PROPOSED PLAN for

Operable Unit B-2

Cleanup of Munitions and Explosives of Concern

September 2012

INTRODUCTION

(Note: Technical terms used in this plan are italicized where they are first used and defined in the Glossary section at the end of the plan.)

This *Proposed Plan* is issued by the U.S. Navy (Navy), the lead agency for site activities. The U.S. Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC), the regulating agencies, have overseen the Navy's investigations at *Operable Unit* (OU) B-2. The Proposed Plan describes the cleanup of *munitions and explosives of concern* (MEC) in OU B-2 on the former Adak Naval Complex, Adak Island under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), and was developed in accordance with the requirements of Section 117(a) of CERCLA and Section 300.430(f)(2) of the *National Contingency Plan* (NCP). The Proposed Plan has the following purposes:

- Provide basic background information
- Describe the cleanup options evaluated
- Identify the preferred cleanup alternatives
- Explain the reasons for recommending the preferred cleanup alternatives
- Solicit public review of and comment on all cleanup alternatives
- Provide information on how the public can be involved in the preferred cleanup alternative selection

The Navy requests comments from the public on this Proposed Plan. The Navy may consult with EPA and ADEC and modify any of the cleanup alternatives, including the preferred alternative, based on public comments. After public comments have been considered, the *Record of Decision* (ROD) will present the final decision for the OU B-2 sites. The ROD will include a responsiveness summary describing how public comments were addressed.

OU B-2 consists of 24 areas of concern (AOCs) or sites that have been evaluated for potential cleanup under CERCLA. This plan identifies the Navy's Preferred Alternative and other cleanup alternatives considered for 11 sites where MEC removal activities are warranted and identifies 13 OU B-2 sites that were evaluated and or remediated such that implementation of island-wide *Institutional Controls* (ICs) are adequately protective. There are also 15 additional areas within OU B-2 that were determined to require no further action in the *preliminary assessment*, were never designated as AOCs for the *Remedial Investigation/Feasibility Study* (RI/FS), and are therefore not addressed in this Proposed Plan, but are also subject to the island-wide ICs.

This document summarizes information that can be found in greater detail in the May 2012 RI/FS for OU B-2, as well as other relevant documents cited in this Proposed Plan, which are available in the information repositories listed on

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PUBLIC COMMENT PERIOD
September 27, 2012 through October 28, 2012

The Navy will accept written comments on the Proposed Plan during the public comment period.

For more information, see the information repositories at the following locations:

Bob Reeve High School
Mechanic Road
Adak, AK 99546
(907) 592-4500

Adak Update Website
www.adakupdate.com

the side bar and the *Administrative Record* file located at Naval Engineering Facilities Command Northwest (NAVFAC NW), Silverdale, Washington. The Navy, EPA, and ADEC encourage the public to review these documents to increase their understanding of OU B-2 and the activities that have been conducted there.

SITE BACKGROUND

The former Adak Naval Complex, which included the former Naval Air Facility Adak, is located on Adak Island, which is approximately 1,200 miles southwest of Anchorage, Alaska, in the Aleutian Island chain (Figure 1). The former Navy base occupied 76,800 acres on the northern half of the island. The U.S. Fish and Wildlife Service (USFWS) manages the southern half of the island, which is a designated 117,265-acre wilderness area within the Alaska Maritime National Wildlife Refuge (AMNWR). Figure 2 shows the location of each of the OU B-2 sites addressed in this Proposed Plan.

SITE HISTORY

Military presence on Adak began in 1942 when it was used as a staging area during World War II. The Adak Naval Complex was operated by the Navy from about 1949 to 1997. The Naval Air Facility Adak was closed under the 1995 Base Realignment and Closure program on March 31, 1997. In September 2000, the federal government entered into a *land transfer agreement* with The Aleut Corporation (TAC), an Alaskan Native Regional Corporation. This agreement set forth the terms and conditions to transfer approximately 47,000 acres of the former Adak Naval Complex property to TAC. The actual transfer occurred on March 17, 2004 and included all of the downtown area, housing units, and industrial facilities; and part of the undeveloped lands located on the northern half of Adak Island. All of the OU B-2 sites are within Parcel 4, which includes most of the land surrounding Andrew Lake at the north end of Adak Island. Parcel 4 consists of 5,600 acres retained by the Navy which was not included in the land transfer due to MEC contamination.

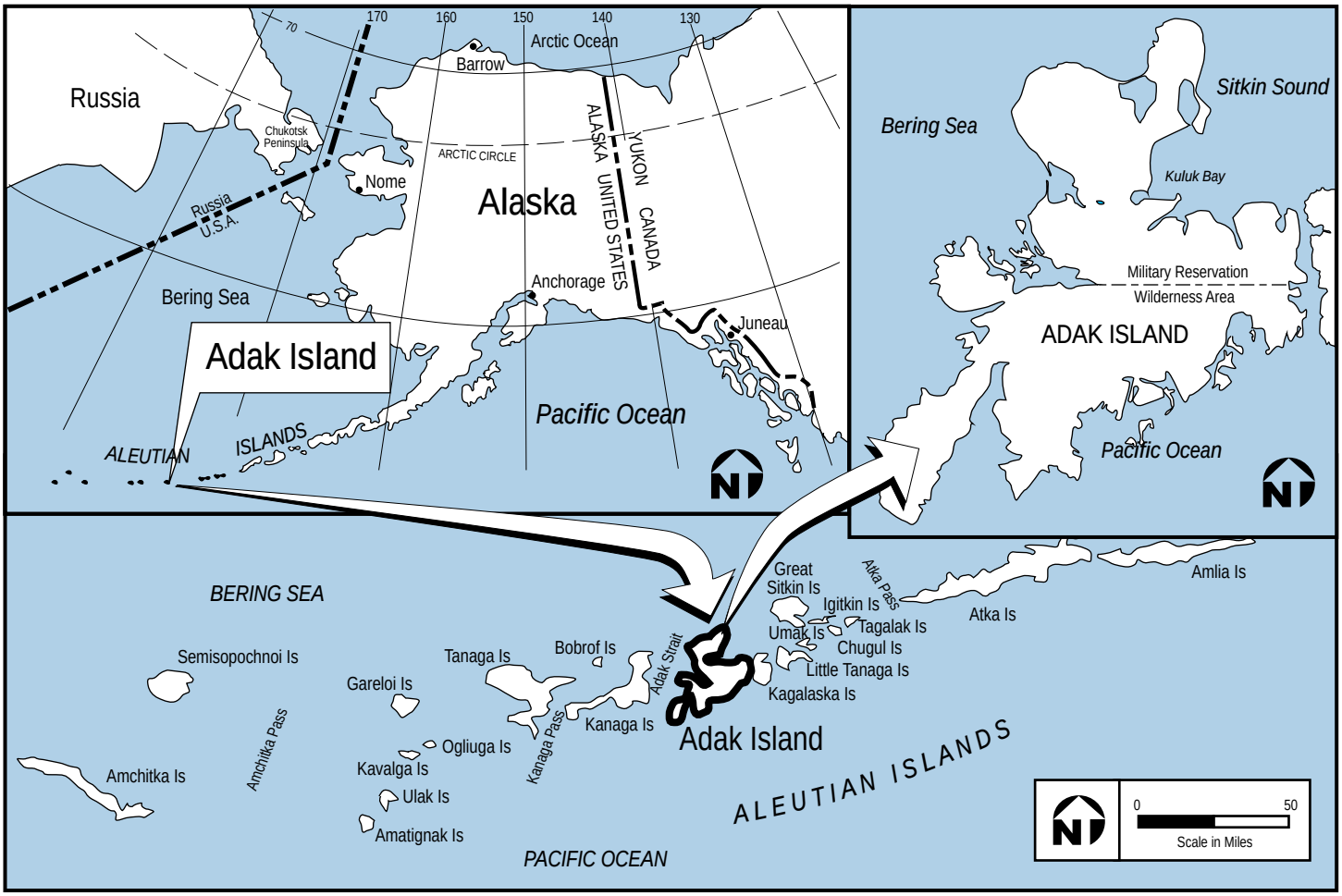

Figure 1. Adak Island and Vicinity

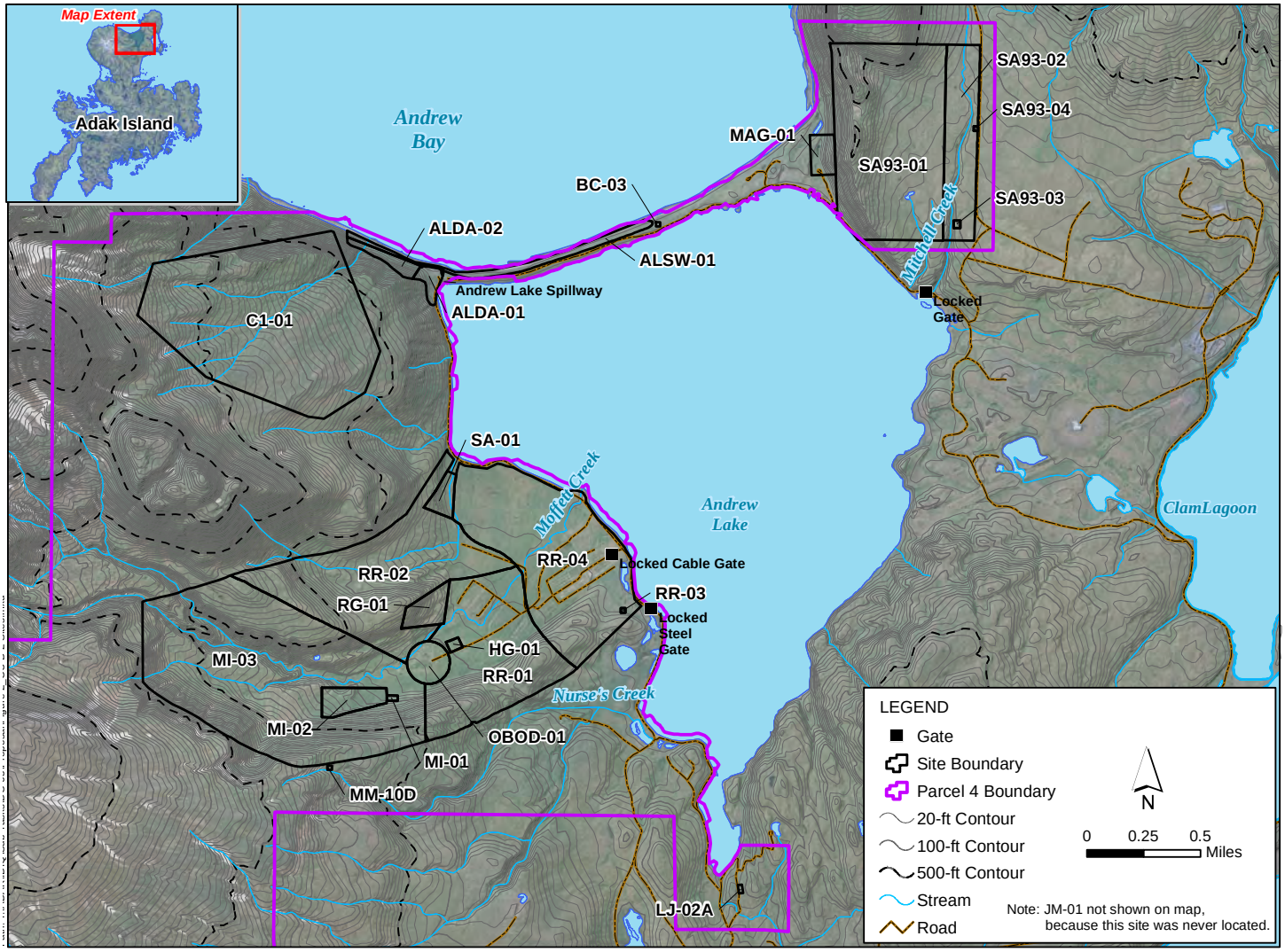

Figure 2. OU B-2 Sites, Adak Island, Alaska

SITE REGULATORY HISTORY

The former Adak Naval Complex was placed on the *National Priorities List* (NPL) by the EPA in 1994.

In order to facilitate investigation and cleanup activities, the Navy, as lead agency, has entered into agreements with the EPA and ADEC:

- In 1993, the Navy, EPA, and ADEC signed a *Federal Facilities Agreement* (FFA). This agreement ensures the environmental impacts associated with past and present activities at the facility are thoroughly investigated and appropriate cleanup actions are taken to protect the public health, welfare, and the environment. It incorporates the EPA's cleanup process under CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986 (SARA)*. CERCLA does not include petroleum as a hazardous substance, so the FFA stated that petroleum contamination cleanup would follow State of Alaska regulations under a separate two-party agreement between the Navy and the State of Alaska.
- In April 1994, the Navy and ADEC signed the *State-Adak Environmental Restoration Agreement (SAERA*), to implement site characterization and remediation of petroleum sites on Adak.

In May 1997, the Navy and ADEC agreed to integrate the cleanup decision process for petroleum sites with the cleanup decision process being conducted for hazardous-substance-release sites under CERCLA. In addition, on May 11, 1991, the Navy submitted a *Resource Conservation and Recovery Act (RCRA)* Part B permit application to EPA to authorize hazardous waste treatment at the open burn/open detonation (OB/OD)-01 site. Although the permit was never issued, OB/OD-01 is considered an *interim*

status site because RCRA activities occurred at the site. Therefore, this portion of the site is subject to RCRA.

In 1998, the FFA was amended to divide Adak into OU A (CERCLA and petroleum sites) and OU B (MEC sites). The final ROD for OU A was signed in April 2000. In 2001, OU B was divided into OU B-1 and OU B-2 to accommodate land transfer. The OU B-1 ROD was signed in December 2001.

SITE INVESTIGATIONS AND CLEANUPS

Between 1986 and 2010, the Navy performed various environmental investigations at the OU B-2 sites to identify the potentially contaminated areas and determine the nature and extent of contamination. A partial list of the investigations performed includes:

- The 1986 initial assessment study
- The 1990 RCRA facility assessment (completed by EPA)
- Preliminary source evaluations performed from 1993 through 1996
- An *ordnance* survey conducted in 1996 as part of the OU A RI/FS
- A 1997 historical archive search
- The 1998 minefield investigation
- The 1999 site investigation
- The 2000 preliminary assessment
- The 2000 underwater survey offshore of the Andrew Lake Seawall
- The 2001 *frost heave* study
- The 2002 Andrew Bay sediment dynamics study
- The 2008 OU B-2 RI
- The 2010 Andrew Bay technical memorandum
- The 2011 Andrew Bay historical photograph analysis
- The 2012 OU B-2 RI/FS
- The 2011 and 2012 wetland delineation, biological survey, and cultural resource survey

Cleanup activities have already been performed at one OU B-2 site, RG-01. Historical documentation indicated that seven dud-fired grenades and two mortars were present. These items were not removed from the range at the time of discovery due to their hazardous nature. The Navy performed a *Non-Time Critical Removal Action* (NTCRA) at RG-01 in 2006 and 2008, where a total of 167 MEC were recovered and destroyed.

