ENGINEERING EVALUATION/COST ANALYSIS REPORT
RIFLE GRENADE RANGE (RG-01)
FORMER NAVAL AIR FACILITY
ADAK ISLAND, ALASKA

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APPENDICES

Appendix A: Cost Breakdowns and Assumptions
LIST OF ACRONYMS

A/PIA  Aleutian/Pribilof Islands Association
ADEC  Alaska Department of Environmental Conservation
ARAR  Applicable or Relevant and Appropriate Requirements
ARC   Adak Reuse Corporation
BRAC  Base Realignment and Closure
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
CFR   Code of Federal Regulations
CRP   Community Relations Plan
CSM   Conceptual Site Model
DMM  Discarded Military Munitions
DoD   Department of Defense
DOI   Department of Interior
DQO  Data Quality Objective
EE/CA Engineering Evaluation/Cost Analysis
EOD  Explosive Ordnance Disposal
ESHA  Explosive Safety Hazard Assessment
FFA  Federal Facility Agreement
MD   Munitions Debris
MEC  Munitions and Explosives of Concern
MRS  Munitions Response Site
NAF  Naval Air Facility
NAS  Naval Air Station
NAVFAC NW Naval Facilities Engineering Command, Northwest
NAI  No Action Indicated
NCP  National Oil and Hazardous Substances Pollution Contingency Plan
NTCRA Non Time Critical Removal Action
OU   Operable Unit
PCB  Polychlorinated biphenyl
PPE  Personal Protective Equipment
QC   Quality Control
RAB  Restoration Advisory Board
RCRA Resource Conservation and Recovery Act
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG-01</td>
<td>Former Rifle Grenade Range</td>
</tr>
<tr>
<td>RI/FS</td>
<td>Remedial Investigation/Feasibility Study</td>
</tr>
<tr>
<td>ROD</td>
<td>Record of Decision</td>
</tr>
<tr>
<td>RPM</td>
<td>Remedial Project Manager</td>
</tr>
<tr>
<td>SOW</td>
<td>Statement of Work</td>
</tr>
<tr>
<td>TAC</td>
<td>The Aleut Corporation</td>
</tr>
<tr>
<td>TBC</td>
<td>To Be Considered</td>
</tr>
<tr>
<td>USAE</td>
<td>USA Environmental, Incorporated</td>
</tr>
<tr>
<td>USEPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>UXO</td>
<td>Unexploded Ordnance</td>
</tr>
</tbody>
</table>

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EXECUTIVE SUMMARY

As a result of past United States Navy (U.S. Navy) use of the former Rifle Grenade Range (RG-01), munitions and explosives of concern (MEC) may be present at the site and may constitute an explosive safety risk to the public, site personnel, and the environment. Some examples of MEC include: (1) unexploded ordnance (UXO), which are military munitions that have been fuzed and fired, but did not exploded either because of malfunction, design, or any other causes; (2) discarded military munitions (DMM), which are military munitions that have been abandoned without proper disposal; and (3) munitions constituents, which are materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Due to the catastrophic hazard rating of the MEC known to exist on the munitions response site (MRS) RG-01, there has been no formal field investigation performed within this project area. Because of the high potential hazard associated with the MEC known to exist at this project site, the U.S. Navy has elected to accelerate the response action for this installation in advance of completion of a Record of Decision (ROD) for all Operable Unit B-2 (OU B-2) sites, beginning with the MRS RG-01 site. As required by 40 Code of Federal Regulations (CFR) section 300.415(b)(4)(i), this Engineering Evaluation/Cost Analysis (EE/CA) is conducted to analyze the removal alternatives for RG-01. The development of this EE/CA report is based almost entirely on existing data collected from the Community Relations Plan, administrative record, and information repository for the former Adak Naval Complex.

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Federal Facilities Agreement (FFA), the U.S. Navy is required to complete all necessary remedial actions for site areas within OU B-2 on Parcel 4 of the former Adak Naval Complex located at Adak Island, Alaska. Among these areas is the former Rifle Grenade Range - 01, which has been designated as MRS RG-01. The objective of the accelerated response action for this site is to remove all MEC and Munitions Debris (MD) from this site as necessary to support the reasonably anticipated future use of the site. The U.S. Navy intends to use its lead agency authority under CERCLA to perform the response action using guidance for performance of a Non Time Critical Removal Action (NTCRA).

