brought the total site presence up to 45 personnel.

The following Navy and QA representatives were also on-site during this preliminary effort:

- NAVFAC NW Technical Representative
- Battelle QA Specialists (3)

3.2 SURVEY CONTROL

Survey control was established based on Tidal Bench Mark 18 (PID UW7919) as the reference point. After confirming control monument labeled OBOD, the GPS base station was relocated to this control point and Bench Mark 18 was back checked. Control monument OBOD was used for the GPS base station location for all activities.

A reoccupation measurement was taken for previously established survey location control points, which ensured the accuracy of the base station setup. The locations shown in Table 3-1 were used to establish control and to perform and record the results of daily geodetic functionality checks.

Table 3-1: Control Monument Confirmation

Geodetic Functionality Report								
2016								
Date	*Geodetic Sensor*	*Control Point ID*	*Control X*	*Control Y*	*Measured X*	*Measured Y*	*Offset (ft.)*	*QC Stat*
4/5/2016	Orange	BM18	315129.186	3135925.289	315129.184	3135925.287	0.004	Pass
4/6/2016	Orange	OBOD	341774.724	3134728.354	341774.731	3134728.362	0.015	Pass
4/5/2016	Orange	BR-06	318792.904	3128679.095	318792.911	3128679.071	0.031	Pass
4/6/2016	Orange	OBOD1	339216.171	3130270.419	339216.152	3130270.436	0.036	Pass
4/6/2016	Orange	ADK-401	334516.414	3135732.455	334516.451	3135732.429	0.063	Pass
4/6/2016	Orange	ADK-401_BC	334497.841	3135732.995	334497.803	3135732.938	0.095	Pass
4/5/2016	Orange	Bunker Alpha	324632.876	3135540.166	324632.851	3135540.186	0.035	Pass
4/5/2016	Orange	BR-01	321167.549	3135810.198	321167.571	3135810.134	0.086	Pass
2017								
Date	*Geodetic Sensor*	*Control Point ID*	*Control X*	*Control Y*	*Measured X*	*Measured Y*	*Offset (ft.)*	*QC Stat*
4/17/2017	Orange	BM18	315129.186	3135925.289	315129.181	3135925.311	0.027	Pass
4/17/2017	Orange	OBOD	341774.724	3134728.354	341774.729	3134728.351	0.008	Pass
4/17/2017	Orange	BR-06	318792.904	3128679.095	318792.915	3128679.113	0.029	Pass
4/17/2017	Orange	OBOD1	339216.171	3130270.419	339216.159	3130270.433	0.026	Pass
4/17/2017	Orange	ADK-401	334516.414	3135732.455	334516.448	3135732.437	0.052	Pass
4/17/2017	Orange	ADK-401_BC	334497.841	3135732.995	334497.819	3135732.928	0.089	Pass
4/17/2017	Orange	Bunker Alpha	324632.876	3135540.166	324632.902	3135540.191	0.051	Pass
4/17/2017	Orange	BR-01	321167.549	3135810.198	321167.582	3135810.129	0.102	Pass
SPCS83 Alaska Zone 10, WGS84, US Survey ft								

3.3 TRAINING

On arrival at Adak, all personnel received operational, safety, and QC training, plus training on equipment used on the job. Training included, but was not limited to, the following topics:

- Project administration, including MEC QAPP required documentation of activities
- Photograph requirements
- Cultural resources
- Data management
- Field equipment and instrumentation
- Accident/incident reporting
- Activity Hazard Analyses (AHAs)
- SOPs

MPPEH training certificates for the APTIM site personnel and subcontractors, regardless of their mobilization date or field season, are included in Appendix D.

APTIM located the existing metal detector function check area (FCA) and established that it was still effective as an FCA. The field teams used the FCA to check the detectors during field activities to ensure that they detected the seed items buried in the FCA and that they were operating as defined in the manufacturers' manuals. Prior to the start of the field work, teams conducted an instrument test of all detection instruments to be used during field activities for that day.

This page intentionally left blank.

4.0 FIELD PROCEDURES

The following subsections describe the NTCRA areas and activities performed during 2016 and 2017 field seasons.

4.1 RAA-01

The following activities occurred in RAA-01 during 2016/2017, which are each described in the subsequent subsections:

- Site preparation/stakeout
- Access path maintenance and restoration
- Identification of archaeological sites
- Discrete anomaly removal
- Mass excavation of HALSAs
- Crater inspection
- MEC/MPPEH disposal
- Explosives management
- QC program

4.1.1 Site Preparation/Site Stakeout

At the outset of the 2016 field season's site setup, boundary and HALSA stakeout were conducted in accordance with MEC QAPP SOP 6, using anomaly avoidance procedures. APTIM established a survey control base station location at control point OBOD (see Section 3.2) located near the access to the OB/OD. With the Real Time Kinematic (RTK) Differential Global Positioning System (DGPS) Base Station located at this control point, signal coverage was provided for all RAAs. DGPS was checked daily against one of the control points listed in Table 3-1. APTIM re-established the survey control base station in 2017 and continued with daily checks against the control points throughout that field season. A table of the daily checkshot data is included in Appendix E, QC reports. The daily checkshots are also recorded in the team logbooks, included in Appendix H.

The HALSAs and discrete anomalies were identified by the survey team using RTK DGPS survey equipment to locate each boundary point and HALSA vertex (set up and check within 10 centimeters). Each Vertex point was marked with a survey witness stake.

4.1.2 Access Paths and Restoration

RAA-01 primary construction activities involved access road maintenance along Andrew Lake and into the RAA. Additional access paths within the RAA-01 boundary were constructed using crane mats made of 8-inch or 12-inch thick lumber built into 4-foot by 14-foot sheets. These mats are sufficient to prevent even the largest on-site excavator—a 42-ton John Deere 470 with 75-foot-long reach arm—from sinking into the saturated soil. Utilizing the swamp mats allowed traversal of the site after surface clearance without performing 100 percent clearance to depth of the access routes.

At the completion of HALSAs within RAA-01, the temporary access paths across cleared areas were repaired and re-graded with gravel to allow vehicles to utilize this season and following seasons. Access roads remain in place to support additional field work.

4.1.3 Archaeological Sites/Environmental Sensitive Areas

A cultural resources survey was conducted within OU B-2 in September 2011. Six Alaska Heritage Resources Survey (AHRS) resources are considered eligible for listing in the National Register of Historic Places (NRHP) as contributing elements to the World War II-era Army Base and Adak Naval Operating Base National Historic Landmark and the Adak Island Cultural Landscape Historic District. These cultural

resources were identified and documented in the Final Cultural Resources Protection Plan (NAVFAC NW, 2013). In accordance with this plan, training was provided to all site personnel regarding the recognition and protection measures associated with these cultural features.

Three distinct areas within RAA-01 were identified as cultural features and documented in Field Memo 2016-001, "*Cultural Features / HALSAs at RAA-01,*" provided in Appendix G. Cultural Features OB/OD-01-01, AHRS# ADK-00300 Features 1 and 2 are historic foundations within the 2016 clearance area and were found to correlate with HALSA CO4_PLY3, HALSA CO4_PLY2, respectively. Feature 4 is an earthen berm that comprises a portion (approximately 490 sq ft) of HALSA CO3_QA_P3.

4.1.4 Discrete Anomaly Intrusive Removal

Discrete anomaly targets from the Phase II DGM survey within the RAA-01 2016 work boundary were reacquired and intrusive investigation of each reacquired target was performed. These anomalies were not the main focus of the 2016 work, but were removed to gain safe access to HALSAs in RAA-01. Removed anomalies are shown on Figure A-2 in Appendix A with black circles. Number of anomalies removed and a discussion of the results is provided in Section 7.2.

Reacquisition of targets was performed in accordance with MEC QAPP SOP 7. Trimble Rovers with a field computer deployed on a range pole utilized an RTK DGPS base station to obtain survey grade location accuracy. The daily GPS check was completed by the Geophysical QC Technician to ensure that the RTK DGPS base station was accurate, and the results were posted to the project SharePoint site. Pin flags with the target identification were placed at the target location within 0.5 foot.

APTIM's UXO Teams performed intrusive investigations on DGM targets in RAA-01 beginning on April 25, 2016. The UXO Teams used handheld all-metal detectors to aid in recovering metallic items from within a 2.5-foot radius of the flagged target locations. When anomaly removal was completed, the UXOQCS (or designee) inspected 10 percent of the targets using a UXO Large Head or Small Head Vallon to verify that the MPC for DGM Targets had been met.

In addition to the discrete anomaly intrusive removal procedure described above, 10 anomalies close to the edges of the HALSAs were removed by over-excavation during HALSA removal. HALSAs were slightly over-excavated in some areas to ensure the entire HALSA was removed. The procedures described below for mass excavation of HALSAs (Section 4.1.5) apply to these anomalies. These anomalies are shown with a black "x" on Figure A-2 in order to differentiate between the anomalies reacquired and investigated and those incidentally removed as part of a HALSA.