Sampling for *munitions constituents (MC),* which are chemicals originating from MEC, occurred during the 2001 OU B-1 cleanup action field season as well as during the 2008 OU B-2 RI and RG-01 cleanup action. MCs were detected at several OU B-2 sites, but concentrations were below levels of concern for human health and the environment.

As the OU B-1 ROD requires, an island-wide MEC educational awareness program is in place to familiarize the public with (1) the history of ordnance use, storage, handling, and disposal on Adak; (2) basic characteristics and hazards of MEC on Adak; and (3) procedures that should be followed if suspected MEC is encountered. These island-wide ICs are applicable to the OU B-2 sites and will be incorporated into the OU B-2 ROD by reference. Although not specified in the OU B-1 ROD, access to the Parcel 4 area, which contains the OU B-2 sites, is restricted. *Engineering Controls (ECs),* including locked gates, fences, and posted signs, have been installed in an effort to prevent access to the OU B-2 sites. These ECs will be maintained until the MEC removal activities are complete at the OU B-2 sites.

COMMUNITY INVOLVEMENT

The Navy established a community involvement program in 1994 to provide Adak residents and other interested Alaska citizens with timely, updated information on the environmental cleanup, transfer, and reuse of Navy land and facilities, as well as providing a way for the public to have input on environmental cleanup decisions. Information is conveyed to the public via fact sheets and newsletters; Restoration Advisory Board meetings and other formal public meetings; a web site (www.adakupdate.com); an information repository on Adak Island (Bob Reeve High School building); and the Administrative Record file located at NAVFAC NW, Silverdale, Washington. In addition, a mailing list is maintained and updated to send interested citizens newsletters, fact sheets, and announcements of upcoming meetings and significant activities, such as public comment periods. Public input is obtained through Restoration Advisory Board meetings and other formal public meetings, community interviews, requests for public comments, and a telephone hotline.

SCOPE AND ROLE OF OPERABLE UNIT

OU B-2 is one of three operable units at the Adak Naval Complex. These include OU A, OU B-1, and OU B-2.

OU A addresses chemical releases to the environment throughout the entire former military reservation. Construction for cleanup action was completed in 2006. Ongoing activities include monitoring groundwater, surface water, sediment, and marine tissue; landfill inspections; EC inspections (e.g., signs, gates, and fences); IC inspections to ensure the continued effectiveness of land use restrictions, groundwater use restrictions, and excavation restrictions; educational awareness; and cleanup system monitoring and maintenance.

OU B addresses ordnance explosive safety hazards and human health and ecological risks associated with MC throughout the former Adak Naval Complex. The investigation and cleanup of OU B sites was conducted under CERCLA. However, CERCLA does not include specific provisions for sites with explosive hazards related to ordnance. Therefore, the OU B project team, which consists of representatives for the Navy, EPA, ADEC, USFWS, and their consultants, was formed to develop a site-specific process to address MEC on Adak. The team provides a forum for data input, discussion, and issue resolution between the project team members and *Adak stakeholders*.

In 2001, OU B was subdivided into OU B-1 and OU B-2, in order to expedite land transfer by placing a higher priority on investigating and cleaning up the OU B-1 sites on the land planned for transfer to TAC. OU B-1 includes all ordnance sites within the Adak Naval Complex outside of the Mt. Moffett/Andrew Lake Area (Parcel 4). OU B-1 cleanup actions were completed in 2010 with ongoing activities including EC inspections (e.g., signs, gates, and fences); IC inspections to ensure continued effectiveness of land use restrictions; and educational awareness.

OU B-2 includes ordnance sites in the Mt. Moffett/Andrew Lake Area. This Proposed Plan addresses cleanup activities for 11 sites where MEC removal activities are warranted. In addition, the OU B-1 island-wide ICs apply to all 24 OU B-2 sites. These sites are divided into three categories (Table 1):

- **Category 1 – FS Areas:** Category 1 sites require cleanup because MEC found at these sites pose unacceptable explosive safety risks to future land users. Eleven sites are Category 1. The sites have been assembled into five Remedial Action Areas (RAAs) on the basis of similarities in site characteristics, proximity, and distribution of MEC, as described in the section below. The locations of the five RAAs are shown on Figures 3, 4, and 5. In most cases, the entire site is not included within the boundaries of the RAA, because only the areas of a site where MEC was found and removal is planned are included within the RAA.
- **Category 2 – Removal Action Complete:** Category 2 sites contain MEC but were fully investigated and cleared as part of the RI or a removal action. Only one site, RG-01, is Category 2. The residual risks at RG-01 are considered acceptable (low) and, therefore, manageable through ICs that address potential MEC hazards throughout Adak. Additional MEC removal activities are not required. The ICs are currently included in the OU B-1 ROD, which includes an island-wide educational awareness program and an island-wide MEC discovery reporting process, and these apply to the OU B-2 sites.
- **Category 3 – Institutional Control Only Areas:** Category 3 sites are considered to be fully investigated as part of the RI/FS and found to have acceptable (low) potential explosive hazards that are manageable through the OU B-1 island-wide ICs alone. Twelve sites are Category 3. No MEC removal actions are necessary at these sites.

Table 1. Categorization of Sites, OU B-2, Adak Island, Alaska

Type of Site	Remedial Action Area	Sites
Category 1 – FS Areas	RAA-01	OB/OD-01
	RAA-02	C1-01
	RAA-03 West	MI-01, MI-02, and MI-03
	RAA-03 East	HG-01 and RR-01
	RAA-04	SA93-01 and SA93-03
	RAA-05	ALDA-01 and ALSW-01
Category 2 – Removal Action Complete Areas	Not Applicable	RG-01
Category 3 – Institutional Control Only Areas	Not Applicable	ALDA-02, BC-03, JM-01, LJ-02A, MAG-01, MM-10D, RR-02, RR-03, RR-04, SA-01, SA93-02, and SA93-04

FS – Feasibility Study
OU – Operable Unit
RAA – Remedial Action Area

One site, ALDA-02, was identified in the RI/FS as a Category 4 Additional Investigation Area. This site was investigated as part of the RI/FS and found to have acceptable (low) potential explosive hazards based on presumed use as a bombing range. However, historical archive information found in 2011 indicated that the site may have been used for munitions disposal operations, which could have resulted in MEC contamination at the site. Additional investigation of ALDA-02 was performed in June 2012

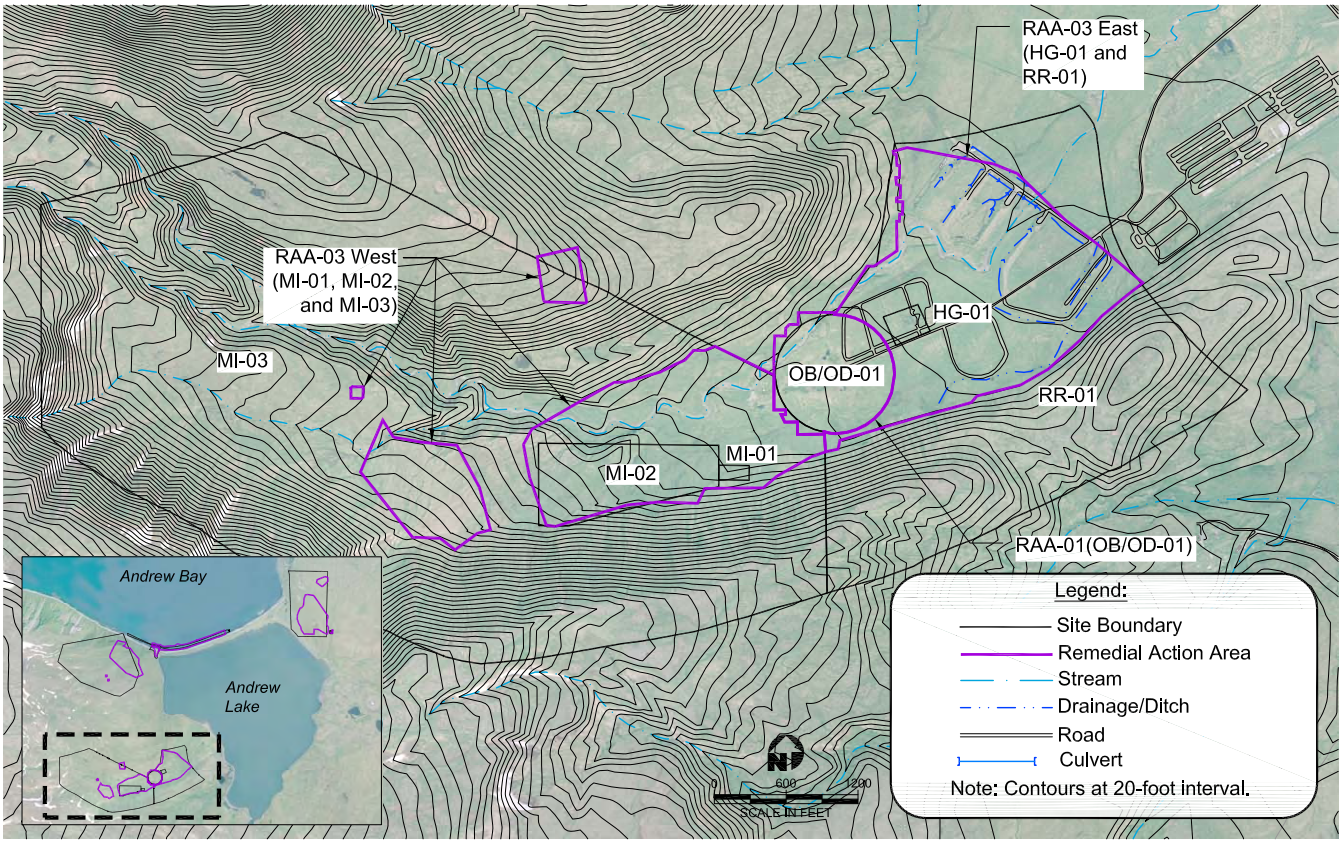

Figure 3. Locations of RAA-01 and RAA-03 (West and East)