The Department of the Navy, Naval Facilities Engineering Command, Northwest (NAVFAC NW) tasked USA Environmental, Incorporated (USAE) to perform an MEC EE/CA to identify and recommend the best response action alternative for the NTCRA of RG-01.

USAE developed this EE/CA report in accordance with the requirements of CERCLA (as amended) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Section 6 of this EE/CA report provides an analysis of munitions response alternatives, and Section 8 provides details of the recommended response alternative(s) in support of the NTCRA for RG-01.

SUMMARY OF THE SOURCE, NATURE, AND EXTENT OF MEC PRESENCE

Adak Island was reserved as part of the Aleutian Island National Wildlife Refuge by Executive Order in 1913. Adak remained largely unoccupied until August 1942 when U.S. forces (U.S. Air Force and U.S. Navy) established an air base and staging area to support operations against Japanese installations on nearby Kiska and Attu Islands. After the War, the U.S. Air Force used these facilities until 1951, when it became Naval Air Station (NAS) Adak under control of the U.S. Navy. The NAS Adak was re-designated as the Naval Air Facility (NAF) by the 1993 Base Realignment and Closure (BRAC) Commission, and later selected for closure by the-1995 BRAC Commission. The military mission on the Adak Island ended in March of 1997. Since then the Adak Island population has fluctuated between 100 and 1,000 persons. Currently, there are less than 70 people residing on the Adak Island. Among these are people involved with environmental remediation and scientific research work. The Adak Reuse Corporation (ARC) is now actively marketing the economic reuse of Adak. An ordnance survey accomplished in 1996 by Navy
Explosive Ordnance Disposal (EOD) Mobile Unit Eleven Detachment Whidbey Island personnel indicated that UXO is present in many areas of Adak Naval Complex, including the MRS RG-01.

Based on the historical data collected, the specific types of munitions used in the MRS RG-01 have been considered very sensitive and extremely dangerous. In accordance with the Draft Final Remedial Investigation/Feasibility Study (RI/FS) for Operating Unit (OU) B-2, dated 18 June 2004, to date the area within MRS RG-01 has been considered too hazardous to enter. Historically, the EOD activity on the former Adak Naval Complex has responded to reports of dud-fired rounds of 40mm grenades within this former range. On 10 July 1973, four dud-fired 40mm grenades were reported and not located. On 12 August 1980, one dud-fired 40mm grenade was reported, and again not located. On 20 August 1980, two dud-fired 40mm grenades were reported as part of the Marine training exercise. The report also indicated that 3 pounds of TNT were set off near the area where the grenades were thought to have fallen. On 31 October 1989, EOD personnel found one 60mm mortar and one 81mm mortar while clearing a path for target construction. It has been assumed that all these MEC items encountered remained on the RG-01 site because their final dispositions were unknown or not reported.

SUMMARY OF SITE CONDITIONS

The RG-01 project site is located within the historical range area of the former Adak Naval Complex located on the western side of Andrew Lake. RG-01 encompasses 16 acres of the OU B-2 Parcel 4 area, forming a trapezoid shaped area with the wider end situated at the historical firing area on the eastern side of the range. The eastern portion of RG-01 is relatively flat and marshy with areas of standing (or running) water throughout. The western end of RG-01, where the targets were located, is comprised of a relatively steep hillside, which served as a backstop for the former range. Unpaved gravel roads running up to the firing line provide the only access to RG-01. This road branches from the access road to the larger range area on the western side of Andrew Lake.

Currently, there is a locked gate at the south end of Andrew Lake preventing the public from entering the former range areas west of the lake, and blocking access to the road leading out to the former rifle grenade range or RG-01 area. Since the access is restricted, there is currently no public use of the site. The current and likely near-term land use is a Restricted Access Military Reservation. RG-01 has not been the subject of any formal investigation to date due to the catastrophic hazard from the potential ordnance items.

SUMMARY OF RECOMMENDED ALTERNATIVE(S)

Five alternatives were evaluated using the type, quantity, location, and depth of MEC and MD; past, current, and future land use; and input from local agencies, stakeholders, and the community.