4.1.5 Mass Excavation of HALSAs

An armored, long-reach excavator was used to remove the metallically saturated material from RAA-01 HALSAs. Crane mats were placed on the ground when moving and positioning the excavators to establish a stable working area, due to the irregular/unstable ground in RAA-01. The crane mats were also used to provide access over surface-cleared areas because they distribute the weight of the excavator sufficiently to prevent the excavator from sinking into the soft ground and potentially disturb MEC in surface-cleared areas.

Each HALSA was divided into trenches that could be easily accessed by the excavator. The trenches were then divided into lifts. The amount of material removed for each lift was based on the room available on the processing pad. Each trench was a distinct work unit covering a defined footprint within the HALSA. Each trench was subject to QC inspection and the criteria for determining if a trench is complete (i.e., no metal fragments greater than 3 inches in any dimension, or, after the discovery of 20mm projectiles within HALSAs, no metal 3 inches in any dimension or MEC down to 20mm projectiles). No trench was backfilled without approval by QC and QA. The size, shape, and location of each trench were dependent on site conditions and the reach of the excavator. The RTK DGPS coordinates of the corners of each trench were recorded and are included in the project GIS (Appendix O). When the entire HALSA was trenched and completely covered by defined trenches, the HALSA was considered complete.

When executing a trench, the excavator operator scooped material and spread the excavated spoils adjacent to the trench, typically on a subsequent trench to be excavated. The spoils were placed on top of a pad constructed of wood and/or plastic to keep it from mixing with the underlying ground. During excavation of spoils, a spotter from the UXO team was positioned approximately 70 feet (at least the K24

distance) away behind a blast shield, observing a remote, live feed from the excavator camera. The remainder of the UXO team was positioned outside of the HFD. The operator excavated and staged spoils in a lift, consisting of covering the available area on the processing pad to a depth of up to 1-foot thick. Excavation was also halted if the UXO team observed a potential MEC on the remote feed. The maximum lift thickness on the processing pad was reduced to 8 inches in September 2016 after consultation with NOSSA on the discovery of 20mm projectiles within RAA-01 HALSA areas.

After the lift was placed on the processing pad, the operator stopped digging and the UXO team searched through the excavated spoils for any MEC/MPPEH, and also metal 3 inches or greater in any dimension, using handheld metal detectors. Metallic debris was inspected for the presence of MEC/MPPEH and processed. Multiple lifts were required to complete most trenches. Each lift became another distinct work unit subject to QC inspection. Once a lift had been searched and QC completed, the spoils were moved to a designated area near the excavation to allow for a subsequent lift to be spread and searched. Adequate separation was maintained to avoid intermingling of un-cleared and cleared spoils.

The excavator operator was protected with a fragmentation blast shield of 1.43 inches of steel to protect the operator from unintentional detonation of the MGFD. Cameras attached to the boom were connected to a monitor system inside the cab to allow the operator to use the machine while behind a solid blast shield. An electromechanical device was installed on the excavator to prevent the bucket from coming within the blast overpressure distance to the operator.

The trenches that were excavated in the 2016 and 2017 field seasons are shown on Figures A-3 through A-14. Trenches excavated in 2016 are shown in gray shading on the figures, while the trenches completed in 2017 are shown in light green shading. The majority of the trenches were less than 4 feet in depth and were stopped based on absence of further response at the base of the excavation. In the central portion of RAA-01, excavations went deeper due to continued metallic debris. In this area, excavations reached a maximum depth of 8 feet. In some cases, excavations were stopped at a depth of 4 feet with concurrence from Navy QA and approval from the NTR based on the MPC in the MEC QAPP (metal present, but no MEC/MPPEH present at the base of the excavation at 4 feet below mineral surface). Although groundwater intrusion was anticipated to potentially limit the depth of excavations, it did not affect excavation depths.

4.1.6 MEC/MPPEH Disposal

MEC/MPPEH were located and disposed of by blow-in-place (BIP) or consolidated demolition shots. Demolition operations were conducted in accordance with the MEC QAPP, the Explosives Safety Submission (ESS), and SOP 9. Small MPPEH items were thermally treated at the Mobile Thermal Destruction Unit (MTDU) in accordance with the MEC QAPP, ESS, and SOP 10. A detailed listing of type, depth, location, and the final disposition of the items are provided in the Munitions Accountability Log (Appendix I). Photographs of all MEC items are included in Appendix Q.

4.1.7 Explosives Management

APTIM used two sited Government Type II portable explosives magazines on Adak. These magazines are located east of RAA-03 and were cited in the OU B-2 Department of Defense Explosives Safety Board (DDESB)-approved ESS (see Appendix A of the ESS, Quantity Distance maps). One magazine was used for donor explosives and the other was used for temporary storage of safe-to-move MEC pending treatment by demolition or processing in the MTDU. Binary explosive components were stored in a separate 20-foot container, also located east of RAA-03.

APTIM verified the grounding of the magazines with a licensed electrician (see Appendix J). Access to the magazines was controlled by the SUXOS, who also maintained the explosives magazine data sheets. Copies of the magazine data sheets and explosive usage form are presented in Appendix J.

In accordance with the MEC QAPP, the UXOQCS Supervisor performed Preparatory and Initial inspections prior to the start of demolition operations. The UXOQCS Supervisor, the SUXOS, and the demolition team leader performed weekly magazine inspections using an inspection checklist. Records of the initial and preparatory inspections are contained in Appendix E, QC Reports. The weekly magazine inspections are included in Appendix J, Explosives and MDAS Documentation.

4.1.8 CRATER INSPECTIONS

For any crater that was not remediated as part of a HALSA, the UXO Teams dewatered the crater to expose the bottom and sides for a visual inspection and MEC/MPPEH removal. When complete, the UXOQCS (or designee) inspected the crater from the edges (without entering the crater) to safely verify that all visible MEC/MPPEH was removed and the outline accurately recorded by GPS prior to backfill. The craters that were inspected and backfilled in the 2016/2017 season are shown on Figures A-3 through A-14.

4.1.9 QC PROGRAM

The following QC processes were conducted in RAA-01:

- Placement of blind seed items (BSIs)
- Surveillance of the initial and ongoing work performed on definable features of work (DFWs) and the documentation of the QC findings
- Performance of QC checks on completed trenches for compliance with data quality objectives
- Preparation and submittal of trench certification packages to QA for approval and acceptance by the Navy

4.1.9.1 BSIs and Coverage Seed Placement

The UXOQCS Supervisor (or designee) planted blind seeds that were recovered by the production team for acceptance of the trench. The QA also had a separate seed program that is independent and not communicated to APTIM except in a general sense.

Blind seeds consisted of 1.5-inch by 4-inch black steel pipe. The seeds were not painted or otherwise made easier to find. Each blind seed was engraved or otherwise marked with a unique identifying number.

The goal was for each team to encounter blind seeds at an average rate of three per day. The UXOQCS maintained an element of randomness so that the production team never knew if and how many seeds were present in a given work unit. Seeds were incorporated in a combination of ways as follows:

- Pre-Excavation Seeds – The UXOQCS Supervisor installed blind seeds a few days in advance of initiating the trench by burying the seeds between 25 percent and 75 percent of the total anticipated lift depths in future work areas. Anomaly avoidance techniques were used when placing these seeds. Deeper placement of Pre-Excavation Seeds was not planned due to difficulty safely burying the seeds deeply in a metal saturated area. The purpose of these seeds was to test the coverage of the trenches and the ability of all MEC/MPPEH to be removed from the excavation and recovered in lifts. The GPS coordinates, date, time, and seed ID were recorded at the time of placement.
- Mid-Excavation Seeds – The UXOQCS Supervisor added one or more blind seeds to in-process excavations at least once per day when the production team was not present. The purpose of these seeds was to test the ability to remove all MEC/MPPEH from depths of the excavation below 1 foot and recovered in lifts. The Trench ID, date, time, and seed ID were recorded at the time of placement.
- Lift Seeds – The UXOQCS Supervisor added one or more blind seeds to exposed lifts at least once per day when the production team was not present. The purpose of these seeds was to test the ability of the team to recover items from lifts. The Trench ID, lift, date, time, and seed ID were recorded.

The UXOQCS Supervisor tracked the placement of all seeds and ensured that the team recovered all seeds. The results of the blind seeding program are discussed in Section 5.

4.1.9.2 QC Surveillance of Initial and Ongoing Work

A Three-Phase Inspection Checklist was used to document the QC surveillance for each DFW. Appropriate DFW checklists were completed on each DFW activity depending on the status of the activity. The results of the three-phase inspections are provided in Section 5.

4.1.9.3 QC Checks of Completed Trenches

When performing trench excavations in RAA-01 HALSAs, the UXO Teams used handheld all-metal detectors to aid in locating any metallic items in the excavator spoils spread out in distinct lifts from trenches. When each lift was completed by the UXO Team, 10 percent of each lift was checked by QC using a UXO Large Head or Small Head Vallon to verify that the lift met the MPC for lift completion.