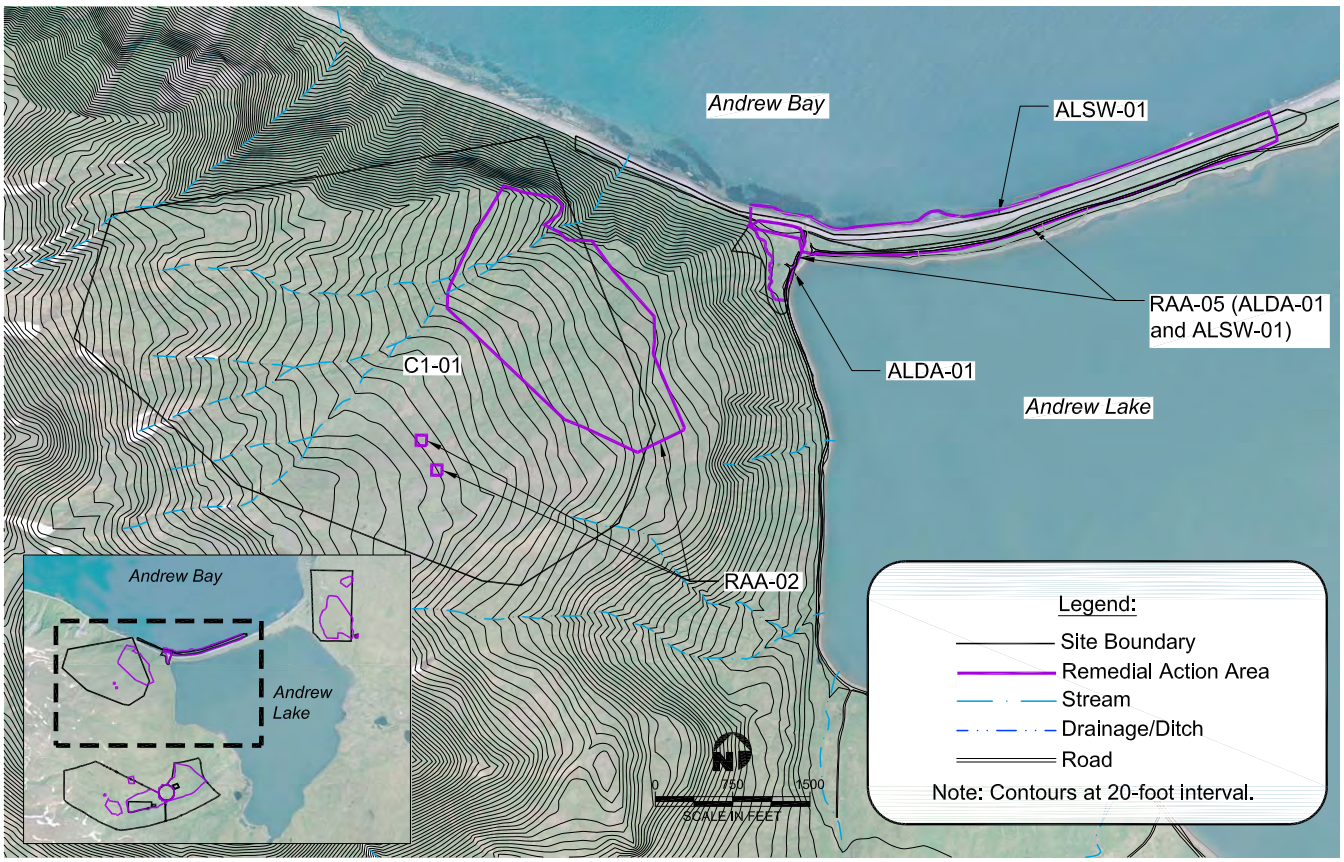

Figure 4. Locations of RAA-02 and RAA-05

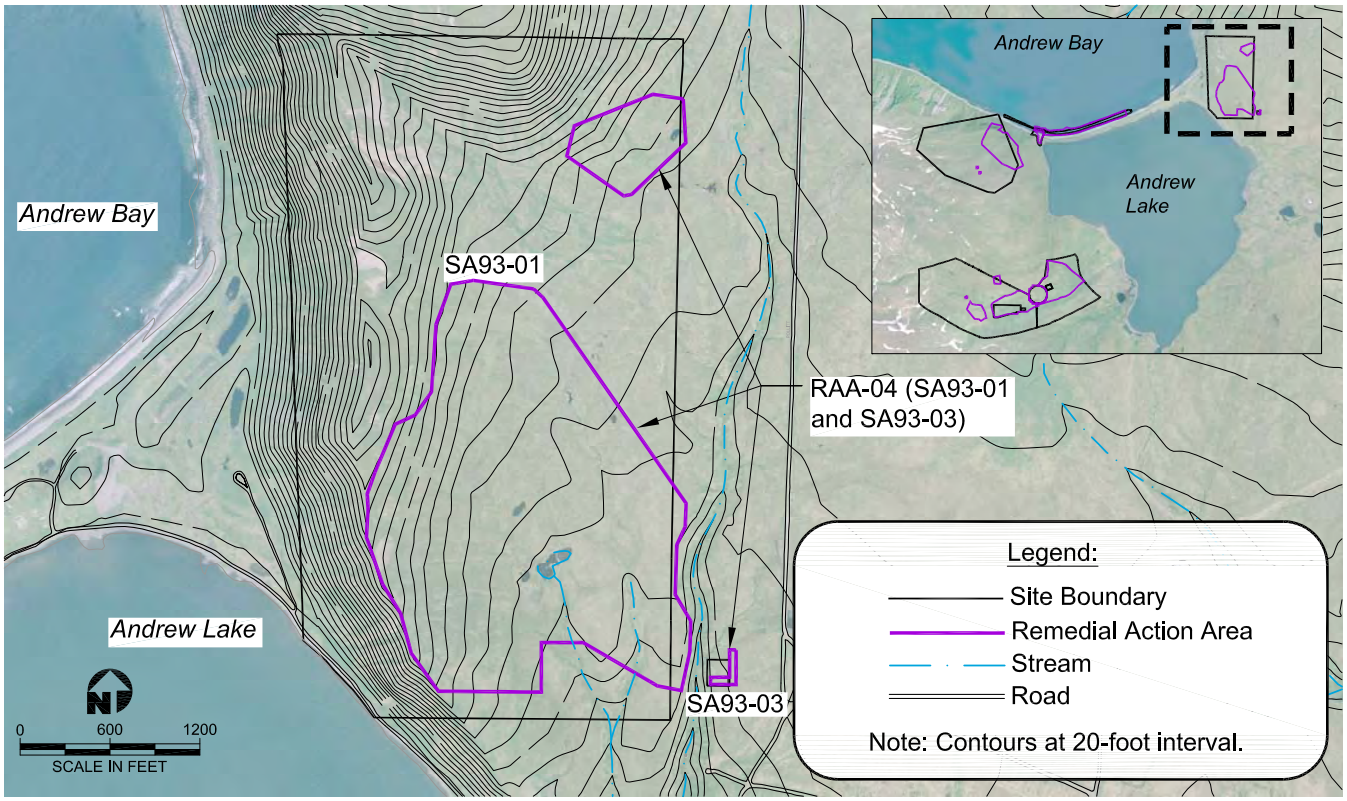

Figure 5. Location of RAA-04

and no MEC was identified and only limited *munitions debris* (MD) was found. Therefore, ALDA-02 was moved to Category 3.

As discussed in the Summary of Site Risks Section, Category 2 and 3 sites require implementation of the OU B-1 ICs described previously (e.g., island-wide educational awareness program and an island-wide MEC discovery reporting process). The remainder of this Proposed Plan focuses on the 11 sites requiring active remedies (Category 1 sites).

REMEDIAL ACTION AREAS (RAAS)

RAA-01 – OB/OD-01

RAA-01 consists of the former OB/OD-01 area at the Andrew Lake Range Complex. The area was identified as a separate RAA because operations in the OB/OD area differed significantly from those of the surrounding target/impact areas and because, as a RCRA interim status hazardous waste treatment unit, the site is subject to specific closure requirements. RAA-01 is an approximately 19-acre parcel of land that encompasses all of the OB/OD-01 site (see Figure 3), plus small portions of RR-02 (located to the northwest of OB/OD-01) and MI-03 (located to the southwest of OB/OD-01). The precise locations and extent of past operations within the OB/OD-01 area are unknown. The RAA boundary encompasses the demolition craters identified on aerial photography and extends outward to meet adjacent RAA boundaries.

RAA-02 – C1-01

RAA-02 contains the apparent target/impact area for munitions (20-mm, 37-mm, and 40-mm projectiles; 60-mm and 81-mm mortars) fired into Combat Range 1 Mortar Impact Area (C1-01). The impact area is located on a sloping plateau, above the Andrew Lake Seawall Area, on the eastern flank of Mount Moffett. The area was identified as a separate RAA because of its isolated location, away from the other OU B-2 target/impact areas. RAA-02 includes a 74-acre area that was identified through analyses of *intrusive investigation* data for C1-01 and the characteristics of the types of munitions fired, and two outlying areas centered on MD and finds indicative of possible target/impact areas (see Figure 4).

RAA-03 WEST – MI-01, MI-02, AND MI-03

RAA-03 West contains the apparent target/impact areas for munitions fired in the western part of the Former Andrew Lake Range Complex. The impact areas occupy the valley drained by Moffett Creek and include both the valley floor

and the bounding valley walls (which are steep, greater than 30 degrees), as well as steeply sloped creek banks. All of MI-01 and MI-02, and portions of MI-03 are located in the RAA. The three sites were grouped into a single RAA because they have a similar MEC source, transport mechanisms, site conditions, and land uses. RAA-03 West is a 71-acre area that was identified through analyses of intrusive investigation data for MI-01, MI-02, and MI-03, and the characteristics of the types of munitions found at the three sites (see Figure 3). The RAA is made up of four subareas: a 52-acre main target/impact area encompassing all of MI-01, MI-02, and the eastern portion of MI-03; a 15-acre secondary target/impact area in the west-central portion of MI-03; a 3.4-acre possible impact area on a ridge north of the main target/impact area; and a 0.2 acre area in the west central portion of MI-03.

RAA-03 EAST – HG-01 AND RR-01

RAA-03 East contains the apparent target/impact areas for munitions fired in the eastern part of the Former Andrew Lake Range Complex. The impact areas occupy the east-central portion of the valley drained by Moffett Creek. All of HG-01 and portions of RR-01 are located in the RAA. The two sites were grouped into a single RAA because they have a similar MEC source, transport mechanisms, site conditions, and land uses. RAA-03 East is a 78-acre area that was identified through analyses of intrusive investigation data for RR-01 and HG-01 and the characteristics of the types of munitions found at the sites (see Figure 3). The RAA is made up of two subareas: a 76-acre target/impact area encompassing much of RR-01 and a 1.8-acre area comprising HG-01.

RAA-04 – SA93-01 AND SA93-03

RAA-04 consists of apparent target/impact areas for munitions fired in the Source Area 93 Multiple Impact Area (SA93-01) and the Source Area 93 Firing Point (SA93-03) east of Andrew Lake. The impact area occupies the plateau drained by Mitchell Creek and portions of the ravine occupied by Mitchell Creek. RAA-04 is a 104-acre area that was identified through analyses of intrusive investigation data for SA93-01, information about MEC finds in an adjacent site (SA93-02), and the characteristics of the types of munitions found at the sites (see Figure 5). The RAA is made up of three subareas: a 96-acre main target/impact area encompassing most of the southern half of SA93-01, an 8-acre possible impact area north of the main target/impact area, and an area along the eastern and southern boundaries of SA93-03.

RAA-05 – ANDREW LAKE SEAWALL AREA

RAA-05 consists of the northern portion of OU B-2 that borders Andrew Bay (see Figure 4). Two sites are located within the RAA, the Andrew Lake Disposal Area (ALDA-01) and the Andrew Lake Seawall (ALSW-01). RAA-05 consists of the portion of ALDA-01 where a *geophysical investigation* found extensive geophysical *anomalies* (4.7 acres), the portion of ALSW-01 where MEC is deposited along the shoreline and seawall (approximately 21 acres), and part of Andrew Bay where the MEC that washes up on the seawall may have been historically disposed (250 acres). Although MEC is located within Andrew Bay, there is no potential human exposure to the MEC located within the bay. Humans could only be potentially exposed to MEC deposited on the shoreline and seawall.

SITE CHARACTERISTICS

PHYSICAL CHARACTERISTICS THAT AFFECT SELECTION OF THE PREFERRED CLEANUP ALTERNATIVE

Adak Island experiences a polar maritime climate with persistently overcast skies, high winds, frequent and often violent storms, and a narrow range of temperature fluctuation throughout the year. The average total annual precipitation for Adak Island 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. Frost heave is not likely a significant factor in MEC mobility at the majority of the sites in OU B-2.

Adak Island consists primarily of volcanic and sedimentary rocks, with a relatively thin layer of unconsolidated material (generally less than 10 feet) covering much of the bedrock. Only the downtown area is known to have more than 100 feet of unconsolidated material. Surficial deposits across the island were formed primarily by glaciation, volcanic activity, and erosion and deposition. Some localized slumping, landslides, or small-scale debris flows have been noted in some areas, including several OU B-2 sites. These have been noted mainly in areas that have relatively steep slopes. The geology of the Andrew Bay Seawall area reflects the high-energy nature of the Andrew Bay coastline, with rocks up to 3 feet in diameter and cobbles making up the steeply sloped beach and nearby areas.

The surface water hydrology near the OU B-2 sites is characterized by several short, steep-gradient streams draining radially from Mount Moffett and Mount Adag-

dak. One major stream, Moffett Creek, drains off Mount Moffett into the valley on the western side of Andrew Lake and runs through many of the OU B-2 sites. A smaller, unnamed creek is located north of Moffett Creek. On the eastern side of Andrew Lake, a smaller drainage, Mitchell Creek, runs through several OU B-2 sites from north to south and drops down a steep ravine to Andrew Lake. Moffett Creek and Mitchell Creek remain active throughout the year, although the flow may fluctuate seasonally.

The hydrogeology of northern Adak Island is limited by the low *permeability* of native surface materials and bedrock. Most undisturbed areas are covered by tephra (ash) deposits. Combined with steep slopes, these conditions offer little opportunity for water infiltration. Additionally, the combination of a thin layer of unconsolidated material over poorly jointed bedrock results in groundwater that is intermittent and limited laterally. The most notable exception is the extensive flat area with permeable soil located in the downtown area and in the Moffett Creek valley.

The native vegetation of Adak Island is that of a terrestrial-maritime tundra ecosystem. The tundra vegetation consists of grasses, lichens, mosses, and other species adapted to the wet, cold, and windy climate. This vegetation, often thick and spongy, is difficult to walk on and prevents easy access.

RAA-specific information, including areas, historical land use, access, terrain, and cultural resources, is provided in Table 2.

LAND USE

Approximately 65 adults and children currently live on Adak. The Adak population increases when the fish plant is operating and during the summer months, mostly because of ongoing environmental cleanup efforts and seasonal fishing and hunting. The developed downtown area of Adak includes the airfield and port facilities, as well as light industrial, administrative, commercial/recreational, and residential areas. USFWS manages the southern half of the island, which is within the AMNWR. All residences and commercial activities are located in the city of Adak. Access to Parcel 4, which includes all of the OU B-2 sites, is currently restricted by locked gates, fences, and posted signs.

The Navy intends to relinquish Parcel 4 to the USFWS for use as a wildlife refuge when the required cleanup actions are complete. The anticipated future land uses are wildlife management, subsistence (fishing and hunting), research, and recreation. Possible depths of intrusive activities for recreation are expected to be less than 2 feet, and the potential depths of intrusive activities for wildlife management and subsistence are expected to be less than 4 feet. Potential research activities, such as archeological investigations or soil sampling, may include intrusive activities greater than 4 feet.

NATURE AND EXTENT OF CONTAMINATION

MEC Contamination. Data collected in 1999, 2000, and 2008 were used to document the nature, extent and distribution of MEC contamination at OU B-2. This includes data from (1) site reconnaissance to assess site accessibility and potential for MEC transport by erosion or slope failure, (2) instrument-aided surveys to assess the presence of MEC on the surface, and (3) geophysical and intrusive investigations to assess the presence of MEC in the subsurface. The potential for erosion and off-site MEC transport was evaluated through investigations of erosion features, unstable slopes, and other areas deemed likely to erode, and by determining whether MEC was present in these areas based on geophysical and intrusive investigation results. Overall, the potential for erosion and off-site MEC migration was considered low at all locations based on the results of this evaluation.

MEC found at OU B-2 include mortars, rockets, projectiles, bombs, grenades, small arms, and other miscellaneous explosive devices. Table 3 shows the number of MEC detected at each RAA and how far below the ground surface the items were found, except for ALSW-01 in RAA-05. Table 4 provides the number of MEC detected during beach sweeps at ALSW-01. The location and depth of MEC found, along with the extent of geophysical anomalies, were used to develop the boundaries for MEC removal, which are shown in Figures 3, 4, and 5.

MC Contamination. During the 2008 OU B-2 RI, 28 soil samples, nine groundwater samples, seven sediment samples, and four surface water samples were collected at 14 OU B-2 sites and analyzed for MC. MC was detected only in soil samples. Of the 18 chemicals analyzed for in the soil samples, only nitroglycerin and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) were detected. Nitroglycerin was detected at a single location at OB/OD-01, and RDX was detected in three separate samples at RG-01.

SUMMARY OF SITE RISKS

During the RI, separate risk evaluations characterized potential explosive hazards from MEC, as well as potential risks posed to human and ecological receptors by MCs in environmental media at OU B-2.