- Alternative 1, No Action Indicated, was considered as not appropriate because the risk assessment requires action.
- Alternative 2, Institutional Controls, was considered an appropriate alternative, but as a stand-alone alternative it does not satisfactorily address the long-term risk and may not be acceptable to the stakeholders.
- Alternative 3, Surface Removal of MEC and MD, was considered an appropriate response action.
- Alternative 4, Surface and Subsurface Removal of MEC and MD, was considered an appropriate response action.
- Alternative 5, Construction Support, was considered as not applicable because there are no future plans for development of the site.

Alternative 4 supplemented with Alternative 2 are recommended as this combination represents the most appropriate response for RG-01. Alternative 3 was considered in place of Alternative 4 in this evaluation,
but since the additional cost was only 17%, Alternative 4 was selected over Alternative 3. Alternative 4 includes 100% surface and subsurface removal of MEC and MD, metal detector-assisted, to depth of detection, from the entire 16 acres of the RG-01 project area. Alternative 2 involves continuation of the Institutional Control program currently in place. The estimated cost for these recommended response actions are provided in following sections. Detailed cost breakdowns for all response alternatives are provided in Appendix B of this EE/CA report. The selection of Alternative 4 as the prime response action for RG-01 is based on the following reasons:

- The presence of dangerous MEC, (40mm grenades, 60mm mortars, and 81mm mortars) suggests a bias toward a removal action.
- This alternative is ranked highest in terms of effectiveness and protection of public safety over the long term.
- This alternative can be obtained for a slightly higher cost (17 percent) than Alternative 3 Surface Removal.
- Stakeholders and regulators would consider Alternative 4 as the most acceptable response alternative.

Institutional Controls, including Recurring Review programs for the formal Adak Naval Complex have already been established, are currently active, and will continue after the MEC removal actions are completed. The costs associated with the existing Institutional Controls and Recurring Reviews are assumed to remain at current levels being incurred on Adak for the performance of MEC awareness programs.

SUMMARY OF RECURRING REVIEW PLAN

Residual Risk Management: Once the recommended MEC response actions have been implemented, the potential for encountering MEC will still exist. Members of the public will be instructed to contact the local Adak Island officials if they encounter MEC at RG-01. If recurring MEC responses are initiated, the U.S. Navy will determine the need for further action and review the selected response action(s).

Recurring Reviews: The U.S. Navy will retain responsibility for the residual risk following response actions and will perform recurring reviews of RG-01. The U.S. Navy will coordinate recurring reviews with regulators and stakeholders at five-year intervals to assess the effectiveness and reliability of the implemented response actions and evaluate the need for additional reviews. The U.S. Navy may conduct additional reviews if:

- New information and discoveries identify additional public safety risks at the site;
- A change occurs that opens restricted areas to the public, which were previously closed due to deed restrictions; or
- Major events (e.g., flooding, storms, and fires) at the RG-01 resulted in the exposure of buried MEC.

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1.0 INTRODUCTION

As a result of past U.S. Navy use of RG-01, MEC may be present at the site and may constitute an explosive safety risk to the public, site personnel, and the environment. Some examples of MEC include: (1) UXO, which are military munitions that have been fuzed and fired, but did not explode either because of malfunction, design or any other causes; (2) DMM, which are military munitions that have been abandoned without proper disposal; and (3) munitions constituents, which are materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Due to the catastrophic hazard rating of the MEC identified to exist on RG-01, there has been no formal field investigation performed within this project area. Because of the high potential hazard associated with the MEC known to exist at this project site, the U.S. Navy has elected to accelerate the response action for this installation in advance of completion of a ROD for all OU B-2 sites, beginning with the RG-01 site. As required by 40 CFR section 300.415(b)(4)(i), this EE/CA is conducted to analyze the removal alternatives for RG-01. The development of this EE/CA report is based on existing data collected from the Community Relations Plan, administrative record, and information repository for the former Adak Naval Complex. This EE/CA is developed in accordance with the requirements and guidance contained in NOSSA INST 8020.15 (8 March 2004) and EP 1110-1-18 (24 April 2000).

1.1 REGULATORY FRAMEWORK/AUTHORIZATION

Under CERCLA and the FFA, the U.S. Navy is required to complete all necessary remedial actions for site areas within OU B-2 on Parcel 4 of the former Adak Naval Complex located at Adak Island, Alaska. Among these areas is the former Rifle Grenade Range - 01, which has been designated as RG-01. The objective of the accelerated response action for this site is to remove all MEC and MD from this site as necessary to support the reasonably anticipated future use of the site. The U.S. Navy intends to use its lead agency authority under CERCLA to perform the response action using guidance for performance of a NTCRA.