When all lifts were completed and the trench was thought to be complete, the UXOQCS (or designee) ensured that one of the MPC for trench completion was met and documented. If the excavation was believed to be free of additional metal greater than or equal to 3 inches in any dimension, the UXOQCS confirmed that the last lift contained no metal greater than or equal to 3 inches in any dimension. Alternatively, the UXOQCS could verify completeness by requesting a fresh bucket of spoils from the bottom of the trench and inspecting for metal or by direct inspection of the bottom of the trench with a Large Head or Small Head Vallon all-metals detector. When the UXOQCS (or designee) concurred that one of the MPC for trench completion was met, the UXOQCS (or designee) notified the QA contractor that the trench was complete and the QA contractor performed the required QA inspection prior to backfill. The UXOQCS (or designee) ensured that tundra mats were inspected for MEC/MPPEH before replacement.

4.1.9.4 Final Confirmation of Completeness

When trenches (and DGM Targets in some cases) were completed over 100 percent of the HALSA or defined work area, the UXOQCS Supervisor (or designee) reviewed the surveyed trench extent in GIS to ensure that there was 100 percent coverage, and also reviewed the documentation to make sure that it was completed before turning over to the QA contractor for review. QA approval was then received verbally and the trench completion information was presented in the following week's QC briefing.

4.2 RAA-05

The following activities occurred in RAA-05 during the 2016 and 2017 field seasons, which are each described in the subsequent subsections:

- Site preparation/stakeout
- Access path maintenance and restoration
- Mass excavation of disposal areas
- Completion of monthly seawall sweeps
- MEC/MPPEH disposal
- Explosives management
- QC program

4.2.1 Site Preparation/Site Stakeout

At the outset of the 2016 field season's site setup, boundary and boundary stakeout were conducted in accordance with MEC QAPP SOP 6. APTIM established a survey control base station location at control point OBOD (see Section 3.2) located near the access to the OB/OD. With the RTK DGPS Base Station located at this control point, signal coverage was provided for all RAAs. DGPS was checked daily against one of the control points listed in Table 3-1. The survey control base station location was re-established in April 2017, at the beginning of the 2017 field season.

The 6-meter by 6-meter grid corners at the SDA were located and marked by the survey team using RTK DGPS survey equipment. These grids were utilized by USA Environmental in 2013 to establish the boundaries of the areas they were clearing at the time. APTIM completed three test trenches (TRUV46, TRUV48, and TRW49) to demonstrate that the area cleared in 2013 (shown in green hatching on Figure A-15 in Appendix A) met the project MPCs to be considered complete.

At RAA-05, the areas being investigated in 2016 and 2017 were disposal areas at the northern end of the site that were approximately outlined based on surface reconnaissance and very limited geophysical work. Trenches 101, 102, and 103 in the western portion of the site were dug in an attempt to delineate the

western end of the disposal area. Extensive, deep debris, including MEC/MPPEH ultimately led to this area being removed from the scope of the 2016/2017 field work. This deep, mounded debris area ("Deep Piles Area") extends from the SDA west approximately 0.25 miles along the base of the mountain. No work was performed in the southern DGM portion of the site in 2016/2017.

During the 2017 field season, the Navy surveyed and marked the Deep Piles Area – an area of mounded debris that extends west out of the SDA along the beach. The portion of the Deep Piles Area that overlaps the SDA was de-scoped from the 2016/2017 field season due to the deeper than expected extent of waste in this area. During the 2017 season, it was discovered that the Deep Piles area extended further to the east than previously believed. An additional de-scope of deep piles square footage was performed in July 2017. Two small slivers of land (one at the base of the mountain slope and one on the banks of the Lake Andrew spillway) were determined to be inaccessible due to the slope. These areas are shown on Figure A-15 in Appendix A.

4.2.2 Access Paths and Restoration

RAA-05 primary construction activities involved access road maintenance along Andrew Lake and into the RAA. A temporary bridge was constructed in order to access the seawall and the Eastern Step-out Area. This bridge was removed by APTIM after completion of 2016 field activities (photograph included in Appendix Q). Similarly, the bridge was re-established in 2017 and removed at the conclusion of field activities.

4.2.3 Mass Excavation of Disposal Areas

An armored, long-reach excavator was used to remove the metallically saturated material from RAA-05 disposal areas. As with the RAA-01 HALSAs, the disposal area was divided into trenches that could be easily accessed by the excavator. The trenches were then divided into lifts. The amount of material removed for each lift was based on the room available on the processing pad. Each trench was a distinct work unit covering a defined footprint within the disposal area. Each trench was subject to QC inspection and the criteria for determining if a trench is complete (i.e., no metal fragments greater than 3 inches in any dimension). No trench was backfilled without approval by QC and QA. The size, shape, and location of each trench were dependent on site conditions and the reach of the excavator. The RTK DGPS coordinates of the corners and depth of each trench were recorded.

When executing a trench, the excavator operator scooped material and spread the excavated spoils adjacent to the trench onto a pad constructed of wooden crane mats. During excavation of spoils, the UXO team was positioned approximately 70 feet (at least the K24 distance) away behind a blast shield, observing a remote, live feed from the excavator camera. The operator excavated and staged spoils in lifts of up to 1-foot thick until the available area was filled. Note that the large cobble size is the actual limitation for lift thickness, and the excavator operator spread the lift as a single layer of larger cobbles. Based on NOSSA direction in September 2016, this lift thickness was decreased from 12 inches to 8 inches after discovery of 20mm rounds at RAA-01 HALSAs, but was still limited by the size of the cobbles. This reduced lift thickness was utilized for the remainder of the 2016 season and all of the 2017 season. Excavation was halted if the UXO team observed a potential MEC on the remote feed.

After the lift was placed on the ground, the operator stopped digging and the UXO team searched through the excavated spoils for MEC/MPPEH, and metal 3 inches or greater in any dimension using handheld metal detectors. Metallic debris was inspected for the presence of MEC/MPPEH and processed. Multiple lifts were required to complete most trenches. Each lift became another distinct work unit subject to QC inspection. Once a lift had been searched and QC completed, the spoils were moved to a designated area near the excavation to allow for a subsequent lift to be spread and searched. Adequate separation was maintained to avoid intermingling of un-cleared and cleared spoils.

The excavator operator was protected with a fragmentation blast shield of 1.43 inches of steel to protect the operator from unintentional detonation of the MGFD. Cameras attached to the boom were connected to a monitor system inside the cab to allow the operator to use the machine while behind a solid blast shield. An electromechanical device was installed on the excavator to prevent the bucket from coming within the blast overpressure distance to the operator.

Trenches that were excavated in the 2016 and 2017 field seasons are shown on Figures A-15 through A-16. The excavations were generally 2–4 feet in depth across the eastern portion of the SDA, but reached depths of 8–10 feet in the western portion of the SDA.

4.2.4 MONTHLY SEAWALL SWEEPS

APTIM conducted monthly visual surface sweeps to remove MEC items from the cobble beach portion of the defined boundary of RAA-05/ALSW-01, documented the GPS locations, and took photographs of all MEC items. The team used GPS to track the area covered. The cobble beach area is defined as the seawall surf zone to the edge of the grassy area on the seawall). Sweep tasks were performed with a sweep line of qualified personnel to walk the seawall while visually looking for MEC. Seawall sweeps were performed monthly April through October in 2016 and May through September in 2017. In addition to the sweeps performed by APTIM UXO personnel, Navy Explosive Ordnance Disposal (EOD) was on-island in June 2016, September 2016, May 2017, and August 2017, and performed additional seawall sweeps. Results from these sweeps are presented in the EOD After Action Reports in Appendix N.

4.2.5 MEC/MPPEH DISPOSAL

MEC/MPPEH were located and disposed of by BIP or consolidated demolition shots. Demolition operations were conducted in accordance with the MEC QAPP, the ESS, and SOP 9. Small MPPEH items were thermally treated at the MTDU in accordance with the MEC QAPP, ESS, and SOP 10. A detailed listing of type, depth, location, and photographs of the items are provided in the Munitions Accountability Log (Appendix I).

4.2.6 EXPLOSIVES MANAGEMENT

APTIM utilized two Government Type II portable explosives magazines on Adak. These magazines are located east of RAA-03 and were cited in the OU B-2 DDESB-approved ESS (see Appendix A of the ESS, Quantity Distance maps). One magazine was used for donor explosives and the other was used for temporary storage of safe-to-move MEC pending treatment by demolition or processing in the MTDU. Binary explosive components were stored in a separate 20-foot container also located east of RAA-03.

APTIM verified the grounding of the magazines with a licensed electrician (see Appendix J). Access to the magazines was controlled by the SUXOS, who also maintained the explosives magazine data sheets. Copies of the magazine data sheets and explosive usage form are presented in Appendix J.

In accordance with the MEC QAPP, the UXOQCS Supervisor performed Preparatory Training and the demolition team provided the Initial Training prior to the start of demolition operations. The UXOQCS Supervisor, the SUXOS, and the demolition team leader performed weekly magazine inspections using an inspection checklist. Records of the training and inspections are contained in Appendix D, Site-Specific Training Records, and Appendix J, Explosives and MDAS Documentation, respectively.