Table 2. Summary of RAA Characteristics, OU B-2, Adak Island, Alaska

RAA	Area/ Accessible Area [a]	Previous Land Use	Access/Terrain	NRHP Eligible Cultural Resources Historic Site
RAA-01 (OB/ OD-01)	19.4 acres/ 17 acres	Used for detonation of munitions from military training activities and MEC removal operations (1940s through 1990s). RCRA interim status hazardous waste treatment unit area.	Direct access via gravel range entry road, which branches from main access road along the west side of Andrew Lake. Relatively flat, but hummocky in some locations and marshy in others; several craters resulting from previous disposal events. Elevation ranges from 110 to 130 feet asl. The center and southern portion of RAA-01 are occupied by wetlands.	Collapsed wooden structures and an abandoned bridge at OB/OD-01
RAA-02 (C1-01)	74 acres (majority is accessible)	Combat range mortar impact area (WWII training range). Locations of firing points and targets unknown.	Indirect access via moderate hike from the Andrew Lake range area. Moderately steep and rocky in most areas; inaccessible along northern boundary. Elevation ranges from about 500 to 1,300 feet asl. Several small wetlands have been mapped in the area.	None found
RAA-03 West (MI-01, MI-02, and MI-03)	71 acres (majority is accessible)	Combat range mortar impact area and disposal area.	Indirect access via gravel range entry road that terminates at OB/OD-01. Terrain ranges from relatively low and flat in the eastern portion near the OB/OD area to steep and inaccessible at the western end and along the southern border. Elevations range from 130 feet asl on the valley floor to 920 feet asl along the flanks of Mount Moffet. Wetlands mapped through much of the main target/impact area.	None found
RAA-03 East (HG-01 and RR-01)	78 acres (majority is accessible)	RR-01: Hand grenade and 40-mm impact area. Locations of firing points and targets are uncertain. HG-01: Hand grenade training range. Remnants of a berm with throwing pits are located near the east side of the range.	Direct access via range entry road, which branches from the main access road along the west side of Andrew Lake. RR-01 is generally flat in the northern portion and can be uneven and marshy, while steep slopes in the south make the southern third of RR-01 inaccessible. HG-01 is relatively flat with steep slopes on the berm protecting the throwing pits. Elevations range from about 50 to 500 feet asl. Lowland areas bordering the creek are often saturated with pooled water.	Rifle range at RR-01
RAA-04 (SA93-01 and SA93-03)	104 acres (majority is accessible)	Combat training range with multiple impact areas. Target areas apparent from distribution of MEC.	Indirect access via walk from gravel road originating from the east side of Andrew Lake near the Recreation Center. On the west of SA93-01, a steep ridge forms a cliff above Andrew Lake. To the east of the ridge, terrain falls gently toward a deep drainage ravine. SA93-03 is generally flat with a deep ravine abutting the site on the west. Most of the site is on a plateau 300 to 400 feet above the lake. Central elevations range from 220 to 320 feet asl, and steep ridges just over 500 feet asl are located west and north of the RAA. Areas of standing water or streams in the south-central portion of RAA-04	None found
RAA-05 (ALDA-01 and ALSW-01)	ALDA-01: 6.7 acres/4.7 acres ALSW-01: 270 acres[b]/ 21 acres	ALDA-01: Debris disposal area with possible bombing and OB/OD craters. ALSW-01: Designated a munitions response area based primarily on historical and continuing observations of accumulated MEC along the tidal and upland zones.	Direct access to ALDA-01 via main access road running along the western shore of Andrew Lake. Direct access to ALSW-01 via unimproved road originating on the east side of Andrew Lake near the Recreation Center. Terrain of ALDA-01 generally flat, steep slopes along western edge and a line of craters trends NW to SE across site. ALSW-01 transitions from flat atop seawall to very steep along the sides (north and south). Most of ALDA-01 lies at elevations ranging from about 20 to 40 feet asl; however, a cliff on the west side of the area rises to heights of over 200 feet asl. Wetland vegetation and soils in the southern portion of ALDA-01.	Underground bunker and four Quonset hut depressions at ALDA-01, underground bunker at ALSW-01

[a] – Note that steep slopes (slopes greater than 30 degrees) or areas of standing water are not considered accessible.

[b] – 250 acres in offshore area

asl – above sea level

OB – open burn

OD – open detonation

mm – millimeter

NW – northwest

MEC – munitions and explosives of concern

NRHP – National Register of Historic Places

RAA – Remedial Action Area

RCRA – Resource Conservation and Recovery Act

SE - southeast

Table 3. MEC Distribution by Depth, OU B-2, Adak Island, Alaska

Distribution of MEC by Depth (Percentage)	Remedial Action Area					
	RAA-01 (OB/OD-01)	RAA-02 (C1-01)	RAA-03 West (MI-01, MI-02, and MI-03)	RAA-03 East (HG-01 and RR-01)	RAA-04 (SA93-01 and SA93-03)	RAA-05 (ALDA-01 only[a])
Surface	25%	56%	2%	14%	15%	93%
Near Surface (0 to 0.5 ft bgs)	67%	22%	66%	79%	45%	0%
Subsurface (0.5 to 2 ft bgs)	8%	22%	32%	7%	36%	7%
Subsurface (2 to 4 ft bgs)	0%	0%	0%	0%	4%	0%
Total Quantity	**12**	**9**	**87**	**29**	**67**	**15**

[a] – MEC beach sweep results for RAA-05, ALSW-01, is provided separately in Table 4.

RAA – Remedial Action Area

MEC – munitions and explosives of concern (consists of UXO and DMM in this table)

ft bgs – feet below ground surface

Table 4. Summary of MEC Beach Sweep Results for RAA-05 (ALSW-01), OU B-2, Adak Island, Alaska

Time Frame[a]	60-mm Mortar	81-mm Mortar	Bomb	Fuzes	Grenades	Projectiles
1962-1967	68	363	47	23	14	95
1971-1975	0	3	6	7	0	1
1979-1992	8	24	25	9	5	40
2004-2009	0	45	0	19	0	4
Totals	**76**	**435**	**78**	**58**	**19**	**140**

[a] - All items found at surface, no intrusive investigation conducted.

RAA – Remedial Action Area

MEC – munitions and explosives of concern

mm – millimeter

SUMMARY OF EXPLOSIVE SAFETY HAZARD ASSESSMENT AND MUNITIONS AND EXPLOSIVES OF CONCERN HAZARD ASSESSMENT SCORES

Two tools were used to estimate the risks and hazards posed by MEC at the OU B-2 sites. All 24 Category 1 to Category 3 sites were evaluated using the Adak-specific *Explosive Safety Hazard Assessment* (ESHA) and the 11 Category 1 sites were further evaluated using the MEC Hazard Assessment (MEC HA).

The Adak ESHA evaluated explosive safety while considering the unique character of the island. This tool takes the MEC results (e.g., how much, what depth, and what types of MEC were found) from the RI and determines how much risk/hazard is likely to be present. Results range from a likelihood of low risk (A) to extreme risk (E). The ESHA follows CERCLA principles and includes extensive input from Adak stakeholders. The following is known about MEC risks/hazards on Adak:

- Areas where MEC is known to occur or is indicated to be present based on historical land use are likely to have a higher chance of explosive hazards than areas where MEC has been searched for and has either not been found or has been removed
- Different types of MEC can detonate in different ways if disturbed, and, if detonated, can result in different types of adverse consequences
- When MEC is located where it is likely to be disturbed by current and/or future land use activities, there is a potential for explosive hazards
- There is greater potential for explosive risk where public exposure is greatest (for example, increased contact or easier accessibility)

The MEC HA is used to help evaluate current or baseline explosive hazards to people, based on current and reasonably anticipated future land use activities, as well as the explosive hazards following CERCLA cleanup actions. This tool identifies the potential magnitude of the hazard present, ranging from least hazardous/lowest potential explosive conditions (4) to most hazardous/highest potential explosive conditions (1). MEC HA scores were developed for sites that received an ESHA score of C (moderate hazard level) or D (high hazard level) (i.e. Category 1 sites).

For each site, the potential for MEC exposure was evaluated assuming no cleanup actions were being conducted and the reasonably anticipated future land use of Adak OU B-2 is an unrestricted wildlife refuge. The sites received ESHA scores of A, C, or D and MEC HA scores of 1 through 4. Table 5 provides site-specific scoring details and results for each site.

CHEMICAL RISKS

Chemical risk assessments evaluated whether past releases of MCs to soil, sediment, surface water, groundwater, and air in OU B-2 resulted in potential risks to human health or the environment under current and reasonably anticipated

Table 5. Explosives Safety Hazard Assessment and Munitions and Explosives of Concern Hazard Assessment Scoring Results, OU B-2, Adak Island, Alaska

Site Name	ESHA Score	MEC HA Rank	Scoring Details
ALDA-01	C	2	100 percent survey, limited intrusive investigation, variety of DMM intermingled with subsurface debris. MEC HA score is high due to type of MEC (60-mm mortars).
ALDA-02	A	Not Scored	Score is based on presumption of bombing range use. No MEC found during RI or FS. Bedrock is shallow, which would promote high-order detonation of any bombs dropped. Additional investigation of possible MEC disposal area conducted in 2012 with no MEC found.
ALSW-01	D	3	Variety of highly deteriorated MEC, including bombs, mortars, grenades and projectiles, bursters, and flares (critical hazard ratings), MEC at surface. MEC HA score related to type of MEC and uncertainty regarding amount of MEC/nature of site.
BC-03	A	Not Scored	100 percent instrument-aided reconnaissance in accessible areas. All contacts intrusively investigated; only cultural metal debris found.
C1-01	D	1	40-mm projectiles (critical hazard rating), MEC present; MEC at surface. MEC HA score related to type of MEC and type of operational area.
HG-01	D	1	Hand grenades (catastrophic hazard rating), MEC found, MEC at surface. MEC HA score related to type of MEC and type of operational area. Scores do not reflect 80 percent geophysical survey and removal in 1999 and 2008.
JM-01	A	Not Scored	Site has not been located; characterization not feasible.
LJ-02A	A	Not Scored	100 percent survey and investigation; no MEC found.
MAG-01	A	Not Scored	No evidence of possible storage magazine found, and only cultural metal debris found at surface and subsurface.
MI-01	D	1	40-mm projectiles (critical hazard rating), MEC found; MEC at surface. MEC HA score related to type of MEC
MI-02	D	1	40-mm projectiles (critical hazard rating), MEC found; MEC at surface. MEC HA score related to type of MEC and type of operational area.
MI-03	D	1	40-mm projectiles (critical hazard rating), MEC found; MEC at surface. MEC HA score related to type of MEC and type of operational area.
MM-10D	A	Not Scored	100 percent survey and investigation; no MEC found.
OB/OD-01	D	2	Fuzing (critical hazard rating), MEC present; MEC at surface. MEC HA score related to type of MEC and type of operational area.
RG-01	A	Not Scored	Site scored to complete RI requirements for site; 100 percent investigation and removal to a depth of 2 feet bgs during Non–Time Critical Removal Action.
RR-01	D	1	40-mm grenades (catastrophic hazard rating), MEC present; MEC at surface. MEC HA score related to type of MEC and type of operational area.
RR-02	A	Not Scored	No MEC encountered (no explosive hazard rating); no MEC at surface or depth.
RR-03	A	Not Scored	100 percent survey and investigation. All detected MEC cleared.
RR-04	A	Not Scored	No MEC encountered (no explosive hazard rating); no MEC at surface or depth.
SA-01	A	Not Scored	No MEC encountered (no explosive hazard rating); no MEC at surface or depth.
SA93-01	D	1	Multiple MEC encountered (critical hazard rating); MEC at surface. MEC HA score related to type of MEC and type of operational area.
SA93-02	A	Not Scored	No MEC found.
SA93-03	A	4	Scores reflect 100 percent geophysical survey and removal to a depth of 2 feet in 2008, but do not account for investigation completeness issue (use of transects instead of expansion grids) on boundary of site.
SA93-04	A	Not Scored	No MEC found.

Notes:

bgs – below ground surface
DMM – discarded military munitions
ESHA – Explosives Safety Hazard Assessment
FS – Feasibility Study
MEC – munitions and explosives of concern
MEC HA – Munitions and Explosives of Concern Hazard Assessment
mm – millimeter
RI – Remedial Investigation

future land and water uses. Risks to current and future workers, hypothetical future residents, and future recreational users were evaluated. Potential exposure pathways included ingestion and skin contact with soil, sediment, surface water, and groundwater, and dust inhalation. Risks to wildlife/mammals, birds, plants/vegetation, and aquatic and benthic organisms (e.g., aquatic insects) were also evaluated. Potential exposure pathways included ingestion and/or direct contact with soil, sediment, surface water, and/or groundwater. More detailed information on the risk assessments is provided in the RI.

MC sample results were compared to EPA Region 10 human health risk-based screening concentrations, Adak ecological risk-based screening concentrations, and Adak background concentrations. Based on the concentrations observed during the RI, and current and reasonably anticipated future land uses, risks posed to human health are well

below ADEC's target health goals. In Alaska, the target health goal for potentially cancer causing chemicals is $1x10^{-5}$ (a risk of contracting cancer of 1 in 100,000), and the target health goal for non-cancer chemicals is a *hazard index* of 1. No additional risk assessments or cleanup actions are required to further address risks to human health from MCs. The concentrations of chemicals detected in soil, sediment, surface water, groundwater, and air are not high enough to pose unacceptable risk to wildlife/mammals, birds, plants/vegetation, and aquatic and benthic organisms. Therefore, existing concentrations of MC are protective of human health and the environment at the OU B-2 sites.

RISK CONCLUSIONS

Based on the MEC hazards and chemical risk assessment findings, the RI made recommendations regarding the status and future action for each OU B-2 site. The following sites were sufficiently investigated or cleaned up that the RI concluded site conditions do not pose unacceptable risks to human health or the environment. However, OU B-1 ICs (e.g., island-wide educational awareness program and MEC discovery reporting process) are applicable for these sites:

- ALDA-02
- BC-03
- JM-01
- LJ-02A
- MAG-01
- MM-10D
- RG-01
- RR-02
- RR-03
- RR-04
- SA-01
- SA93-02
- SA93-04

The following sites potentially pose unacceptable hazards to future users of the sites; therefore, the FS evaluated potential MEC removal activities to address these risks:

- ALDA-01
- ALSW-01
- C1-01
- HG-01
- MI-01
- MI-02
- MI-03
- OB/OD-01
- RR-01
- SA93-01
- SA93-03

As noted in the Scope and Role of Operable Unit Section above, the 11 sites with recognized MEC hazards were assembled into 5 RAAs. It is the Navy, EPA and ADEC's current judgment that the preferred cleanup alternatives identified in this Proposed Plan, or one of the other alternatives considered in this Proposed Plan, are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances at these sites.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are site-specific cleanup objectives that are established based on the nature and extent of contamination, potential for human and environmental exposure, and Applicable or Relevant and Appropriate Requirements (ARARs). RAOs provide the basis for selecting appropriate response actions and cleanup technologies, and for developing alternatives. Based on the risk analysis conducted for OU B-2 and the regulatory requirements, the Navy, EPA and ADEC developed the following RAO for MEC for protection of human health and the environment:

- 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

Additionally, the Navy, EPA and ADEC established the following cleanup goals to assist in achieving the above RAO:

- Achieve an ESHA score of "B" or better (or a MEC HA score of "3" or better) to achieve acceptable (low) risk for future land use as a wildlife refuge
- Restrict access to the site(s) until MEC removal activities are completed as defined in the ROD
- Educate island residents and visitors/workers about the potential presence of MEC and the appropriate response and notification procedures
- Minimize the need for *Land Use Controls* (LUCs), which include ICs and ECs, after MEC removal activities are complete

As indicated earlier, risks posed by MC to human and ecological receptors in OU B-2 are acceptable; consequently, RAOs for protection of human health and the environment from chemical contamination were not developed.