The NAVFAC NW tasked USAE to perform an EE/CA and generate a report to identify and recommend the best response action alternative for the NTCRA of RG-01.

USAE developed this EE/CA report in accordance with the requirements of the CERCLA (as amended) and the NCP. Section 6 of this EE/CA report provides an analysis of munitions response alternatives, and Section 8 provides details of the recommended response alternative(s) in support the NTCRA for RG-01.

1.2 PURPOSE AND SCOPE

The purpose of this EE/CA is to characterize potential MEC risks at RG-01 and develop appropriate response alternatives to reduce those public safety risks associated with MEC. This EE/CA report documents the existing data collected and analyzed to perform the site characterization, presents the results of the site characterization, provides an analysis of munitions response alternatives, and recommends an appropriate response action for RG-01 based on the response action effectiveness, implementability, and cost. As this EE/CA is based on the site historical data and previous study only, there was no formal field study activities performed (e.g., field reconnaissance, geophysical investigation, and interviews) due to the catastrophic hazard from the potential ordnance items.

The USAE project team applied the Explosive Safety Hazard Assessment (ESHA) developed for Area RG-01 under the 2004 RI/FS. The response alternatives identified from this EE/CA will be used to support a NTCRA for the RG-01 site. Figure 1-1 depicts the area for RG-01.
Former Rifle Grenade Range
MRS RG-01
ESHA Area
Adak Island, Alaska

Figure 1-1

Data is projected to the Alaska State Plane Coordinate System: NAD83, Units in Feet.

Path: S:\Adak\ArcMap\ESHA Map.mxd
1.3 PROJECT TEAM

The EE/CA project team consisted of the NAVFAC NW and USAE. The roles of the project team members are described in the following subsections.

1.3.1 NAVAL FACILITIES ENGINEERING COMMAND, NORTHWEST

NAVFAC NW is the lead project management and funding agency for this project. The NAVFAC NW responsibilities include performing the review and approval of project documents and support USAE with public notice and community relation activities. All community relations associated with the development of this EE/CA are coordinated through the U.S. Navy Remedial Project Manager (RPM).

1.3.2 USA ENVIRONMENTAL, INCORPORATED

USAE is the prime contractor to the NAVFAC NW. USAE provides comprehensive munitions response services, engineering, project management, and quality control (QC) support services for the EE/CA for the RG-01 site. USAE is responsible for managing the project deliverables, schedules, and budget to ensure accurate and on-time completion of the EE/CA tasks as detailed in the Statement of Work (SOW).

1.4 SUMMARY OF PUBLIC PARTICIPATION

CERCLA and U.S. Navy policy requires the involvement of the local community throughout the remediation process. The future development and use of the site has a direct influence on the life and livelihood of the public, including landowners or those with a financial or business interest. All community relations during the development of this EE/CA were coordinated through the U.S. Navy RPM. As there is no formal field activity for this EE/CA, public involvement and participation is limited to the review and comment of the draft and draft final EE/CA report.

As part of the public involvement element of the EE/CA, the U.S. Navy will issue this EE/CA Report for RG-01 for public review and comment. If required, the U.S. Navy will schedule a public meeting to present the findings of the EE/CA and publish a notice of the availability of this document. The U.S. Navy will hold a 30-day public comment period. Responses to the public’s comments received during this period will be presented in the Responsiveness Summary (Appendix G), which will become a part of this EE/CA final report.

Following approval of the Final EE/CA Report, the U.S. Navy will issue an EE/CA Action Memorandum and conduct a public meeting (if required) to present the selected munitions response action for the RG-01 site.

1.5 OTHER ENVIRONMENTAL CONTAMINATION

No other environmental contamination has been identified or reported within the RG-01 site.
2.0 SITE DESCRIPTION

Adak Island is located approximately 1,300 air miles southwest of Anchorage, Alaska in the Aleutian Island chain and encompasses 280 square miles.

2.1 SITE LOCATION

The RG-01 project area is located within the historical range area of the former Adak Naval Complex located on the western side of Andrew Lake. The RG-01 site encompasses 16 acres of the OU B-2 Parcel 4 area, forming a trapezoid shaped area with the wider end situated at the historical firing area on the eastern side of the range. The eastern portion of RG-01 is relatively flat and marshy with areas of standing (or running) water throughout. The western end of RG-01, where the targets were located, is comprised of a relatively steep hillside, which served as a backstop for the former range. Unpaved gravel roads running up to the firing line provide the only access to RG-01. This road branches from the access road to the larger range area on the western side of Andrew Lake.