4.2.7 QC PROGRAM

The following QC processes were conducted in RAA-05:

- Placement of BSIs
- Surveillance of the initial and ongoing work performed on DFWs and the documentation of the QC findings
- Performance of QC checks on completed trenches for compliance with data quality objectives
- Preparation and submittal of trench certification packages to QA for approval and acceptance by the Navy

4.2.7.1 BSIs and Coverage Seed Placement

The UXOQCS Supervisor (or designee) planted blind seeds that were recovered by the production team for acceptance of the trench. The QA also had a separate seed program that is independent and not communicated to APTIM except in a general sense.

Blind seeds consisted of 1.5-inch by 4-inch black steel pipe. The seeds were not painted or otherwise made easier to find. Each blind seed was engraved or otherwise marked with a unique identifying number.

The goal was for each team to encounter blind seeds at an average rate of three per day. The UXOQCS maintained an element of randomness so that the production team never knew if and how many seeds were present in a given work unit. Seeds were incorporated in a combination of ways as follows:

- Pre-Excavation Seeds – The UXOQCS Supervisor installed blind seeds a few days in advance of initiating the trench by burying the seeds between 25 percent and 75 percent of the total anticipated lift depths in future work areas. Anomaly avoidance techniques were used when placing these seeds. Deeper placement of Pre-Excavation Seeds was not planned due to difficulty safely burying the seeds deeply in a metal saturated area. The purpose of these seeds was to test the coverage of the trenches and the ability of all MEC/MPPEH to be removed from the excavation and recovered in lifts. The GPS coordinates; date, time, and seed ID were recorded at the time of placement.
- Mid-Excavation Seeds – The UXOQCS Supervisor added one or more blind seeds to in-process excavations at least once per day when the production team was not present. The purpose of these seeds was to test the ability to remove all MEC/MPPEH from depths of the excavation below 1 foot and recovered in lifts. The Trench ID, date, time, and seed ID were recorded at the time of placement.
- Lift Seeds – The UXOQCS Supervisor added one or more blind seeds to exposed lifts at least once per day when the production team was not present. The purpose of these seeds was to test the ability of the team to recover items from lifts. The Trench ID, lift, date, time, and seed ID were recorded.

The UXOQCS Supervisor tracked the placement of all seeds and ensured that the team recovered all seeds. The results of the blind seeding program are provided in Section 5.

4.2.7.2 QC Surveillance of Initial and Ongoing Work

A Three-Phase Inspection Checklist was used to document the QC surveillance for each DFW. Appropriate DFW checklists were completed on each DFW activity depending on the status of the activity. The results of the three-phase inspections are provided in Section 5.

4.2.7.3 QC Checks of Completed Trenches

When performing trench excavations in RAA-05 Disposal Areas, the UXO Teams used handheld all-metal detectors to aid in locating any metallic items in the excavator spoils spread out in distinct lifts from trenches. When each lift was completed by the UXO Team, 10 percent of that lift was checked by QC using a UXO Large Head or Small Head Vallon to verify that the lift met the MPC for lift completion.

When all lifts were completed and the trench was thought to be complete, the UXOQCS (or designee) ensured that one of the MPC for trench completion was met and documented. If the excavation was believed to be free of additional metal greater than or equal to 3 inches in any dimension, the UXOQCS confirmed that the last lift contained no metal greater than or equal to 3 inches in any dimension. Alternatively, the UXOQCS could verify completeness by requesting a fresh bucket of spoils from the bottom of the trench and inspecting for metal or by direct inspection of the bottom of the trench with a Large Head or Small Head Vallon. When the UXOQCS (or designee) concurred that one of the MPC for trench completion was met, the UXOQCS (or designee) notified the QA contractor that the trench was complete and the QA contractor performed the required QA inspection prior to backfill.

4.2.7.4 Final Confirmation of Completeness

When trenches were completed over 100 percent of the defined work area, the UXOQCS (or designee) reviewed the surveyed trench extent in GIS to ensure that there was 100 percent coverage, and also reviewed the documentation to make sure that it was completed before turning over to the QA contractor for review.

5.0 PROJECT QC AND QA RESULTS

5.1 PROJECT QC RESULTS

5.1.1 THREE-PHASE INSPECTIONS

The QC staff employed a three-phase inspection process to check the performance of each DFW. The three-phase process included a preparatory, an initial, and a series of follow-up inspections for each DFW. The preparatory inspection was conducted prior to any work activities for each DFW. The preparatory inspection included a review of the DFW objectives, all plans (SOPs, safety plans, AHAs, etc.) and equipment to ensure all personnel were knowledgeable of their assignments and responsibilities and how to safely execute the task objectives. The initial inspection checked the preliminary work on each DFW for compliance with approved procedures and project objectives, and documented any noncompliance or deficiencies in workmanship. The series of follow-up inspections were conducted, at the frequency established in the MEC QAPP, as long as work continued on each DFW. The follow-up inspections checked to ensure continued compliance with the approved procedures and the project objectives, and to document any noncompliance or deficiencies in workmanship. Appendix C presents the documentation of all of the inspections performed. The Inspection Tracking Table (Table 5-1), presents the planned and actual dates for the inspections. Preparatory, Initial, and weekly Follow-up inspections were performed for all DFWs, and the QC staff determined the DFWs to be compliant with the accuracy requirements in the established MPCs.

1

Table 5-1: QC Inspection Tracking Table

Project:	MEC NTCRA at OU B-2, Adak Island, AK	**Project Manager:**	Doug Schicho	**UXOQCS Supervisor:**	Joe Stultz

		Preparatory		**Initial**		**Follow-Up**		**Completion**	
Reference Number	**Definable Feature of Work**	**Date Planned**	**Actual Date**	**Date Planned**	**Actual Date**	**Planned Begin/ End**	**Actual Begin/ End**	**Date Planned**	**Actual Date**
MEC QAPP Table 16-3, SOP 5	Remove Vegetation	4/25/2016	4/25/2016 4/21/2017	4/25/2016	6/1/2016 7/12/2017	6/1/2016 10/15/2016	6/1/2016 7/12/2017	10/15/2017	7/12/2017
MEC QAPP Table 16-3, SOP 5	Technology-Aided Surface Removal	4/25/2016	4/25/2016 4/21/2017	6/1/2016	6/1/2016 7/12/2017	6/1/2016 10/15/2016	6/1/2016 7/12/2017	10/15/2017	7/12/2017
MEC QAPP Table 16-3, SOP 7	Target Reacquisition	4/11/2016	4/11/2016 4/21/2017	4/11/2016	4/11/2016 4/24/2017	4/13/2016 10/15/2016	4/13/2016 6/23/2016	10/15/2017	6/23/2016
MEC QAPP Table 16-3, SOP 8	Conduct Intrusive Investigations of Discrete DGM Targets	4/15/2016	4/15/2016 4/21/2017	4/21/2016	4/21/2016 4/24/2017	4/22/2016 10/15/2016	4/22/2016 6/23/2016	10/15/2016	6/23/2016
MEC QAPP Table 16-3, SOP 12	Conduct Intrusive Investigations of RAA-01 HALSAs and RAA-05 Disposal Areas	4/15/2016	4/15/2016 4/21/2017	4/21/2016	4/21/2016 4/24/2017	4/22/2016 10/15/2015	4/22/2016 9/19/2017	10/15/2017	9/19/2017
MEC QAPP Table 16-3	Dewater and Clear Craters	4/25/2016	4/25/2016 4/21/2017	5/2/2016	5/2/2016	5/2/2016 10/15/2016	5/2/2016 10/15/2016	10/15/2016	10/15/2016
MEC QAPP Table 16-3, SOP 13	Data Management	4/25/2016	4/25/2016 4/18/2017	4/27/2016	4/27/2016	4/25/2016 10/20/2016	4/3/2016 9/22/2017	10/15/2017	9/22/2017

Reference Number	Definable Feature of Work	Preparatory		Initial		Follow-Up		Completion	
		Date Planned	Actual Date	Date Planned	Actual Date	Planned Begin/ End	Actual Begin/ End	Date Planned	Actual Date
MEC QAPP Table 16-3, SOP 9	Manage and Dispose of MEC	4/15/2016	4/15/2016 4/21/2017	4/23/2016	4/23/2016 4/22/2017	5/7/2016 10/15/2016	5/7/2016 9/22/2017	10/15/2017	9/22/2017
MEC QAPP Table 16-3, SOP 10	Manage and Dispose of MPPEH/MDAS	4/15/2016	4/15/2016 4/21/2017	4/25/2016	4/25/2016 5/26/2017	5/20/2016	9/22/2017	10/15/2017	9/22/2017

Abbreviations and Acronyms:
DGM – digital geophysical mapping
HALSA – high amplitude large spatial anomaly
MDAS – material documented as safe
MEC – munitions and explosives of concern
MPPEH – material potentially presenting an explosive hazard
NTCRA – non-time critical removal action
OU – operable unit
QAPP – Quality Assurance Project Plan
RAA – remedial action area
SOP – standard operating procedure
UXOQCS – Unexploded Ordnance Quality Control Specialist

5.1.2 BLIND SEEDS

During the course of the 2016 field season, one BSI in RAA-01 and three BSIs at RAA-05 were not recovered. NCRs were initiated to document the missing BSIs. These NCRs are described below in Section 5.1.3. Methodical searches using Vallons were performed in the area the seeds were originally buried, between the trench and the pad, and in the spoils cleared from the pad. The seed were not recovered, and QC/QA were unable to recover the seed. QC explained the importance of ensuring all seeds are recovered to the UXO teams, and QC also verified that the QC processes were properly implemented. These NCRs were held open until the end of the field season to establish whether a pattern could be detected in the missing BSIs. Ultimately, 743 of 747 BSIs were recovered during the 2016 field season, a 99.5 percent recovery rate. This rate was considered acceptable by the project team and indicative that the production process was successful of its intended goal. The NCRs were closed at the conclusion of the 2016 field season. Ultimately, the blind seeding program was adjusted as a result of these lost seeds, and trench and excavation seeds were replaced with additional lift seeds.