SUMMARY OF REMEDIAL ACTION ALTERNATIVES

The Navy developed nine alternatives to address MEC at the five RAAs in OU B-2 that require MEC removal. These alternatives, briefly summarized below, represent the most effective combination of cleanup actions for meeting the RAO. Table 6 summarizes the major components of each alternative. Alternatives 1 through 5 were evaluated for RAA-01 through RAA-04 (Table 7). Different alternatives (Alternatives 1, 6A and 6B, and 7A and 7B) were evaluated for RAA-05 because MEC is present in Andrew Bay, and is transported by wave action to the shoreline (Table 7). This is the only OU B-2 RAA in which this occurs.

Table 6. Summary of Alternative Major Components, OU B-2, Adak Island, Alaska

Major Component	Alternative								
	1	2	3	4	5	6A	6B	7A	7B
LUCs		✓	✓	✓		✓	✓	✓	
Limited LUCs					✓				✓
RAA-Specific LUCs for RAA-05						✓	✓	✓	✓
Surface MEC Removal to 0.5 feet BTMS		✓	✓	✓	✓	✓	✓	✓	✓
Subsurface MEC Removal to Depth of Detection (Maximum 2 feet BTMS)			✓	✓	✓	✓	✓	✓	✓
Subsurface MEC Removal to Depth of Detection (Maximum 4 feet BTMS)				✓	✓		✓		✓
Subsurface MEC Removal to Depth of Detection					✓				✓
Beach Sweeps						✓	✓	✓	✓
Dredging								✓	✓

Notes

BTMS – below top of mineral soil
MEC – munitions and explosives of concern
LUC – Land Use Control
RAA – Remedial Action Area

Table 7. Summary of RAAs and Applicable Remedial Action Alternatives, OU B-2, Adak Island, Alaska

Alternative	RAA-01 (OB/OD-01)	RAA-02 (C1-01)	RAA-03 West (MI-01, MI-02, and MI-03)	RAA-03 East (HG-01 and RR-01)	RAA-04 (SA93-01 and SA93-03)	RAA-05 (ALDA-01 and ALSW-01)
1 – No Action	✓	✓	✓	✓	✓	✓
2 – Surface MEC Removal to 0.5 foot BTMS and LUCs	✓	✓	✓	✓	✓	
3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 feet BTMS) and LUCs	✓	✓	✓	✓	✓	
4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 feet BTMS) and LUCs	✓	✓	✓	✓	✓	
5 – Surface and Subsurface MEC Removal to Depth of Detection and LUCs	✓	✓	✓	✓	✓	
6A – Beach Sweeps, MEC Removal to 2 feet BTMS at ALDA-01 and RAA-specific LUCs						✓
6B – Beach Sweeps, MEC Removal to 4 feet BTMS at ALDA-01 and RAA-specific LUCs						✓
7A – Dredging, Beach Sweeps, MEC Removal to 2 feet BTMS at ALDA-01 and RAA-specific LUCs						✓
7B – Dredging, Beach Sweeps, MEC Removal to Depth of Detection at ALDA-01 and RAA-specific LUCs						✓

Notes:

BTMS – below top of mineral soil
MEC – munitions and explosives of concern
LUC – Land Use Control
RAA – Remedial Action Area

- **Alternative 1 – No Action:** no additional LUCs or site-specific cleanup actions, such as the location, removal, and disposal of MEC. This alternative is not compatible with the RAO defined for OU B-2.
- **Alternative 2 – Surface MEC Removal to 0.5 Foot Below Top of Mineral Soil (BTMS) and LUCs:** one-time removal of surface MEC to the depth at which it can be detected, but not to exceed 0.5 foot BTMS. LUCs include periodic erosion monitoring along uninvestigated/uncleared steep slopes within and adjacent to the RAAs, ECs specific to the alternative (e.g., warning signs), and ICs specific to the alternative (e.g., restricting activities that may extend below the 0.5-foot depth of clearance), as well as the ICs associated with the OU B-1 ROD. LUCs associated with Alternative 2 would remain in place for as long as MEC remains in the subsurface or until cleanup action is complete and RAOs and cleanup levels for unrestricted use/unrestricted exposure are attained. Existing ECs restricting access to Parcel 4, including locked gates, fences, and signs, will be maintained until the MEC removal activities are complete.
- **Alternative 3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs:** removal of surface and subsurface MEC to the depth at which it can be detected, but not to exceed 2 feet BTMS. Once targeted anomalies are investigated and acquired, and no additional anomalies are detected below 2 feet, the subsurface investigation would cease. If anomalies are detected below 2 feet, decisions would be made by the Navy regarding further investigation. LUCs would be similar to those for Alternative 2, except activities below the 2 foot depth of clearance would be restricted.
- **Alternative 4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet BTMS) and LUCs:** removal of surface and subsurface MEC to the depth at which it can be detected, but not to exceed 4 feet BTMS. Similar target anomaly investigation and acquisition procedures as described in Alternative 3, but to a depth of 4 feet. If anomalies are detected below 4 feet, decisions would be made by the Navy regarding further investigation. LUCs would be similar to those for Alternatives 2, except activities below the 4 foot depth of clearance would be restricted.
- **Alternative 5 – Surface and Subsurface MEC Removal to Depth of Detection and LUCs:** removal of all detectable surface and subsurface MEC. This alternative addresses detectable MEC present to the depth of detection and requires limited LUCs (e.g., no warning signs or intrusive activity restrictions). Implementation of this alternative allows for unrestricted activities associated with wildlife refuge land use.
- **Alternative 6A – Beach Sweeps, MEC Removal to 2 Feet BTMS at ALDA-01 and RAA-specific LUCs:** the same MEC removal activities as in Alternative 3, to the depth at which it can be detected, but not to exceed 2 feet, for ALDA-01. Additionally, beach sweeps would be conducted using visual inspection, initially on an annual basis, with reduced frequency of inspections coinciding with the reduction of MEC deposition along the shoreline. Beach sweeps would be discontinued when MEC is no longer found. LUCs specific to RAA-05 (ALDA-01 and ALSW-01) consist of more stringent controls while beach sweeps are required (e.g., access controls). LUCs similar to those included for Alternative 3 would be included for RAA-05.
- **Alternative 6B – Beach Sweeps, MEC Removal to 4 Feet BTMS at ALDA-01 and RAA-specific LUCs:** the same MEC removal activities as in Alternative 4, to the depth at which it can be detected, but not to exceed 4 feet, for ALDA-01. Additionally, beach sweeps would be conducted and LUCs implemented similarly to Alternative 6A.
- **Alternative 7A – Dredging, Beach Sweeps, MEC Removal to 2 Feet BTMS at ALDA-01 and RAA-specific LUCs:** the same MEC removal activities, to the depth at which it can be detected, but not to exceed 2 feet, for ALDA-01; visual beach sweep investigations; and LUCs as in Alternative 6A. Additionally, dredging would be performed to an approximate depth of about 3 feet below the sediment surface, and would remove both metallic and non-metallic material, as well as sediment and rocks, thereby requiring substantial materials management and screening processes.
- **Alternative 7B – Dredging, Beach Sweeps, MEC Removal to Depth of Detection at ALDA-01 and RAA-specific LUCs:** the same components as Alternative 7A, except MEC removal in ALDA-01 would be to the depth of detection (as in Alternative 5).

LUCs consist of more stringent controls while beach sweeps are required (e.g., access controls). No warning signs or intrusive activity restrictions are required at ALDA-01 since this alternative addresses detectable MEC at ALDA-01 to the depth of detection.

Tables 8 and 9 provide the estimated capital, operation and maintenance (O&M), and total *net present value* (NPV) costs of these alternatives, as well as the estimated time to implement them. Capital costs are expenses required to construct or install a cleanup action. O&M costs are post-construction/installation costs necessary to provide for or verify the continued effectiveness of a cleanup action. NPV costs are the present value of total expenses for an alternative.

The key ARARs for the cleanup actions being considered for OU B-2 are related to land use, wetlands, the Clean Water Act, water quality standards, cultural resources, and coastal zone management (e.g., 40 Code of Federal Regulations [CFR] 131.10; 10 CFR 1022; 33 United States Code [USC] 1251, Section 404; 18 Alaska Administrative Code 70; Alaska Statute 41.35; 16 USC 1451; USC 1401-1445). Generally, ARARs are federal or state environmental cleanup standards, standards of control, and other substantive requirements, criteria, or limitations that may specially apply or be relevant to an aspect of a CERCLA site. Note that with the exception of the Marine Protection, Research and Sanctuaries Act, these ARARs apply to all action alternatives (Alternatives 2 through 7B). The Marine Protection, Research and Sanctuaries Act is only applicable to Alternatives 7A and 7B. None of these ARARs is applicable to Alternative 1, the no action alternative.

Table 8. Summary of Alternative Costs and Durations for RAA-01, RAA-02, RAA-03 East, RAA-03 West, and RAA-04, OU B-2, Adak Island, Alaska

Alternative	Cost/Duration[a]	RAA-01 (OB/OD-01)	RAA-02 (C1-01)	RAA-03 West (MI-01, MI-02, and MI-03)	RAA-03 East (HG-01 and RR-01)	RAA-04 (SA93-01 and SA93-03)
2 – Surface MEC Removal to 0.5 foot BTMS and LUCs	Capital Cost	$1,400,000	$2,700,000	$4,000,000	$3,200,000	$3,600,000
	O&M Cost	$300,000	$300,000	$300,000	$300,000	$300,000
	Net Present Value Cost	$1,700,000	$3,000,000	$4,300,000	$3,500,000	$3,900,000
	Duration to Complete	2 months	5 months	6 months	6 months	6 months
3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 feet BTMS) and LUCs	Capital Cost	$1,700,000	$4,700,000	$7,200,000	$6,100,000	$6,800,000
	O&M Cost	$300,000	$300,000	$300,000	$300,000	$300,000
	Net Present Value Cost	$2,000,000	$5,000,000	$7,500,000	$6,400,000	$7,100,000
	Duration to Complete	3 months	10 months	13 months	12 months	14 months
4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 feet BTMS) and LUCs	Capital Cost	$1,700,000	$4,700,000	$7,400,000	$6,400,000	$7,000,000
	O&M Cost	$300,000	$300,000	$300,000	$300,000	$300,000
	Net Present Value Cost	$2,000,000	$5,000,000	$7,700,000	$6,700,000	$7,300,000
	Duration to Complete	3 months	10 months	13 months	12 months	14 months
5 – Surface and Subsurface MEC Removal to Depth of Detection and LUCs	Capital Cost	$1,700,000	$4,700,000	$7,400,000	$6,400,000	$7,000,000
	O&M Cost	$300,000	$300,000	$300,000	$300,000	$300,000
	Net Present Value Cost	$2,000,000	$5,000,000	$7,700,000	$6,700,000	$7,300,000
	Duration to Complete	3 months	10 months	13 months	13 months	14 months

Notes:

[a] – Duration to complete is for the active portion of the remedy. Long term O&M includes 30 years of LUC implementation. LUCs will be required for as long as MEC remains in the subsurface or until cleanup action is complete and RAOs and cleanup levels for unrestricted use/unrestricted exposure are attained.

Alternative 1 was not included in this table because it does not require additional costs or time to implement.

Alternative durations assume the use of one crew to complete the alternatives (i.e., achieve the remedial action objective). However, costs for some alternatives assume use of multiple field crews in order to complete remedial action within two five-month field seasons.

BTMS – below top of mineral soil

LUC – Land Use Control

MEC – munitions and explosives of concern

O&M – Operations and Maintenance

RAA – Remedial Action Area

EVALUATION OF ALTERNATIVES

Each alternative for OU B-2 was evaluated using the seven threshold and balancing criteria specified in the NCP. Threshold criteria must be met by the preferred alternative, balancing criteria are used to compare the alternatives, and modifying criteria are evaluated in the ROD after receipt of public and state comments on this Proposed Plan (Table 10).

Table 9. Summary of Alternative Costs and Durations for RAA-05, OU B-2, Adak Island, Alaska

Alternative	Cost/Duration[a]	RAA-05 (ALDA-01 and ALSW-01)
6A – Beach Sweeps, MEC Removal to 2 feet BTMS at ALDA-01 and RAA-specific LUCs	Capital Cost	$1,400,000
	O&M Cost	$3,600,000
	Net Present Value Cost	$5,000,000
	Duration to Complete	1.5 months (MEC removal in ALDA-01) + 50 to 75 years (beach sweeps)
6B – Beach Sweeps, MEC Removal to 4 feet BTMS at ALDA-01 and RAA-specific LUCs	Capital Cost	$1,600,000
	O&M Cost	$3,600,000
	Net Present Value Cost	$5,200,000
	Duration to Complete	2 months (MEC removal in ALDA-01) + 50 to 75 years (beach sweeps)
7A – Dredging, Beach Sweeps, MEC Removal to 2 feet BTMS at ALDA-01 and RAA-specific LUCs	Capital Cost	$165,500,000
	O&M Cost	$3,600,000
	Net Present Value Cost	$169,100,000
	Duration to Complete	1.5 months (MEC removal in ALDA-01) + 7 field seasons (dredging)
7B – Dredging, Beach Sweeps, MEC Removal to Depth of Detection at ALDA-01 and RAA-specific LUCs	Capital Cost	$165,500,000
	O&M Cost	$3,600,000
	Net Present Value Cost	$169,100,000
	Duration to Complete	2 months (MEC removal in ALDA-01) + 7 field seasons (dredging)

Notes:

[a] – Duration to complete is for the active portion of the remedy. Long term O&M includes 30 years of LUC implementation. LUCs will be required for as long as MEC remains in the subsurface or until cleanup action is complete and RAOs and cleanup levels for unrestricted use/unrestricted exposure are attained.

Alternative 1 was not included in this table because it does not require additional costs or time to implement.

Alternative durations assume the use of one crew to complete the alternatives (i.e., achieve the remedial action objective).