Currently, there is a locked gate at the south end of Andrew Lake (Parcel 4 is partially fenced) preventing the public from entering the former range areas west of the lake and blocking access to the road leading out to the rifle grenade range. Since the access is restricted, there is currently no public use of the site. The ultimate future land use will be for wildlife management. Recreational activities related to access for hunting and hiking on Mount Moffett are also anticipated. The current and likely near-term land use is a Restricted Access Military Reservation. RG-01 has not been the subject of any formal investigation to date. Figure 2-1 depicts the location of RG-01.

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Data is projected to the Alaska State Plane Coordinate System: NAD83, Units in Feet.

Former Rifle Grenade Range
MRS RG-01
Location Map

Adak Island, Alaska

Figure 2-1

Adak
Adak Naval Air Station
RG-01
Andrew Lake OB/OD
Paracel 4 Boundary

USA Environmental, Inc.

Drawn By: WAC       Scale: Varies   Rev: 1
Checked By: MS      Date Drawn: 02-07-2006
Submitted By:        Revision Date: 08-01-2006
Path: S:\Adak\ArcMap\rgr_location.mxd
2.2 PHYSICAL DESCRIPTION

2.2.1 TOPOGRAPHY

The topography of RG-01 is typical of northern Adak Island, which is directly related to its volcanic origin from Mount Adagdak to the east and Mount Moffett to the west. However, the RG-01 site lies within the eastern flanks of Mount Moffett, which rises 2,072 feet above the RG-01 site and covers a good portion of the northern peninsula. Two seasonal streams, with a summer depth of approximately 6 inches, flow across the site to nearby Clam Lagoon.

2.2.2 CLIMATE

The mean monthly temperature ranges from a low of 32.9 degrees Fahrenheit (°F) in February to a high of 51.3°F in August. The highest recorded temperature on the island is 75°F in August 1956 and the lowest temperature recorded is 3°F in January 1963 and February 1964. The transformation of southward-flowing arctic air crossing warm water near the Aleutians, results in violent high winds and snow squalls. The “Williwaws” or sudden wind storms are especially common in mountainous areas during the summer months, with peak wind speeds varying between 60 and 100 knots. Prevailing winds are from the west at an average velocity of 15 knots. Average monthly rainfall during the summer ranges from 3-6 inches. Warm moist air from the North Pacific spreads over the cool water during the summer months, producing extensive rain and fog with reduced visibility. The climate is characterized by persistently overcast skies, high winds, and frequent wind storms originating in the Northern Pacific Ocean and Bering Sea.

2.2.3 VEGETATION, GEOLOGY, AND SOILS

The native vegetation of Adak Island is that of a terrestrial-maritime tundra ecosystem (Figure 2-2). Soil at the site is primarily volcanic gravel with high moisture content. Tundra cover may be up to 2.5 feet thick in portions of Adak Island. However, based on a site visit in October 2005, tundra cover within RG-01 is estimated to range from no cover to 2 to 4 inches thick. Plant communities are treeless and dominated by herbaceous vegetation consisting mostly of mixed grasses, sedges, forbs, and low-growing woody heaths with lichens and mosses. Adak Island is lushly vegetated from sea level to about 1,000 feet above mean sea level.

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2.2.4 HYDROLOGY

The surface water hydrology within RG-01, which is part of the northern portion of Adak Island, is characterized by short, steep-gradient streams, draining radially from Mount Moffett (Figure 2-3) and other upland areas. Perennial flow is maintained by snow melt in the mountains and groundwater seepage from the shallow surficial soils. Numerous lakes and sediment deposits occur along stream courses.