During the 2017 field season, a total of 476 BSIs were placed, and one was not recovered. The unrecovered BSI was one of three QA seeds placed on the pad from Trench 61, Lift 18 at RAA-05. The corrective action was 100 percent QC of the following 10 lifts. The NCR was closed after 10 lifts were completed with no further lost seeds. At the end of the 2017 season, only 1 out of 476 seed items was not recovered, a 99.8 percent recovery rate, which was considered acceptable by the project team.

5.1.3 NONCONFORMANCE REPORTS

Throughout the project, the QC staff initiated NCRs on project tasks that did not meet the project performance metrics. Table 5-2 is a list of all of the NCRs initiated during the project field effort. A discussion of each NCR and the corrective actions taken to resolve the deficiencies are provided in the QC program subsections in Section 4 of this report. There were four NCRs recorded in 2016 and three in 2017. All NCRs were resolved and closed.

Table 5-2: Nonconformance Reports

NCR #	Description of Conditions / Items Affected	Issue	Disposition / Approval	Closure	Remarks
2005 JP01 NCR-001	Blind Seed was not recovered by field production team, QC or 3rd party QA.	6/17/2016	Hold open until all adjacent grids are completed	9/3/2016	Loss of a single blind seed is not a nonconformance. NCR was opened to track lost blind seeds throughout the progress and assess whether there is a pattern in losing them or if they are single isolated incidences.
2005 JP01 NCR-002	Excavation Blind Seed #021 was not recovered by field production team, QC or 3rd party QA.	7/26/2016	Hold open until all adjacent grids are completed	9/3/2016	Loss of a single blind seed is not a nonconformance. NCR was opened to track lost blind seeds throughout the progress and assess whether there is a pattern in losing them or if they are single isolated incidences.
2005 JP01 NCR-003	Mid-excavation Blind Seed #055 was not recovered by field production team, QC or 3rd party QA.	9/6/2016	Hold open until all adjacent grids are completed	10/18/2016	Loss of a single blind seed is not a nonconformance. NCR was opened to track lost blind seeds throughout the progress and assess whether there is a pattern in losing them or if they are single isolated incidences.

NCR #	Description of Conditions / Items Affected	Issue	Disposition / Approval	Closure	Remarks
2005 JP01 NCR-004	Pre-excavation Blind Seed #042 was not recovered by field production team, QC or 3rd party QA.	10/13/2016	Hold open until all adjacent grids are completed	10/18/2016	As of 10/12/16, 747 blind seeds have been placed and four have not been recovered (0.53% loss rate).
2005 JP01 NCR-005	Mid-Excavation Blind Seed 043 was missed on Trench 56 Lift 17 at RAA-05.	5/11/2017	Hold open until next 10 lifts are completed with 100 percent QC	5/23/2017	The seed was located by QA during their check of the lift. The UXO Team has been informed of the importance of the blind seeding program, daily instrument FCA use, and seed reporting requirements. The UXO Team will receive refresher training on the use of the Vallons and the importance of fully screening lifts on the pads. Root Cause: Improper use of handheld metal detectors during rain and high winds causing audible only signals to be missed by the operator. Corrective Action: 100% of the next 10 lifts will be QC'd. Failure of any of these lifts will cause a reevaluation of the corrective action.
2005 JP01 NCR-006	Team 3 missed 1 of 3 QA blind seeds on Trench 61 Lift 18 at RAA-05.	5/30/2017	Hold open until next 10 lifts are completed with 100 percent QC	7/20/2017	Team 3 missed one (1) of the three (3) QA seeds that had been placed on the pad from Trench 61 Lift 18. The UXO Team has been informed of the importance of Blind seed items which provide an unbiased opportunity to evaluate the contractors' ability to detect and recover subsurface MEC under actual working conditions and comprise a key component for QA of the planned excavation activities. Root Cause: Team did not ensure complete Vallon coverage of the lift pad. Specifically, existing gaps

NCR #	Description of Conditions / Items Affected	Issue	Disposition / Approval	Closure	Remarks
					between the pads and over the pad connecting rods. Corrective Action: 100% of the next 10 lifts will be QC'd. Failure of any of these lifts will cause a reevaluation of the corrective action.
2005 JP01 NCR-007	Team 1's excavator rolled forward and entered the HFD of Team 2's excavator while Team 2's excavator was intrusive.	5/30/2017	6/17/2017	6/27/2017	Root Cause: 1. Inadequate communication between all parties involved in maintaining and checking the HFD (survey, Team Leaders, Field QC, SUXOS, UXOQCS Supervisor). 2. There was no specific UXOQC follow-up or surveillance for the HFD in the QAPP or SOP for Intrusive work. Corrective Actions: 1. Excavator operators will coordinate directly with each other to ensure that armor is between themselves and their excavations if they are within the HFD of each other before one or the other begins intrusive activities. 2. Additional Surveillance specifically for HFD added to Daily UXOQC checks.

Abbreviations and Acronyms:
FCA – function check area
HFD – hazardous fragmentation distance
MEC – munitions and explosives of concern
NCR – nonconformance report
NTR – Navy Technical Representative
QA – quality assurance
QAPP – Quality Assurance Project Plan
QC – quality control
SOP – standard operating procedure
SUXOS – Senior Unexploded Ordnance Supervisor
UXO – unexploded ordnance
UXOQCS – Unexploded Ordnance Quality Control Specialist

5.1.4 DEFICIENCY NOTICES

Deficiency notices (DNs) were used to address nonconforming conditions discovered during QA/QC inspections or other functions that did not impact the final product. No DNs were initiated during the project field effort.

5.2 PROJECT QA RESULTS (2016/2017)

A report detailing QA activities for the 2016/2017 field seasons will be issued by the QA contractor under separate cover. A summary is provided below.

5.2.1 GENERAL QA ACTIONS AND RESPONSIBILITIES

The general QA activities conducted during the NTCRA were as follows:

- Attendance at and oversight of all Preparatory and Initial Phase QC inspections
- QA of the contractor intrusive investigations and other field activities, which included:
  - Daily QA surveillances of the field-work-related DFW according to the frequency approved in the Quality Assurance Surveillance Plan
  - Independent post-intrusive investigation checks of contractor investigations to verify removal to project standards
  - A review of the field work-related QC documentation to verify compliance with the frequency requirements and adequacy standards in the approved QAPP and SOPs
- Management of NCRs issued by QC or QA, which is included evaluating root cause analysis and verifying appropriate corrective actions, conducting follow-up inspections of the corrective action (e.g., re-work) including verification of required re-inspections and documentation by QC and ensuring timely close-out of open NCRs
- Additional investigations, research, process analysis and/or other quality functions, which were determined necessary to support the field effort and aid in achieving the goals of the project

5.2.2 QUALITY ASSURANCE FIELD ACTIVITIES

Field QA personnel conducted surveillances for field activities during the field season for all DFWs. QA conducted daily surveillances of each team during the first week that DFW was being performed and on each team once per week thereafter. The QA checks of the management and disposal of the MDAS DFW were accomplished by observing the thermal treatment process at the MTDU and inspecting the final product as it was being containerized. The checks were accounted for using logbook entries and the totals were tracked with dual signature turn-in documents (1348-1).

5.2.3 QUALITY ASSURANCE LIFT/TRENCH APPROVAL

The QA inspection sequence comprised two elements. One element was a review and verification of documentation and results for all the production and QC work for the trench. The other element was independent verification through inspection of each lift. The independent verification consisted of re-checks of contractor-completed digs.

QA personnel reviewed all the production and QC data for the trench. Documentation review consisted of:

- Intrusive dig sheet results
- QC close out documentation, targets checked, inaccessible areas (standing water, slopes, cultural features, etc.), targets below required clearance depths, no finds, etc.
- QA documentation for the trench
- QA-placed BSIs identified by number
- Disposal of all MEC and management of MPPEH from the grid

QA re-inspected a minimum of 5 percent of each lift prior to the lift being removed from the pad.

5.2.4 DEFICIENCIES AND NONCONFORMANCES

No DNs and four NCRs were issued during the 2016 field season. No DNs and three NCRs were issued during the 2017 field season. All were issued by QC and are described in Section 5.1. No NCRs were issued by QA during the 2016 or 2017 field seasons.

5.3 NAVY EOD SEAWALL SWEEPS

Navy EOD was on site in June 2016 and May 2017 to open the Andrew Lake Spillway and also performed seawall sweeps while on-island. The Navy EOD After Action Reports are included in Appendix N.