BTMS – below top of mineral soil MEC – munitions and explosives of concern RAA – Remedial Action Area

LUC – Land Use Control O&M – Operations and Maintenance

Table 10. Evaluation Criteria, OU B-2, Adak Island, Alaska

Criteria		Description
Threshold Criteria – Criteria must be met before an alternative can be considered as a preferred cleanup alternative	Overall Protection of Human Health and the Environment	Assesses whether an alternative provides adequate protection of public health and the environment. Describes how an alternative eliminates, reduces, or controls threats to public health and the environment through LUCs, engineering controls, or treatment.
	Compliance with ARARs	Evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Balancing Criteria – Relative tradeoffs between different criteria are evaluated	Long-Term Effectiveness and Permanence	Considers the ability of an alternative to maintain protection of human health and the environment over time.
	Reduction of Toxicity, Mobility, or Volume through Treatment	Evaluates an alternative's use of treatment to reduce the harmful effects of the principal contaminants, their ability to move in the environment, and the amount of contamination present.
	Short-Term Effectiveness	Considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	Implementability	Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	Cost	Include estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to –30 percent.
Modifying Criteria – Evaluate whether preferred cleanup alternative is supported by state and community after the public comment period	State Acceptance	Considers whether the State agrees with or opposes the preferred alternative. ADEC reviews and comments upon all important documents throughout the process.
	Community Acceptance	Considers whether the local community agrees with or opposes the preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance

Notes:

ADEC – Alaska Department of Environmental Conservation ARARs – Applicable or Relevant and Appropriate Requirements LUCs – Land Use Controls

This section of the Proposed Plan summarizes the relative performance of each alternative against the NCP evaluation criteria. Each alternative was rated as to how well it is expected to meet the criteria as shown in Figures 6 through 8. Due to the similarity of alternatives and the conclusions reached in the FS, the evaluations for RAA-01, RAA-02, RAA-03 East, and RAA-03 West were combined (Figure 6). Separate evaluations were performed for RAA-04 (Figure 7) and RAA-05 (Figure 8). The costs presented for each alternative on these figures include the NPV costs. The key advantages and disadvantages of the alternatives are summarized in Tables 11 through 13. Figures 6 through

EPA Criteria		Rating of Alternatives 1	2	3	4	5
Overall protection of human health and the environment		○	○	●	●	●
Compliance with ARARs		●	●	●	●	●
Long-term effectiveness and permanence		--	--	◔	◔	◔
Reduction of toxicity, mobility, or volume through treatment		--	--	◔	◔	◔
Short-term effectiveness		--	--	◕	◒	◒
Implementability		--	--	◒	◒	◒
Cost ($ millions)	Remedial Action Area					
	RAA-01	--	--	2.0	2.0	2.0
	RAA-02	--	--	5.0	5.0	5.0
	RAA-03 West	--	--	7.5	7.7	7.7
	RAA-03 East	--	--	6.4	6.7	6.7

Alternatives

1 No Action

2 Surface MEC Removal to 0.5 Foot below Top of Mineral Soil and LUCs

3 Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet below Top of Mineral Soil) and LUCs

4 Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet below Top of Mineral Soil) and LUCs

5 Surface and Subsurface MEC Removal to Depth of Detection and LUCs

Legend

● Highest/ Meets Criterion

◔ High

◒ Medium

◔ Low

○ Lowest/Does Not Meet Criterion

-- Not Evaluated Further

Figure 6. Evaluation of Alternatives for RAA-01, RAA-02, RAA-03 West, and RAA-03 East at OU B-2

EPA Criteria	Rating of Alternatives 1	2	3	4	5
Overall protection of human health and the environment	○	○	○	●	●
Compliance with ARARs	●	●	●	●	●
Long-term effectiveness and permanence	--	--	--	◔	◔
Reduction of toxicity, mobility, or volume through treatment	--	--	--	◔	◔
Short-term effectiveness	--	--	--	◒	◒
Implementability	--	--	--	◒	◒
Cost ($ millions)	--	--	--	7.3	7.3

Alternatives

1 No Action

2 Surface MEC Removal to 0.5 Foot below Top of Mineral Soil and LUCs

3 Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet below Top of Mineral Soil) and LUCs

4 Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet below Top of Mineral Soil) and LUCs

5 Surface and Subsurface MEC Removal to Depth of Detection and LUCs

Legend

● Highest/ Meets Criterion

◔ High

◒ Medium

◔ Low

○ Lowest/Does Not Meet Criterion

-- Not Evaluated Further

Figure 7. Evaluation of Alternatives for RAA-04 (SA93-01 and SA93-03) at OU B-2

EPA Criteria	Rating of Alternatives 1	6A	6B	7A	7B
Overall protection of human health and the environment	○	●	●	●	●
Compliance with ARARs	●	●	●	●	●
Long-term effectiveness and permanence	--	◒	◒	◒	◒
Reduction of toxicity, mobility, or volume through treatment	--	◒	◒	◒	◕
Short-term effectiveness	--	◒	◒	○	○
Implementability	--	◕	◕	◔	○
Cost ($ millions)	--	5.0	5.2	169	169

Alternatives

1 No Action

6A Beach Sweeps, MEC Removal to 2 Feet below Top of Mineral Soil at ALDA-01 and RAA-specific LUCs

6B Beach Sweeps, MEC Removal to 4 Feet below Top of Mineral Soil at ALDA-01 and RAA-specific LUCs

7A Dredging, Beach Sweeps, MEC Removal to 2 Feet below Top of Mineral Soil at ALDA-01 and RAA-specific LUCs

7B Dredging, Beach Sweeps, MEC Removal to Depth of Detection at ALDA-01 and RAA-specific LUCs

Legend

● Highest/ Meets Criterion

◕ High

◒ Medium

◔ Low

○ Lowest/Does Not Meet Criterion

-- Not Evaluated Further

Figure 8. Evaluation of Alternatives for RAA-05 (ALDA-01 and ALSW-01) at OU B-2

8 and Tables 11 through 13 include evaluation of only those alternatives which meet the threshold criterion of Overall Protection of Human Health and the Environment.

RAA-01 (OB/OD-01), RAA-02 (C1-01), RAA-03 EAST (RR-01 AND HG-01), RAA-03 WEST (MI-01, MI-02, MI-03), AND RAA-04 (SA93-01 AND SA93-03)

Alternatives 1 through 5 were all evaluated for RAA-01 through RAA-04. Rankings for each of these alternatives, based on the CERCLA criteria, are described below.

Overall Protection of Human Health and the Environment. For RAA-01, RAA-02, and RAA-03, Alternatives 1 and 2 received a lowest, or "Not Protective" rating for overall protection of human health and the environment because MEC would not be removed to a depth where people could potentially be exposed to it based on the anticipated future land use activities. For RAA-04, the lowest, or "Not Protective" rating also included Alternative 3 since MEC has been found below 2 feet. For RAA-01 through RAA-03, Alternatives 3, 4, and 5 received a highest, or "Protective", rating because they remove surface and subsurface MEC to, or beyond, the depth it is expected to occur (2 feet). For RAA-04, Alternatives 4 and 5 received a highest, or "Protective", rating because they remove surface and subsurface MEC to, or beyond, depths where they are most likely to be present (4 feet)

Since Alternatives 1, 2, and 3 (for RAA-04 only) do not meet the threshold criteria, they are not considered further in this evaluation.

Compliance with ARARs. All alternatives are anticipated to comply with all identified ARARs, waivers are not anticipated.

Long-Term Effectiveness and Permanence. For RAA-01 through RAA-03, Alternatives 3, 4, and 5 received a ranking of high for long-term effectiveness and permanence because they remove MEC to at least the depth where it is expected to occur (2 feet). Alternatives 4 and 5 provide high long-term effectiveness and permanence at RAA-04 because they address MEC to the depth it is expected to occur (4 feet).

Reduction of Toxicity, Mobility, or Volume through Treatment. For RAA-01 through RAA-03, Alternatives 3, 4, and 5 received a ranking of high because they reduce the greatest volume and mobility of MEC by removing it from the surface and subsurface to the maximum depth at which it has been found. Alternatives 4 and 5 also received a ranking of high because they reduce the greatest volume and mobility of MEC at RAA-04 by removing it from the surface and subsurface to the maximum depth at which it has been found.

Short-Term Effectiveness. For RAA-01 through RAA-03, Alternative 3 received a ranking of high for short-term effectiveness because it requires 3 to 14 months to implement and results in short-term environmental impacts from excavation activities. Alternatives 4 and 5 provide moderate short-term effectiveness for RAA-01 through RAA-04 because they also require 3 to 14 months to implement and result in greater short-term environmental impacts from excavation activities to investigate deeper anomalies.

Table 11. Comparative Summary of Remedial Action Alternatives for RAA-01 (OB/OD-01), RAA-02 (C1-01), RAA-03 West (MI-01, MI-02, and MI-03), and RAA-03 East (HG-01 and RR-01), OU B-2, Adak Island, Alaska

Key Tradeoffs	Alternative 3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs	Alternative 4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet BTMS) and LUCs	Alternative 5 – Surface and Subsurface MEC Removal to Depth of Detection and LUCs
Advantages	• Eliminates detectable MEC hazards on the surface and in the subsurface to a depth of 2 feet bgs where it is most likely to be encountered by future land users. Most MEC at RAA-01, RAA-02, RAA-03 West, and RAA-03 East occurs within 0.5 foot of the surface. • Technical approach straightforward and considered reliable. • An increase in the following costs over the base case (No Action) includes removal of potential MEC in subsurface soil to 2 feet: - RAA-01 – $2.0 million (NPV) - RAA-02 – $5.0 million (NPV) - RAA-03 West – $7.5 million (NPV) - RAA-03 East – $6.4 million (NPV) • Addresses 100% of the MEC detected at RAA-01, RAA-02, RAA-03 West, and RAA-03 East.	• Eliminates detectable MEC hazards on the surface and in the subsurface to a depth of 4 feet bgs. Most MEC at RAA-01, RAA-02, RAA-03 West, and RAA-03 East occurs within 0.5 foot of the surface. • Technical approach straightforward and considered reliable. • Since no MEC has been detected at depths greater than 2 feet, the slight increase in cost over Alternative 3 to investigate anomalies detected below 2 feet is approximately $25,000 for RAA-01, $17,000 for RAA-02, $221,000 for RAA-03 West, and $249,000 for RAA-03 East. Note that uncertainty about excavation costs increases exponentially with depth.	• Eliminates detectable MEC hazards on the surface and subsurface to depth of detection in accessible areas. • Requires only limited LUCs and long-term management to restrict exposures to undetected MEC and MEC that might erode from uninvestigated steep areas. • Technical approach straightforward and considered reliable. • Since no MEC has been detected at depths greater than 2 feet, there is only a slight increase in cost over Alternatives 3 and/or 4 to investigate anomalies detected below 2 or 4 feet, respectively. Note that uncertainty about excavation costs increases exponentially with depth.
Disadvantages	• Requires LUCs and long-term management to restrict intrusive activities and exposures to undetected MEC, subsurface MEC present at depths greater than 2 feet, and MEC that might erode from uninvestigated steep areas. However, no MEC has been detected at depths greater than 2 feet at RAA-01, RAA-02, RAA-03 West, or RAA-03 East. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Moffett Creek and in areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Saturated soil conditions may cause delays, because excavated holes require dewatering to safely investigate and resolve anomalies at depth.	• Implementation would reduce the uncertainty regarding MEC at depth, but would not likely increase protectiveness, because no MEC has been found to date at depths greater than 2 feet at RAA-01, RAA-02, RAA-03 West, or RAA-03 East. • Requires LUCs and long-term management to restrict intrusive activities and exposures to undetected MEC, subsurface MEC present at depths greater than 4 feet, and MEC that might erode from uninvestigated steep areas. However, no MEC has been detected at depths greater than 2 feet at RAA-01, RAA-02, RAA-03 West, and RAA-03 East. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Moffett Creek and in areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Saturated soil conditions likely to cause delays, because excavated holes require dewatering to safely investigate and resolve anomalies at depth.	• Implementation would reduce the uncertainty regarding MEC at depth, but would not likely increase protectiveness, because no MEC has been found to date at depths greater than 2 feet at RAA-01, RAA-02, RAA-03 West, or RAA-03 East. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Moffett Creek and in areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Saturated soil conditions likely to cause delays, because excavated holes require dewatering to safely investigate and resolve anomalies at depth.

Notes: Alternatives 1 and 2 were not included in this table because they do not meet the threshold criterion of Overall Protection of Human Health and the Environment.

Steep slopes (slopes greater than 30 degrees) or areas of standing water are not considered accessible.

bgs – below ground surface
BTMS – below top of mineral soil
LUC – Land Use Control
MEC – munitions and explosives of concern
NPV – Net Present Value
RAA – Remedial Action Area

Table 12. Comparative Summary of Remedial Action Alternatives for RAA-04 (SA93-01 and SA93-03), OU B-2, Adak Island, Alaska

Key Tradeoffs	Alternative 4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet BTMS) and LUCs	Alternative 5 – Surface and Subsurface MEC Removal to Depth of Detection and LUCs
Advantages	• Eliminates detectable MEC hazards on the surface and in the subsurface to a depth of 4 feet bgs, the maximum depth in which MEC has been found and is suspected to occur. • Technical approach straightforward and considered reliable. • An increase in cost of approximately $7.3 million (NPV) over the base case (No Action) includes removal of potential MEC in subsurface soil to 4 feet, thereby addressing 100% of the MEC detected at the site. Note that uncertainty about excavation costs increases exponentially with depth	• Eliminates detectable MEC hazards on the surface and subsurface to depth of detection in accessible areas. • Requires only limited LUCs and long-term management to restrict exposures to undetected MEC and MEC that might erode from uninvestigated steep areas. • Technical approach straightforward and considered reliable. • Since no MEC has been detected at depths greater than 4 feet, there is only a slight increase in cost over Alternative 4 to investigate anomalies detected below 4 feet. Note that uncertainty about excavation costs increases exponentially with depth.
Disadvantages	• Requires LUCs and long-term management to restrict intrusive activities and exposures to undetected MEC, subsurface MEC present at depths greater than 4 feet, and MEC that might erode from uninvestigated steep areas. However, no MEC has been detected at depths greater than 4 feet at RAA-04. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Mitchell Creek and in areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Saturated soil conditions likely to cause delays, because excavated holes may require dewatering to safely investigate and resolve anomalies at depth.	• Implementation would reduce the uncertainty regarding MEC at depth, but would not likely increase protectiveness, because no MEC has been found to date at depths greater than 4 feet at RAA-04. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Mitchell Creek and in areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Saturated soil conditions likely to cause delays, because excavated holes may require dewatering to safely investigate and resolve anomalies at depth.