Much of the upland area of RG-01 is covered by a composite layer of weathered volcanic ash, which generally minimizes the amount of rain or snow that permeates deeper than the vegetative mat on the surface. If the layer of soil under the vegetation is thin, precipitation tends to run off as surface water or stream flow. If the soil under the mat of vegetation is thick, precipitation will penetrate the soil until it reaches the ash layer. At that point, the precipitation becomes shallow groundwater that flows beneath the vegetative mat toward discharge areas such as springs or seeps. Deposits of volcanic gravel, known as lahar, may be underlying the ash layer, which is underlain by bedrock in some areas.
2.3 HISTORY

Adak Island was reserved as part of the Aleutian Island National Wildlife Refuge by Executive Order in 1913. Adak remained largely unoccupied until August 1942, when U.S. forces (U.S. Air Force and U.S. Navy) established an air base and staging area to support operations against Japanese installations on nearby Kiska and Attu Islands. Figure 2-4 is a photo of typical active operations at the former Adak Naval Complex in the 1940’s.

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After World War II, the U.S. Air Force used these facilities until 1951, when it became NAS Adak under control of the U.S. Navy. The NAS Adak was re-designated as the NAF by the 1993 BRAC Commission, and later selected for closure by the 1995 BRAC Commission. The military mission on the Adak Island ended in March of 1997. Since then, the Adak Island population has fluctuated between 100 and 1,000 persons. Currently, there are less than 70 people residing on Adak Island, which includes people involved with environmental remediation and scientific research work. The ARC is now actively marketing the economic reuse of Adak. An ordnance survey completed in 1996 by Navy EOD Mobile Unit Eleven Detachment Whidbey Island personnel, indicated that UXO is present in many areas of Adak Naval Complex, including RG-01.

Based on the historical data collected, the specific types of munitions used at RG-01 have been considered very sensitive and extremely dangerous. In accordance with the Draft Final Remedial Investigation/Feasibility Study (RI/FS) for Operating Unit (OU) B-2, dated 18 June 2004, to date RG-01 has been considered too hazardous to enter. Historically, EOD activity on the former Adak Naval Complex has responded to reports of dud-fired rounds of 40mm grenades within this former range. On 10 July 1973, four dud-fired 40mm grenades were reported and not located. On 12 August 1980, one dud-fired 40mm grenade was reported, and again not located. On 20 August 1980, two dud-fired 40mm grenades were reported as part of the Marine training exercise. The report also indicated that 3 pounds of TNT were set off near the area where the grenades were thought to have fallen. On 31 October 1989, EOD personnel found one 60mm mortar and one 81mm mortar while clearing a path for target construction It has been assumed that all MEC items encountered, remained on the RG-01 site because their final dispositions are unknown or not reported. Figure 2-5 provides general location of these MEC items within RG-01 reported from 1973 to 1989.
2.4 CURRENT AND REASONABLY ANTICIPATED FUTURE SITE USE

2.4.1 SITE ACCESS

Currently, there is a locked gate at the south end of Andrew Lake preventing the public from entering the former range areas west of the lake, and blocking access to the road leading out to the former rifle grenade range or RG-01 area (Figure 2-6). Since RG-01 is part of the Parcel 4 Restricted Access Military Reservation, public access is restricted and RG-01 has not been the subject of any formal investigation to date due to the catastrophic hazard from the potential ordnance items.

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2.4.2 CURRENT LAND USE

The RG-01 site is within the boundary of Parcel 4 and currently retained by the U.S. Navy, which intended to maintain all of Parcel 4 as an access restricted area until completion of all remedial actions on all OU B-2 sites. For the purposes of the real estate associated with the OU B-2 sites, the statutorily defined land use is wildlife refuge.

2.4.3 REASONABLE ANTICIPATED FUTURE LAND USE

The U.S. Navy intends to manage all Parcel 4 areas as a “Restricted Access Military Reservation”.

2.5 NATURAL RESOURCES

A natural resource management plan for Adak (USDA, 1990) guides implementation of the natural resources management program. Elements of the natural resource program are discussed in the following sections.

2.5.1 WILDLIFE

The diversity of wildlife inhabiting Adak Island is relatively low because of the harsh climatic conditions and relative lack of vegetation structure. The following sections briefly describe Adak Island wildlife. For greater detail about the species found on Adak Island, please see the Ecological Survey of Potentially

2.5.1.1 Vertebrates

Marine mammals in the bays and harbors of Adak Island, either year-round or on a migratory basis, include the harbor seal, orca, northern harbor porpoise, Dall’s porpoise, sperm whale, Baird’s beaked whale, goosebeaked whale, minke whale, fin whale, humpback whale, right whale, sea otter, and Steller’s sea lion.