6.0 NOSSA AND ADEC AUDITS

6.1 AUDIT FINDINGS

During 2016 field operations, personnel from NOSSA conducted a site visit to audit the field procedures. The purpose of the audit was to assess the extent to which APTIM was complying with applicable environmental, safety, and occupational health requirements related to the management of MEC and MPPEH. NOSSA provided positive feedback regarding audit findings during the subsequent audit wrap-up meeting. Overall, NOSSA found operations satisfactory with respect to explosive safety and environmental criteria. NOSSA had four findings during the audit that were addressed during the audit period. The findings and the NAVFAC response detailing the corrective actions are included in Appendix N. While on-island, the NOSSA representative also provided MPPEH training to site personnel. Documentation of this training is provided in Appendix D.

An ADEC site audit was not performed during the 2016 field season. ADEC visited the site and conducted an inspection in September 2017. No significant findings were reported during the visit. The Site Visit Report generated by ADEC is also included in Appendix N.

This page intentionally left blank.

7.0 NTCRA RESULTS SUMMARY

This section summarizes the results of the RAA NTCRA activities.

7.1 OVERALL SUMMARY OF WORK AND REMOVED MEC/MPPEH

Table 7-1 presents a summary of work completed during the 2016 and 2017 field seasons in RAA-01 and RAA-05 and the amount of MPPEH, MEC, discarded military munitions (DMM), MDAS, and Other Debris located and removed. Weights for MDAS and other debris were originally based on field estimates and were revised after total weights are obtained from the receiving facilities. Note that the weights for each individual site/year are based on the same percent of the total as the field estimates.

Table 7-1: 2016/2017 Results

2016						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	37,271 sq ft (0.86 acres)	408	138	1	3,744	46,797
Crater	23 craters	23	2	0		
Anomalies	228 anomalies 20,880 sq ft (total area containing anomalies) (0.48 acres)	10	1	1		
RAA-05						
Shoreline Dump Area	43,505 sq ft (1.00 acres)	136	212	28	3,895	16,201
West Step-out	0 sq ft	0	0	0		
East Step-out	6,604 sq ft (0.15 acres)	7	6	1		
Seawall	21 Acres 7 events	0	13	0	93	0
Anomalies	4 anomalies	--	--	--	--	--
	Total	584	369	31	7,733	62,998
2017						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	30,992 sq ft (0.71 acres)	2,253	49	2	13,979	7,413
Crater	--	--	--	--		
Anomalies	6 anomalies	--	--	--		
RAA-05						
Shoreline Dump Area	7,567 sq ft (0.17 acres)	47	41	15	3,973	27,221
West Step-out	0 sq ft	0	0	0	--	--

	Total Completed	MPPEH (each)	MEC, unspecified (each)	MEC, DMM (each)	MDAS (lbs)	Other Debris (lbs)
East Step-out	24,049 sq ft (0.55 acres)	1	23	0	5,434	10,767
Seawall	21 Acres 5 events	0	4	0	0	0
	Total	**2,301**	**117**	**17**	**23,387**	**45,401**
Grand Total, 2016 & 2017						
	Total Completed	**MPPEH (each)**	**MEC, unspecified (each)**	**MEC, DMM (each)**	**MDAS (lbs)**	**Other Debris (lbs)**
RAA-01						
HALSA	68,263 sq ft (1.57 acres)	2,661	187	3	17,724	54,210
Crater	23 craters	23	2	0		
Anomalies	234 anomalies 20,880 sq ft (0.48 acres)	10	1	1		
RAA-05						
Shoreline Dump Area	51,072 sq ft (1.17 acres)	183	253	43	13,303	54,189
West Step-out	0 sq ft	0	0	0		
East Step-out	30,653 sq ft (0.70 acres)	8	29	1		
Seawall	21 Acres 12 events	0	17	0	93	0
Anomalies	4 anomalies	--	--	--	--	--
	Total	**2,885**	**489**	**48**	**31,120**	**108,399**

Abbreviations and Acronyms:
DMM – discarded military munitions
HALSA – high amplitude large spatial anomaly
lbs – pounds
MDAS – material documented as safe
MEC – munitions and explosives of concern
MPPEH – material potentially presenting an explosive hazard
RAA – remedial action area
sq ft – square feet

7.2 RAA-01 WORK COMPLETED

7.2.1 RAA-01 WORK (2016 SEASON)

APTIM teams completed location surveys to establish boundaries; performed technology-aided surface clearance; intrusively investigated individual anomalies and intrusively investigated HALSAs. APTIM teams also dewatered 23 craters and performed a surface inspection in preparation for backfill of the craters in accordance with planned procedures.

APTIM cleared individual target anomalies from areas within the 2016 work area footprint to allow safe access to HALSAs. These anomalies were within the access route to the 2016 work area and within slivers of land between the HALSAs in the central portion of RAA-01. These areas contained 224 individual anomalies that were re-acquired using RTK GPS and intrusively investigated. These anomalies are shown in black on Figure A-2 in Appendix A. An additional four anomalies were cleared during HALSA removal activities in 2016. These anomalies were close to the edges of HALSAs and were removed during HALSA

excavation. These anomalies are shown with a black "x" symbol to differentiate the way they were removed on Figure A-2.

Following removal of discrete anomalies along the access roadway and the non-HALSA slivers included in the 2016/2017 work areas, APTIM began intrusive investigations of the HALSAs. Due to slower than anticipated production, not all of the HALSAs within the 2016 work area were completed before the end of the season in October. A total of 58,049 sq ft (1.33 acres) of the total 88,956 sq ft (2.04 acres) work area (HALSA and non-HALSA) was completed in 2016. Table 7-2 presents a grid-by-grid summary of the 2016/2017 investigation.

During 2016 intrusive operations at RAA-01, 584 MEC/DMM/MPPEH items were located and either BIP or, if determined safe to move, were consolidated for detonation or processed in the MTDU. A detailed listing of type, depth, location, and photographs of the items are provided in the Munitions Accountability Log (Appendix I). Additional details are included in the Grid Certification Packages in Appendix B.

7.2.2 RAA-01 WORK (2017 SEASON)

APTIM returned in 2017 and completed location surveys to establish boundaries; performed technology-aided surface clearance; and intrusively investigated HALSAs. No craters cleared in 2017, with the work solely focused on completing the HALSAs that were not finished in 2016. Six individual anomalies were incidentally removed during HALSA removal in 2017. These anomalies are shown as orange dots on Figure A-2 in Appendix A.

The remaining 30,517 sq ft (0.70 acres) of the total 88,956 sq ft (2.04 acres) work area were completed in 2017. Intrusive operations began on April 24, 2017, and continued until August 4, 2017. Figure A-2 in Appendix A shows the HALSAs cleared during the 2017 season in light green color. At the conclusion of the 2017 season, 2 grids in RAA-01 (D5 and E5) are now complete and 20 grids require completion of Phase II discrete anomalies or mass excavation of metallically saturated areas. Additional grids may also be identified as step-outs.

Trench depth was recorded during the 2017 season and the depth results are shown on Figure A-17. In general, the trenches were deeper in the central part of the site, and became shallower near the edges. This pattern is consistent with what would be expected for an OB/OD site.

During 2017 intrusive operations at RAA-01, 2,304 MEC/DMM/MPPEH items were located and either BIP or, if determined safe to move, were consolidated for detonation or processed in the MTDU. A detailed listing of type, depth, location, and photographs of the items is provided in the Munitions Accountability Log (Appendix I). Additional details are included in the Grid Certification Packages in Appendix B.

Table 7-2: Summary Results for RAA-01 by Year

Grid	HALSA Complete (2016)		HALSA Complete (2017)		Discrete Anomalies Complete (2016)		Discrete Anomalies Complete (2017)		Craters Complete (2016)
	ID	sq ft	ID	sq ft	ID	Qty	ID	Qty	
B1	None	0	B01_P1	1,943	None	0	None	0	None
B3	None	0	None	0	None	0			01
C1	None	0	C01_Ply2	1,315	None	0	None	0	None
			C01_Ply3	2,857					
			C01_Ply6	448					
			C01_Ply7	2,011					
C2	C02_P2	1,350	C02_QA_P4	1,898	55, 56, 62, 65, 66, 67, 75, 80, 81, 82, 85, 91, 92, 95, 96, 98, 107, 108, 109, 111, 113, 114, 119, 127, 129, 131, 132, 136, 138, 139, 142, 145, 150, 151, 152, 155, 156, 157, 9138, 9142, 9147, 9153, 9159, 9247, 9251, 9255	46	None	0	19, 23
	C02_P3	1,212	C02_P7	2,318					
	C02_QA_P5_Rev_121515	1,595	C02_P9	4,075					
	C02_P6	2,514							
	C02_P8	1,052							
	C02_QA_P9	455							
	*NH-C2-01 to NH-C2-08	7,778							
C3	C03_QA_P3a	8,112	C03_QA_P3b	5,610	6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 89, 94, 95, 99, 101	37	None	0	02, 04, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 18, 22
	*NH-C3-01 to NH-C3-02	2,858							