Notes: Alternatives 1, 2, and 3 were not included in this table because they do not meet the threshold criterion of Overall Protection of Human Health and the Environment.
Steep slopes (slopes greater than 30 degrees) or areas of standing water are not considered accessible.

bgs – below ground surface
BTMS – below top of mineral soil
LUC – Land Use Control
MEC – munitions and explosives of concern
NPV – Net Present Value
RAA – Remedial Action Area

Implementability. For RAA-01 through RAA-03, Alternatives 3, 4, and 5 received a moderate rating for implementability because they rely on proven technologies; however, saturated soil conditions in many areas may cause delays as will the additional time required to investigate anomalies at deeper depths. For RAA-04, Alternatives 4 and 5 also received a moderate implementability rating.

Cost. For RAA-01 through RAA-03, Alternatives 3, 4 and 5 have moderate costs at $2.0 million to $7.5 million NPV, $2.0 million to $7.7 million NPV, and $2.0 million to $7.7 million NPV, respectively. For RAA-04, Alternatives 4 and 5 have moderate costs at $7.3 million NPV.

RAA-05 (ALDA-01 AND ALSW-01)

As previously discussed, RAA-05 was excluded from the evaluation of Alternatives 2 through 5 because MEC is being transported from Andrew Bay to the shoreline by wave action. This is the only RAA at OU B-2 in which this occurs. Therefore, only Alternatives 1, 6A and 6B, and 7A and 7B were evaluated for RAA-05.

Overall Protection of Human Health and the Environment. Alternative 1 received a lowest, or "Not Protective", rating for overall protection of human health and the environment because MEC would not be removed. Alternatives 6A, 6B, 7A, and 7B received a highest, or "Protective", rating because they mitigate potential exposure to MEC at ALDA-01, where MEC has been found in the debris layer that underlies the rocky surface. Additionally, beach sweeps would be conducted for as long as MEC is transported to the shoreline. Alternatives 7A and 7B, which include dredging Andrew Bay, have the greatest potential for reducing MEC at RAA-05. However, the process of dredging would damage kelp beds and negatively affect marine habitat.

Since Alternative 1 does not meet the threshold criteria, it is not considered further in this evaluation.

Compliance with ARARs. All alternatives are anticipated to comply with all identified ARARs, waivers are not anticipated.

Long-Term Effectiveness and Permanence. Alternatives 6A and 6B provide moderate long-term effectiveness and permanence because they reduce the overall volume of MEC, but do not address MEC in the offshore transport zone. Beach sweeps would be required for as long as MEC appears along the shoreline and seawall. Alternative 6B removes MEC to a depth of 4 feet at ALDA-01, which may be more effective than Alternative 6A, but the degree to which MEC is present in the deeper subsurface is highly

Table 13. Comparative Summary of Remedial Action Alternatives for RAA-05 (ALDA-01 and ALSW-01), OU B-2, Adak Island, Alaska

Key Tradeoffs	Alternative 6A – Beach Sweeps, MEC Removal to 2 Feet BTMS at ALDA-01 and RAA-specific LUCs	Alternative 6B – Beach Sweeps, MEC Removal to 4 Feet BTMS at ALDA-01 and RAA-specific LUCs	Alternative 7A – Dredging, Beach Sweeps, MEC Removal to 2 BTMS at ALDA-01 and RAA-specific LUCs	Alternative 7B – Dredging, Beach Sweeps, MEC Removal to Depth of Detection at ALDA-01 and RAA-specific LUCs
Advantages	• Eliminates detectable MEC hazards on the surface and in the subsurface of ALDA-01 to a depth of 2 feet bgs where it is most likely to be encountered by future land users. Although limited intrusive investigations took place at ALDA-01, occurrences of MEC are limited to the upper 2 feet with only one item found deeper than 6 inches • Technical approach straightforward and considered reliable. • An increase in cost of approximately $5.0 million (NPV) over the base case (No Action) adds removal of potential MEC in surface and subsurface soil at ALDA-01 to 2 feet and at the surface of the beach and terrestrial portions of ALSW-01.	• Eliminates detectable MEC hazards on the surface and in the subsurface of ALDA-01 to a depth of 4 feet bgs. Although limited intrusive investigations took place at ALDA-01, occurrences of MEC are limited to the upper 2 feet with only one item found deeper than 6 inches. • Technical approach straightforward and considered reliable. • The increase in cost over Alternative 6A to investigate anomalies detected below 2 feet bgs is approximately $188,000.	• Eliminates detectable MEC hazards on the surface and in the subsurface of ALDA-01 to a depth of 2 feet bgs where it is most likely to be encountered by future land users. Although limited intrusive investigations took place at ALDA-01, occurrences of MEC are limited to the upper 2 feet with only one item found deeper than 6 inches. • Addresses some of the MEC present in the offshore area at RAA-05. • Surface and subsurface MEC removal and beach sweep activities are straightforward and considered reliable.	• Eliminates detectable MEC hazards on the surface and subsurface of ALDA-01 to depth of detection. • Addresses some of the MEC present in the offshore area at RAA-05. • Surface and subsurface MEC removal and beach sweep activities are straightforward and considered reliable.
Disadvantages	• Requires continued beach sweeps to address MEC transported to the beach from the offshore source and LUCs and long-term management to restrict access to the area during the beach sweep period. Requires LUCs and long-term management to restrict intrusive activities and exposures to subsurface MEC present in the debris layer at depths greater than 2 feet in ALDA-01 during the post-beach sweep period. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Andrew Bay, Andrew Lake, and areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Does not address MEC present in the offshore area (Andrew Bay) at RAA-05.	• The debris layer containing MEC may be greater than 4 feet thick in some areas and deeper investigation of anomalies may not provide a greater level of certainty about MEC removal. • Requires continued beach sweeps to address MEC transported to the beach from the offshore source and LUCs and long-term management to restrict access to the area during the beach sweep period. Requires LUCs and long-term management to restrict intrusive activities and exposures to subsurface MEC present in the debris layer at depths greater than 4 feet in ALDA-01 during the post-beach sweep period. • Moderate short-term environmental impacts from excavating selected locations; particularly work being performed in the vicinity of Andrew Bay, Andrew Lake, and areas identified as wetlands. • Potential impacts to human health during excavation activities from increased handling of MEC from subsurface. • Requires use of more sophisticated equipment and specially trained operators. • Does not address MEC present in the offshore area at RAA-05.	• Given the uncertainty about the location and extent of offshore MEC, ongoing MEC mobility, dangerous working conditions and explosives risks to site workers during the dredging and MEC recovery operations, and impacts to the marine environment and ecology that are likely to result from dredging, the alternative is not likely to be more protective. • The process of dredging could damage kelp beds that could require decades to recover. • Dredging removes some MEC in the offshore area; however, the dynamic environment of Andrew Bay and limitation of underwater MEC identification and recovery operations would result in some MEC left behind at ALSW-01 and beach sweeps would still be required for an extensive period of time. • Potential impacts to human health during excavation and dredging activities from increased handling of subsurface MEC and offshore recovery operations. • Requires use of more sophisticated equipment and specially trained operators. Dredging operation would also require mobilization and use of specialized equipment (dredges, barges, material handling equipment, and support boats), requiring extensive coordination of resources. • The increase in cost over Alternatives 6A and 6B to dredge and remove MEC in the offshore area is approximately $164.0 and $163.8 million (NPV), respectively.	• Given the uncertainty about the location and extent of offshore MEC, ongoing MEC mobility, dangerous working conditions and explosives risks to site workers during the dredging and MEC recovery operations, and impacts to the marine environment and ecology that are likely to result from dredging, the alternative is not likely to be more protective. • The process of dredging could damage kelp beds that could require decades to recover. • Dredging removes some MEC in the offshore area; however, the dynamic environment of Andrew Bay and limitation of underwater MEC identification and recovery operations would result in some MEC left behind at ALSW-01 and beach sweeps would still be required for an extensive period of time. • Potential impacts to human health during excavation and dredging activities from increased handling of subsurface MEC and offshore recovery operations. • Requires use of more sophisticated equipment and specially trained operators. Dredging operation would also require mobilization and use of specialized equipment (dredges, barges, material handling equipment, and support boats), requiring extensive coordination of resources. • The increase in cost over Alternatives 6A and 6B to dredge and remove MEC in the offshore area is approximately $164.1 and $163.8 million (NPV), respectively.

Notes: Alternative 1 was not included in this table because it does not meet the threshold criterion of Overall Protection of Human Health and the Environment.

Steep slopes (slopes greater than 30 degrees) or areas of standing water are not considered accessible.

bgs – below ground surface
BTMS – below top of mineral soil
LUC – Land Use Control
MEC – munitions and explosives of concern
NPV – Net Present Value
RAA – Remedial Action Area

uncertain. Alternatives 7A and 7B both provide moderate long-term effectiveness and permanence because dredging would remove MEC in the offshore area. However, some MEC would be left behind in Andrew Bay and beach sweeps would still be required for an extended period.

Reduction of Toxicity, Mobility, or Volume through Treatment. Alternatives 6A and 6B provide a moderate reduction in the volume and mobility of MEC by removing it from the shoreline as well as the surface and subsurface at ALDA-01. However, they do not address the full thickness of the debris layer at ALDA-01 or MEC in the offshore area. Reduction of toxicity, mobility, and volume for Alternative 7A is also moderate because it addresses MEC in the offshore area, but it is unlikely to identify and recover all MEC that might be transported to the shoreline in the future. Alternative 7B received a high ranking because it has the greatest potential to reduce the volume and mobility of MEC.

Short-Term Effectiveness. Alternatives 6A and 6B provide moderate short-term effectiveness because they require a relatively short duration to remove MEC from ALDA-01 (1.5 to 2 months) and have limited impacts to vegetation. Annual beach sweeps would occur for the first few years and decrease as the frequency of MEC deposition decreases over time. Alternatives 7A and 7B have the potential for extensive short-term impacts (lowest short-term effectiveness rating) from dredging operations, including safety issues while working over water and damage to marine habitats. Also, the dredging Alternatives 7A and 7B could take seven full field seasons to complete.

Implementability. Alternatives 6A and 6B have high implementability because the beach sweep program has been in place for a number of years and MEC removal in the surface and subsurface at ALDA-01 relies on proven technologies with minimal potential for delay. Implementation of Alternatives 7A and 7B is difficult because of the offshore MEC removal component. Implementability of Alternative 7A is low and Alternative 7B received the lowest implementability rating because it requires additional time to investigate anomalies at deeper depths at ALDA-01.

Cost. Alternatives 6A and 6B have moderate costs ($5.0 million to $5.2 million NPV), whereas Alternatives 7A and 7B are costly ($169.0 million NPV).

SUMMARY OF PREFERRED CLEANUP ALTERNATIVES

This section describes the key information and differentiators used to identify the Navy's preferred cleanup alternatives for the OU B-2 RAAs. Table 14 lists the preferred cleanup alternatives recommended for each RAA based on their ability to provide the best balance of trade-offs with respect to the evaluation criteria. The Navy intends to perform a NTCRA at RAA-02, RAA-03, and RAA-04 prior to the completion of the ROD. The NTCRA will be consistent with the preferred remedies in this Proposed Plan.

- RAA-01 (OB/OD-01), RAA-02 (C1-01), RAA-03 East (RR-01 and HG-01), and RAA-03 West (MI-01, MI-02, and MI-03) – Alternative 3, Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs, for the following reasons:
  - Alternative 3 removes surface and subsurface MEC exposure hazards to the depths at which they are most likely to be present based on the previous intrusive investigations and the *conceptual site model* for these RAAs. Combined with LUCs, which limit activities that may extend below the maximum depth of clearance in areas of unresolved anomalies, this alternative provides adequate protection to human health and the environment for the expected future land use as a wildlife refuge.
  - The Navy believes that investigation and removal to a depth of 2 feet, with allowances for investigation of deeper anomalies based on site-specific conditions, will address the detectable MEC at these RAAs. To date, 100 percent of the MEC at these sites has been identified in the upper 2 feet of mineral soil. The Navy desires to reduce its operational footprint on Adak Island and acknowledges that Alternative 5 meets that objective more than Alternatives 3 or 4 (the difference being a permit program for intrusive activities). However, given the uncertainty of the MEC distribution, number of metallic saturated areas, and extensive areas of saturated soil, Alternative 3 provides appropriate protection with the least uncertainty regarding costs and time to complete the cleanup. This alternative (clearance to 2 feet BTMS) requires additional LUCs, prohibiting excavation, if unresolved anomalies remain. If during the course of field work, the additional removal to depth is found to be reasonably attainable within seasonal and budget constraints, the Navy would likely continue the anomaly removal to greater depth. Maintaining this flexibility based on the field conditions encountered during cleanup action implementation is critical when all considered alternatives are pro-

Table 14. Proposed Preferred Cleanup Alternatives, OU B-2, Adak Island, Alaska

Remedial Action Area	Proposed Preferred Cleanup Alternative
RAA-01 (OB/OD-01)	3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs
RAA-02 (C1-01)	3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs
RAA-03 West (MI-01, MI-02, and MI-03)	3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs
RAA-03 East (HG-01 and RR-01)	3 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 2 Feet BTMS) and LUCs
RAA-04 (SA93-01 and SA93-03)	4 – Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet BTMS) and LUCs
RAA-05 (ALDA-01 and ALSW-01)	6A – Beach Sweeps, MEC Removal to 2 Feet BTMS at ALDA-01 and RAA-specific LUCs

Notes:

BTMS – below top of mineral soil LUC – Land Use Control MEC – munitions and explosives of concern RAA – Remedial Action Area

tective of human health and the preferred alternative is most protective of the local environment.