Grid	HALSA Complete (2016)		HALSA Complete (2017)		Discrete Anomalies Complete (2016)		Discrete Anomalies Complete (2017)		Craters Complete (2016)
	ID	sq ft	ID	sq ft	ID	Qty	ID	Qty	
C4	C04_PLY1 C04_PLY2 C04_PLY3 C04_PLY4 C04_PLY5 *NH-C4-01 to NH-C4-03	883 3,212 4,175 1,748 290 6,440	None	0	5, 6, 8, 9, 12, 15, 19, 21, 22, 28, 33, 38, 40, 42, 44, 45, 48, 49, 53, 63, 65, 66, 68, 69, 72, 75, 77, 82, 85, 89, 94, 95, 98, 100, 102, 105, 111, 113, 115, 121, 122, 123, 124, 125, 126, 127, 130, 131, 133, 134, 136, 139, 140, 143, 150, 151, 152, 154, 155, 160, 170, 171, 177, 208, 209, 218, 236, 238, 254, 266, 292, 301, 320, 391, 396, 397, 401, 403, 404, 412, 417, 418, 419, 420, 423, 426, 431, 433, 434, 435, 438, 446, 447, 450, 451, 453, 456, 457, 459, 463, 472	101	None	0	03, 05, 06
D3	*NH-D3-01 to NH-D3-07	1,214	None	0	112, 118, 120, 384, 385, 386, 9058, 9066, 9097	9	368,372	2	17, 20, 21
D4	D04_QA_P1_Rev_121515 *NH-D4-01 and NH-D4-03	2,049 2,590	D04_QA_P2_Rev_121515	6,795	164, 174, 186, 204, 223, 227, 240, 244, 254, 270, 283, 295, 296, 306, 309, 319, 333, 337, 348, 353, 357, 364, 365, 377, 384, 392, 397, 400, 404, 408, 410, 414, 415	33	None	0	None
D5	D05_P1_Rev_Ply D05_P2_Rev_Ply** D05_P3_Rev_Ply	290 1,677 682	None	0	None	0	None	0	None
E3	E03_P1_r E03_QA_P2 E03_QA_P3	1,127 829 793	None	0	9346	1	557, 558, 559, 560	4	None

Grid	HALSA Complete (2016)		HALSA Complete (2017)		Discrete Anomalies Complete (2016)		Discrete Anomalies Complete (2017)		Craters Complete (2016)
	ID	sq ft	ID	sq ft	ID	Qty	ID	Qty	
E4	E04_P2a	1,211	E04_P2b	1,722	154	1	None	0	None
	E04_P1**	694							
	E04_P3	617							
	E04_P4	540							
E5	E05_P1**	164	None	0	None	0			None
	TOTAL	58,151	TOTAL	30,992	TOTAL	228	TOTAL	6	

Notes:
* These areas represent areas cleared by removing discrete anomalies in order to access HALSAs.
**HALSA attributed to culvert and documented in Field Memo 2016-04.

Abbreviations and Acronyms:
HALSA – high amplitude large spatial anomaly
ID – identification
Qty – quantity
RAA – remedial action area
sq ft – square feet

7.3 RAA-05 WORK COMPLETED

7.3.1 ALDA-01 (2016)

The 60,987 sq ft (1.4 acres) SDA was scoped for mechanical excavation and clearance using a similar lift and trench approach as that described in RAA-01. APTIM teams completed location surveys to establish boundaries and performed mechanically assisted excavation and inspection of spoils from Trenches TR01 through TR46, TR101, and TR103 (Figure A-15 in Appendix A). APTIM also completed three test trenches (TRUV46, TRUV48, and TRW49) to demonstrate that the area cleared in 2013 (shown in blue hatching on Figure A-15) met the project MPCs to be considered complete. APTIM completed approximately 43,595 sq ft (1.00 acres) by the end of the season in October 2016. Four individual anomalies were removed from along the southern edge of the 2016/2017 boundary during trenching activities at Trenches TR11, TR31 and TR41. These anomalies are shown with black "x" symbols on Figure A-15. During operations, 136 MPPEH, 215 MEC, and 29 DMM were encountered and destroyed in accordance with the MEC QAPP (NAVFAC, 2016b).

7.3.2 ALDA-01 (2017)

APTIM returned in April 2017 to clear an additional 6,427 sq ft (0.15 acres) in the SDA. During intrusive operations in 2016, the western side of the SDA was found to have significantly deeper piles of debris than expected. This deeper debris is in mounded piles that are 8–10 feet deep and extends to the west along the base of Mount Moffitt. This area was termed the "Deep Piles Area." Trench TR102 was started in this area in 2016, but not completed. At the beginning of the 2017 season, the Navy de-scoped the portion of this "Deep Piles Area" that overlapped the SDA. This area is shown in light blue on Figure A-15 in Appendix A. During intrusive operations in 2017, 47 MPPEH, 41 MEC, and 15 DMM were encountered and disposed of by detonation in accordance with the MEC QAPP (NAVFAC, 2016b).

Trench depth was recorded during the 2017 season, in part due to the deeper than expected material in the "Deep Piles Area." Depth results are shown on Figure A-18. Note that the deep trenches shown in dark green fall along the edge of a steep slope and the depth was measured along the southern (deeper) side of the trench.

7.3.3 EASTERN STEP-OUT AREA (2016)

In 2016, APTIM performed a series of nine test trenches (SOE04 through SOE12) in the Eastern Step-out Area, located across the Andrew Lake Spillway from the SDA (Figure A-16 in Appendix A). These test trenches were designed to assess whether MEC was present in the Eastern Step-out Area before proceeding with full clearance. The trenches were positioned approximately 15 meters apart and ran south from the cobble beach toward the access road and terminated when debris was no longer encountered in the trench. The 15-meter spacing for the trench was based on the 15-meter MEC buffer requirement. Tech Memo 3, included in Appendix G, provides the basis for the trenching decision. The test trenches verified that MEC was present within the debris and helped revise the clearance boundary as shown in blue. After completing the test trenches, APTIM transitioned to 100 percent removal and completed trenches SOE101, SOE102, SOE103, and SOE104. Locations and results of the trenches are shown on Figure A-16. A total of 6,604 sq ft (0.15 acres) of the Eastern Step-out Area was cleared in 2016. Seven MPPEH, six MEC, and one DMM were encountered and destroyed in accordance with the MEC QAPP (NAVFAC, 2016b).

7.3.4 EASTERN STEP-OUT AREA (2017)

APTIM returned to the Eastern Step-out Area in 2017 and continued with 100 percent removal, starting at the eastern boundary of the Eastern Step-out Area and working west. Nineteen trenches (SOE13 through SOE31), totaling 24,049 sq ft (0.55 acres), were cleared in the Eastern Step-out Area in 2017. Trench depths for the 2017 season are presented on Figure A-19. One MPPEH and 23 MEC were encountered and destroyed in accordance with the MEC QAPP (NAVFAC, 2016b).

7.3.5 RAA-05 SUMMARY

During 2016 intrusive operations, 376 MEC/DMM/MPPEH items were found in the SDA and 14 MEC/DMM/MPPEH items were found in the Eastern Step-out Area. In 2017 operations, 103 MEC/DMM/MPPEH items were found in the SDA and 24 MEC/DMM/MPPEH items were found in the Eastern Step-out Area. All items were either BIP or, if determined safe to move, were consolidated for detonation or processed in the MTDU. A detailed listing of type, depth, location, and photographs of the items are provided in the Munitions Accountability Log (Appendix I). Additional details are included in the Grid Certification Packages in Appendix B. At the conclusion of the 2017 season, two grids in RAA-05 (C3 and D3) are now complete, and three grids require completion of Phase II discrete anomalies or mass excavation of metallically saturated areas. Additional grids may also be identified as step-outs.

7.3.6 ALSW-01

APTIM performed seven seawall surface sweeps and recovered 13 MEC items in 2016 and five additional sweeps in 2017, recovering four more MEC items. The MEC were disposed of by detonation. Appendix A contains a map (Figure A-20) showing recovery locations (note that multiple items were found in some locations), and Appendix I contains a description of the recovered items, including nomenclature, GPS coordinates, and photographs. See Table 7-3 for a summary of when the items were found.

Table 7-3: ALSW Seawall Sweeps

2016	Description	Items of MEC
April 2016	Rocket, 2.36-Inch, Model Unknown Mortar, 60mm, HE, Model Unknown	1 6
May 2016	Mortar, 60mm, HE, Model Unknown	4
June 2016	No recoveries	0
July 2016	No recoveries	0
August 2016	No recoveries	0
September 2016	No recoveries	0
October 2016	Mortar, 81mm, HE, M43A1 Mortar, 60mm, HE, Model Unknown	1 1
Total		**13**
2017	**Description**	**Items of MEC**
May 2017	No recoveries	0
June 2017	Mortar, 81mm, HE, Model Unknown	2
July 2017	Mortar, 81mm, HE, Model Unknown Rocket, 2.36-Inch, Model Unknown	1 1
August 2017	No recoveries	0
September 2017	No recoveries	0
Total		**4**

Abbreviations and Acronyms:
ALSW – Andrew Lake Seawall
HE – high explosive
MEC – munitions and explosives of concern
mm – millimeter

7.4 MDAS AND OTHER SCRAP METAL DISPOSAL

During NTCRA operations, APTIM collected, inspected, and certified 31,120 pounds of MDAS. The MDAS consisted of munitions and target debris. MPPEH was processed by demolition or in the MTDU. The MDAS was stored in sealed drums within a locked Conex box and was shipped to a Timberline Environmental in Twain Harte, California, a recycling facility that specializes in MDAS destruction, with signed DD1348-1As for final disposal/processing. In addition, APTIM inspected, removed, and stored 108,399 pounds of other metal debris. MDAS and scrap metal totals for each site and each year are shown above in Table 7-1. The other metal debris was also shipped off island for recycling at the conclusion of the 2017 field season. See Appendix J.

7.5 EXPLOSIVES USAGE AND MANAGEMENT

During 2016 NTCRA operations, APTIM performed demolition operations approximately weekly. Demolition operations were performed on 25 days. On some of these days, demolition operations included multiple consolidated shots at RAA-01. The following donor explosives were used:

- Shape charges, 32-gram 261 each
- Detonators 54 each
- Detonating cord 3,100 feet
- Binary explosives 360 each

2017 NTCRA operations were similar, with approximately weekly demolition shots. There was no demolition shot in the first week of July due to weather, and demo operations occurred less frequently at the end of the season as fewer items were encountered. Demolition operations were performed on 18 days. On some of these days, demolition operations included multiple consolidated shots at RAA-01. The following donor explosives were used:

- Shape charges, 32-gram 122 each
- Detonators 36 each
- Detonating cord 1,130 feet
- Binary explosives 264 each

All explosives management records, including inventories and usage documentation, are located in Appendix J.

This page intentionally left blank

8.0 RAA CERTIFICATION SUMMARY

The RAA certification packages (see Appendix B) for completed trenches were submitted to QA and the Navy during the 2016 field season. The QA contractor reviewed all of the Final Trench Completion Packages for completeness and accuracy, and provided comments to APTIM for clarification and/or revision of the packages. When required, APTIM updated the trench packages and resubmitted them to QA for review and acceptance.

Each Final Trench Certification package contains the following documents:

- Final Trench Package Submittal Form – lists all documents submitted in the final grid package
- Final Trench QC Inspection Record – documents the results of the field QC checks performed in the trench
- Intrusive Results – a record of each target, its location, description, and final disposition
- Trench Map

This page intentionally left blank.

9.0 NOSSA CROSSWALK

In accordance with NOSSA 8020.15, Section 5.E.1.A

> *"The AAR shall contain all of the elements listed in enclosure (5), "Guide for Preparing a Munitions Response Site After-Action Report." In lieu of an AAR prepared in accordance with enclosure (5), NOSSA (N53) will accept a final report prepared by the UXO contractor if it includes a crosswalk table which correlates the contractor report to the required AAR elements."*

Table 9-1 below provides the required crosswalk to correlate the After Action Report (AAR) elements to the sections in this report.

Table 9-1: NOSSA 8020.15 Enclosure 5
Guide for Preparing a Munitions Response Site After Action Report

An AAR must contain the following elements:		
Element #	**Description**	**Report Section**
1	A brief description of the MRA or MRS	Sections 1.3–1.5 for Adak overview Section 2.2 for individual RAA descriptions
2	A request to cancel any exclusion zone or site approval established in the ESS	Requests to cancel exclusion zones and siting approvals will be made based on the Final AAR at the conclusion of the NTCRA.
3	A summary of the MEC and/or MPPEH found	Appendix I – Munitions Accountability Log contains a searchable and filterable spreadsheet of all the MEC/MPPEH found.
4	A description of the relative effectiveness and any limitations of the technologies used during the munitions response and the effects on residual risk relative to that originally projected	Section 7 describes the effectiveness and the results of the QC program.
5	A summary of the QC and QA reports for the response	Section 5.1 – QC Results Section 5.2 – QA Summary Appendix B – RAA Certification Packages Appendix E – Inspection Documentation
6	Maps showing:	
6a	Areas from which MEC and/or MPPEH was removed	Appendix A, Figures A-2–A16
6b	Areas within a response area (such as within an MRA or MRS) where response actions were not performed and the rationale for not addressing those areas	Appendix A, Figures A-2–A16
6c	The known or reasonably anticipated end use of each area	Section 1.6 – Navy's intention is to transfer the property to the Department of the Interior, if they will accept it. Otherwise, the property is held by GSA until a willing agency or entity accepts it.
7	A summary of the land use controls that were implemented, if any, and the areas to which they apply	Land use control decisions will be made based on the Final AAR at the conclusion of the NTCRA.
8	A summary of provisions for long-term management	Long-term management decisions will be made based on the Final AAR at the conclusion of the NTCRA.

Abbreviations and Acronyms:

AAR – After Action Report
ESS – Explosives Safety Submission
MEC – munitions and explosives of concern
MPPEH – material potentially presenting an explosive hazard
MRA – munitions response area
MRS – munitions response site
NTCRA – non-time critical removal action
OU – operable unit
QA – quality assurance
QC – quality control
RAA – remedial action area
USFWS – U.S. Fish and Wildlife Service

This page intentionally left blank.

10.0 CONCLUSIONS AND RECOMMENDATIONS

This section details conclusions and recommendations resulting from the NTCRA at the OU B-2 sites on Adak.

10.1 CONCLUSIONS

In accordance with the remedial action objective and the NTCRA MEC QAPP, mass excavation of metallically saturated debris was completed in many grids in RAA-01 and RAA-05 during the 2016 and 2017 field seasons. There are two grids in RAA-01 (D5 and E5) that are now complete and two grids in RAA-05 (C3 and D3) that are now complete. There are 20 grids in RAA-01, 6 grids in RAA-03W, and 3 grids in RAA-05 that require either completion of Phase II discrete anomalies or mass excavation of metallically saturated areas. Additional grids may also be identified as step-outs.

10.2 RECOMMENDATIONS

- Complete Phase II intrusive removal of discrete anomalies.
- Complete mass excavation of HALSAs and disposal areas in RAA-01, RAA-03W, and RAA-05.
- Complete remaining crater remediation in RAA-01 and RAA-03W
- Finalize the Record of Decision for OU B-2 after completion of RAA-01, RAA-03W, and RAA-05 (ALDA-01).
- The Navy should retain RAA-05 (ALSW-01) as a restricted area and continue annual seawall surface sweeps.

This page intentionally left blank.

11.0 REFERENCES

EPA. 2005. Uniform Federal Policy for Quality Assurance Project Plans Manual. March.

Foster Wheeler Environmental. 2000. Remedial Investigation/Feasibility Study Work Plan.

NAVFAC NW. 2013. Cultural Resources Sensitivity Training Plan Non-Time Critical Removal Action for the Operable Unit B-2 Various Remedial Action Areas, Former Adak Naval Air Facility Adak Alaska (Final Cultural Resource Protection Plan). Prepared by Parsons for USA Environmental Inc. under contract N44255-12-C-3003. Final. February.

NAVFAC NW. 2016a. Explosives Safety Submission, Non-Time Critical Removal Action (NTCRA), Operable Unit B-2 (OU B-2), Various Remedial Action Areas, Former Naval Air Facility, Adak, Alaska. Prepared by CB&I Federal Services LLC. Amendment 2, Correction 1. May.

NAVFAC NW. 2016b. Munitions and Explosives of Concern Quality Assurance Project Plan, Non-Time Critical Removal Action (NTCRA), Operable Unit B-2 (OU B-2), Remedial Action Areas -01 and -05, Former Naval Air Facility, Adak, Alaska. Prepared by CB&I Federal Services LLC. Final. March.

NAVFAC NW. 2016c. Munitions and Explosives of Concern Accident Prevention Plan, Non-Time Critical Removal Action (NTCRA), Operable Unit B-2 (OU B-2), Remedial Action Areas -01 and -05, Former Naval Air Facility, Adak, Alaska. Prepared by CB&I Federal Services LLC. Final. April.

NAVFAC NW. 2016d. Completion Report, Non-Time Critical Removal Action (NTCRA), Operable Unit B-2 (OU B-2), Remedial Action Areas -01, -03W, and -05, 2015 Field Season, Former Naval Air Facility, Adak, Alaska. Final. May.

NAVFAC NW. 2017. Munitions and Explosives of Concern Accident Prevention Plan, Non-Time Critical Removal Action (NTCRA), Operable Unit B-2 (OU B-2), Remedial Action Areas -01 and -05, Former Naval Air Facility, Adak, Alaska. Prepared by CB&I Federal Services LLC. Final. April.

U.S. Navy. 2012. Proposed Plan for Operable Unit B-2 Cleanup of Munitions and Explosives of Concern, Former Naval Air Facility Adak, Adak Island, Alaska. September.

USA Environmental. 2012. Remedial Investigation/Feasibility Study Summary of Study Reports for OU B-2 Sites. May.

This page intentionally left blank.

APPENDICES
(on CD)

This page intentionally left blank.