- In addition to land use restrictions in areas of potentially unresolved anomalies, the LUC program will manage uncertainty and minimize explosive safety risks related to residual MEC through the educational awareness program, MEC discovery and management process, land transfer documentation used to maintain restrictions on intrusive site activities and Navy access for periodic inspections, and CERCLA 5-year reviews. Periodic reviews will be conducted to demonstrate that the cleanup action remains protective of human health, safety, and the environment. The Navy believes that LUCs are a reasonable and practical means of dealing with MEC uncertainty and are consistent with or exceed LUCs implemented elsewhere at Adak and at MEC sites in more populated areas of the United States. LUCs will be required for as long as MEC remains in the subsurface or until cleanup action is complete and RAOs and cleanup levels for unrestricted use/unrestricted exposure are attained.
- Alternative 3 would comply with corrective action and closure requirements for RAA-01 (OB/OD-01), as a RCRA interim status hazardous waste unit. No post-closure care (e.g., groundwater monitoring) would be required.
- Alternative 3 is consistent with the FFA, CERCLA, NCP, and *Executive Order 12580*, and complies with *U.S. Department of Defense (DoD) 6055.09-M* regarding protection of personnel.
- Site work approaches that address and protect cultural and natural resources would resolve potential conflicts with location- and action-specific ARARs. Resources that would be addressed include cultural resources identified at RAA-01 and RAA-03 East, Moffett Creek and related wetlands at RAA-01, RAA-03 East, and RAA-03 West, and fragile upland tundra and ephemeral streams at RAA-02. Site restoration activities would follow site work. Alternative 3 has less potential to affect these resources than Alternatives 4 or 5.
- The surface and subsurface MEC removal technologies are proven and reliable. Trained personnel and equipment are available to carry out the removal action. The current island-wide OU B-1 MEC educational awareness program can easily be adopted or enhanced for use at OU B-2, and resources to implement the remaining Alternative 3 LUC components are readily available.
- When the data for these four RAAs are reanalyzed, assuming implementation of Alternative 3, the ESHA score is A and the MEC HA score is 4. Both hazard evaluation results indicate the lowest relative hazard level and MEC conditions at these RAAs would be compatible with reasonably anticipated future land uses.

• **RAA-04 (SA93-01 and SA93-03)** – Alternative 4, Surface and Subsurface MEC Removal to Depth of Detection (Maximum of 4 Feet BTMS) and LUCs, for the following reasons:

- The rationale for selecting Alternative 4 for RAA-04 is the same as presented above for selecting Alternative 3 for RAA-01, RAA-02, RAA-03 East, and RAA-03 West, except that removal to 4 feet BTMS is preferred, because MEC was found at depths of up to 4 feet BTMS (3 items were found deeper than 2 feet in all of the investigations performed in OU B-2; all 3 were in this RAA). Therefore, investigation and removal to a depth of 4 feet, with allowances for investigation of deeper anomalies based on site-specific conditions, will address the detectable MEC at RAA-04. Such a removal meets or exceeds MEC clearance objectives elsewhere at Adak and at MEC sites in more populated areas of the United States.

- When the data for RAA-04 are reanalyzed, assuming implementation of Alternative 4, the ESHA score is A and the MEC HA score is 4. Both hazard evaluation results indicate the lowest relative hazard level, and MEC conditions at RAA-04 would be compatible with reasonably anticipated future land uses.

- **RAA-05 (ALDA-01 and ALSW-01)** – Alternative 6A, Beach Sweeps, MEC Removal to 2 Feet BTMS at ALDA-01 and RAA-specific LUCs, for the following reasons:
  - The beach sweeps will reduce the overall volume of surface MEC along the shoreline and seawall. Removal of detectable MEC to a depth of 2 feet in ALDA-01 also will reduce the overall volume of MEC beyond the depth of reasonable intrusion by future land users. Although the debris layer at ALDA-01 appears to be approximately 4 feet thick, rare occurrences of MEC are limited to the upper 1.5 feet. (To date, 100 percent of the MEC at ALDA-01 has been identified in the upper 2 feet of mineral soil.) The Navy believes that any MEC that may be present in the debris layer at greater depths will not be accessible to future land users, because heavy equipment is needed to penetrate even the upper few inches of the ground surface at ALDA-01, and there are no activities consistent with wildlife refuge use that involve excavation with heavy equipment. Resolving anomalies and removing MEC to a depth of 2 feet will limit the amount of MEC that could be exposed by erosion along the beach headwall and other sloped areas within ALDA-01. Any MEC that is exposed will be removed as part of the beach sweep program.
  - The RAA-specific LUCs will restrict access to the area and limit exposure to MEC at RAA-05 until MEC is no longer transported to and deposited on the shoreline and seawall, and beach sweeps are no longer required. The Navy will retain responsibility for the area and manage the LUCs during the beach sweep period.
  - The educational awareness program, MEC discovery and management process, land transfer documentation used to maintain restrictions on intrusive site activities and Navy access for periodic inspections, and CERCLA 5-year reviews will minimize explosive safety risks related to residual MEC at ALDA-01 and elsewhere at RAA-05. These components would also provide periodic reviews to demonstrate that the cleanup action remains protective of human health and the environment. LUCs will be required for as long as MEC remains in the subsurface or until cleanup action is complete and RAOs and cleanup levels for unrestricted use/unrestricted exposure are attained.
  - Alternative 6A is consistent with the FFA, CERCLA, NCP, and Executive Order 12580, and complies with DoD 6055.09-M regarding protection of personnel.
  - Site work approaches that address and protect cultural and natural resources would resolve potential conflicts with location- and action-specific ARARs. Cultural resources and shoreline and marine ecosystems would be addressed. Site work would include site restoration activities following MEC removal at ALDA-01.
  - The surface MEC removal technologies associated with Alternative 6A are proven and reliable. Trained personnel and equipment to carry out the removal action and components of RAA-specific LUCs are available.
  - When the data for RAA-05 are reanalyzed, assuming completion of beach sweeps and MEC removal to 2 feet at ALDA-01, the ESHA scores are C (ALDA-01) and A (ALSW-01) and the MEC HA scores are 4 (ALDA-01) and 4 (ALSW-01). The ESHA methodology does not account for conditions that might limit exposure to MEC at depth, such as the large rocks and cobbles at ALDA-01. Therefore, the ESHA score of C for ALDA-01 is highly conservative and likely overstates the hazard to potential future users. The MEC HA results indicate a lower relative hazard level, indicating that MEC conditions at RAA-05 possess a moderate potential for explosive hazard, but are considered safe for future land uses.

SUMMARY

Based on information currently available, the Navy believes the preferred alternatives meet the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. The Navy expects the preferred alternatives to satisfy the following statutory requirements of CERCLA Section 121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principle element.

COMMUNITY PARTICIPATION

The front page of this Proposed Plan provides the dates of the public comment period and the locations of the information repositories. The Navy, EPA, and ADEC will use comments from the public to help determine what action to take. We invite you to comment on this Proposed Plan. You may submit written comments during the public comment period by sending them via mail, fax, or email by the close of business on October 28, 2012 to:

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After considering public comments, the Navy, EPA, and ADEC will select the final cleanup alternatives. The preferred cleanup alternatives may be modified from the preferred alternatives presented in the Proposed Plan, based on public comments or new information. The ROD will describe the chosen cleanup alternatives. The Navy will respond to comments on the Proposed Plan in a responsiveness summary. The responsiveness summary will be part of the ROD, which will be available for review in the information repositories listed on the front page of this plan when completed.

For further information on OU B-2, please contact:

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GLOSSARY

Adak Stakeholders. All individuals or groups with regulatory, economic, or political interest in the cleanup or reuse of Adak Island.

Administrative Record. All the documents supporting a government agency's decision. The administrative record contains all documents, data, and descriptions of site-specific actions or observations that are used to make decisions about the site.

Anomalies. Possible MEC or other metallic debris identified by one or more geophysical techniques.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Also known as Superfund, this is a federal law authorizing action to respond to the release (or substantial threat of release) of hazardous substances that could present an imminent and substantial danger to public health or welfare into the environment. CERCLA emphasizes the cleanup of old/inactive hazardous substance sites. It does not include cleanup of petroleum, oil, and lubricant spills.

Conceptual Site Model. The conceptual site model is developed to provide a conceptual understanding of the site in order to evaluate potential risks to human health and the environment. The conceptual site model includes known and suspected sources of contamination, types of contamination and affected media, known and potential routes of migration, and known or potential human and environmental receptors.

Depth of Detection. The maximum depth below the ground surface that MEC or other metallic debris can be detected.

Discarded Military Munitions (DMM). Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include *unexploded ordnance* (UXO), military munitions that are being held for future use or planned disposal, or military munitions that have been properly destroyed consistent with applicable environmental laws and regulations.

Engineering Controls (ECs). Measures that are used to eliminate or reduce exposure to a chemical or physical hazard. ECs include containing contamination, and/or physical barriers that limit access to property or exposure to contamination. Examples of ECs include caps or other physical barriers, locked gates, fences, and posted signs.

Executive Order 12580. This executive order contains a very detailed list of various Presidential responsibilities delegated under CERCLA to various officials in Federal department agencies. Among the types of authorities delegated are response action oversight, enforcement, liability determinations, litigation, and Superfund management. In particular, the executive order gives the heads of agencies jurisdiction over releases or threatened releases from a vessel or facility under the control of that agency or department.

Explosive Safety Hazard Assessment (ESHA). An evaluation tool developed by the OU B-2 Project Team to assess the explosive hazards posed by MEC on Adak.

Federal Facilities Agreement (FFA). An agreement between the Navy, EPA, and the ADEC that ensures the environmental impacts associated with past and present activities at the facility are thoroughly investigated and appropriate cleanup actions are taken to protect the public health, welfare, and the environment.

Frost Heave. Frost heave occurs when soil expands and contracts because of freezing and thawing. Buried solid items, such as MEC, can move to the surface over time through repeated freezing and thawing cycles.

Geophysical. Pertaining to a group of magnetic, electromagnetic, or other tools that are used to help interpret the subsurface conditions at a site.

Geophysical Investigation. Investigation of the subsurface using a group of magnetic, electromagnetic, or other equipment to interpret the underground conditions at a site without digging.

Hazard Index. A measure of the noncarcinogenic hazard from exposure to a chemical, calculated as the sum of the ratio of estimated exposure to a chemical from a site to the estimated safe dose level of the chemical for all chemicals.

Institutional Controls (ICs). ICs are legal or administrative tools or actions taken to reduce the potential for human exposure to hazardous substances and/or protect the integrity of the cleanup action. ICs are imposed to ensure that ECs stay in place, or to ensure that restrictions on land use stay in place. ICs may include soil excavation and groundwater use restrictions, community education, inspections and maintenance, and reporting.

Interim Status. Facilities that treat, store, and/or dispose of hazardous waste must obtain a RCRA permit. Facilities that have not yet received a permit to operate must comply with the self-implementing interim status standards of RCRA.

Intrusive Investigation. Digging and identifying buried items, including MEC or other metallic debris, by an explosives ordnance technician.

Land Transfer Agreement. An agreement to transfer land ownership from one party to another. The agreement may restrict certain activities on the land.

Land Use Controls (LUCs). LUCs may include ICs, ECs, or a combination of both. See definitions for ICs and ECs.

Munitions and Explosives of Concern (MEC). Items or materials found to contain explosives that pose a potential explosive safety risk. MEC is divided into three subcategories: UXO, *discarded military munitions* (DMM), and explosive munitions constituents (MC).

Munitions Constituents (MC). Any materials originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials as well as the emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris (MD). Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

National Contingency Plan (NCP). The National Oil and Hazardous Substances Pollution Contingency Plan is the federal government's blueprint for responding to oil spills and hazardous substance releases. The NCP provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.

National Priorities List (NPL) A federal list of hazardous waste sites requiring cleanup through the CERCLA program.

Net Present Value (NPV). By discounting costs that occur over different time periods to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative. When calculating present value cost for CERCLA sites, total operations and maintenance costs are included.

Non-Time Critical Removal Action (NTCRA). NTCRAs are conducted at Superfund sites when the lead agency determines, based on the site evaluation, that a removal action is appropriate, and a planning period of at least six months is available before on-site activities must begin. Because NTCRAs can address priority risks, they provide an important method of moving sites more quickly through the Superfund process.

Ordnance. All components related to munitions that were designed to cause damage to personnel or property through explosive force, incendiary action, or toxic effects.

Operable Unit (OU). A separate unit or geographic subarea of a site based on geography, geology, or type of contaminants, which is investigated and evaluated separately from other units at the site.

Permeability. A measure of how easily water passes through soil. The greater the permeability, the more easily water moves through soil.

Preliminary Assessment. A limited investigation, based primarily upon existing information, that is intended to identify sites that pose a significant threat to human health and the environment.

Proposed Plan. A document used to facilitate public involvement in the process of selecting a preferred cleanup alternative. The document presents the lead agency's preliminary recommendation of how best to address contamination at the site, presents alternatives that were evaluated, and explains why the lead agency recommends the preferred alternative.

Record of Decision (ROD). A legal document describing the cleanup actions selected for a site.

Remedial Investigation/Feasibility Study (RI/FS). A study to determine the nature and extent of contamination at a hazardous waste site that identifies and evaluates cleanup alternatives for contamination.

Resource Conservation and Recovery Act (RCRA). A federal law authorizing EPA to control hazardous waste from the "cradle to grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework to manage non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances.

State-Adak Environmental Restoration Agreement (SAERA). An agreement between the Navy and the ADEC to implement site characterization and remediation of petroleum sites on Adak.

Superfund Amendments and Reauthorization Act of 1986 (SARA). Modifications to CERCLA enacted on October 17, 1986.

Unexploded Ordnance (UXO). Military munitions that have been primed, fuzed, armed or otherwise prepared for action; have been fired, placed, dropped, launched or projected in such a manner as to constitute a hazard to operations, installations, personnel, or material; and remain unexploded either by malfunction, design, or any other cause.

U.S. Department of Defense (DoD) 6055.09-M. DoD standard that establishes policies and procedures necessary to provide protection to personnel as a result of DoD ammunition, explosives, or chemical agents contamination of real property currently or formerly owned, leased, or used by DoD.

ACRONYMS

ADEC	Alaska Department of Environmental Conservation
AMNWR	Alaska Maritime National Wildlife Refuge
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BTMS	below top of mineral soil
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DoD	U.S. Department of Defense
EC	Engineering Control
EPA	U.S. Environmental Protection Agency
ESHA	Explosive Safety Hazard Assessment
FFA	Federal Facilities Agreement
FS	Feasibility Study
HA	Hazard Assessment
IC	Institutional Control
LUC	Land Use Control
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
NAVFAC NW	Naval Facilities Engineering Command Northwest
NCP	National Contingency Plan
NPL	National Priorities List
NPV	net present value
NTCRA	Non-Time Critical Removal Action
O&M	operation and maintenance
OB/OD	open burn/open detonation
OU	Operable Unit
RAAs	Remedial Action Areas
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
SAERA	State-Adak Environmental Restoration Agreement
SARA	Superfund Amendments and Reauthorization Act of 1986
TAC	The Aleut Corporation
USFWS	U.S. Fish and Wildlife Service
USC	United States Code
UXO	unexploded ordnance

COMMENT FORM

Your Name: _____

Your Address: _____

Your Phone Number: _____

Email Address: _____

Comments: _____

Please mail, fax, or email comments on this Proposed Plan to:

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If you have special needs or require this document in an alternate form, please call Justin Peach at (360) 396-0082.

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