Land mammals on the Island include feral cats, caribou, and Norway rats, all of which were introduced. Adak is home to numerous avian species, including bald eagles. Many of the birds that use Adak Island as habitat do so seasonally.

The aquatic species in Adak Island’s rivers and lakes include a variety of salmon. In 1993 and 1994, a USFWS survey found pink salmon (in 50 of 57 streams), coho salmon (in 38 of 57 of streams), sockeye salmon (at low numbers in 15 of 57 streams), chum salmon (at low numbers in 11 of 57 streams), Dolly Varden, and three-spine stickleback (URS 1997 and USFWS 1995).

2.5.1.2 Invertebrates

There is a wide variety of spineless sea creatures and insects on Adak Island. The terrestrial and aquatic invertebrate community is a critical component of the ecosystem. Sea urchins, mussels, other bivalves, and other species inhabit the near shore seas and aquatic environments. Insects of many types live in numerous habitats, from the tundra to the streams.

2.5.1.3 Threatened and Endangered Species

The Aleutian Canada goose, a former threatened species that is currently monitored under the Endangered Species Act, does not nest on Adak Island but occasionally stops there during migration. The federally endangered short-tailed albatross may be found offshore of Adak occasionally, but is unlikely to be found in near shore waters.

The Steller’s sea lion is currently listed as federally endangered. This marine mammal’s habitat includes ocean areas, rookeries, and haulouts. The known rookery and haulout on Adak Island are near Cape Yakak on the Island’s southwest side, within the wildlife refuge.

The Aleutian shield fern, a federally endangered plant, has its sole habitat on Mt. Reed, where fewer than 130 plants exist (Boone, 1995). Mt. Reed is southwest of downtown Adak.

2.6 CULTURAL RESOURCES

The status of historical and archaeological resources on Adak Island is described in the following sections. The majority of the cultural resources are located in downtown Adak.

2.6.1 WORLD WAR II-ERA RESOURCES

The Historic and Archeological Resources Protection (I-L4RP) Plan found that the Adak Naval Complex contains three National Register of Historic Places (National Register) resources from World War II. The three National Register resources are as follows:
• The Adak Army Base and Adak Naval Operating Base National Historic Landmark (listed on the National Register).
• The Old Chapel, sometimes referred to as the Bering Chapel, Navy Facility T-4182, and Alaska Heritage Resources Survey number ADK-155 (eligible for the National Register but has not been formally listed).
• The Adak World War II Cultural Landscape Historic District (eligible for the National Register but has not been formally listed).

2.6.2 NATIONAL HISTORIC LANDMARK

The National Historic Landmark is part of the National Landmarks Program, which is separate from, but similar to, the National Register. All landmark properties are also listed on the National Register. The primary difference between the two programs lies in the level of historic significance that a resource must meet to qualify as a landmark. Furthermore, applicable preservation laws generally require a higher level of diligence regarding the management of a landmark than would normally apply to a National Register resource.

The Adak National Historic Landmark is listed as a site, which means the location possesses value regardless of the value of any existing structures. In this case, the value is in the historic locations of the NAS, Army Field, the Naval Operating Base, the Army Reserve Depot, various outposts and coastal defenses, and the areas used in staging the recapture of Attu and Kiska Islands from the Japanese. No formal landmark boundary was delineated, although Universal Transverse Mercator reference points were noted.

The Alaska State Historic Preservation Officer has provided written concurrence with the U.S. Navy’s resource evaluation for the Cultural Landscape Historic District. This concurrence makes the resources eligible for the National Register and makes applicable the consultation and preservation actions.

2.7 ARCHAEOLOGICAL RESOURCES

Previous surveys have identified more than 30 prehistoric archaeological sites and locations of potential sites within the boundaries of the Adak Naval Complex. The sites are mainly house foundations and middens containing shell, sea urchin, bone, and artificial detritus. Some of these sites were damaged by various military actions on the island. None have been formally assessed for a determination of eligibility for the National Register. As a resource protection measure, the exact location of these sites was not publicized, and will be kept by the USFWS. There are known burial sites on Adak proper within the military reservation, and there may be some burials on islands off the west shore. There are no known cultural resources within Area RG-01.

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3.0 PROJECT OBJECTIVES

The overall objective of the EE/CA process is to:

- Identify and recommend a feasible and cost effective response alternative to address MEC that may affect the use of RG-01;
- Determine and recommend areas that warrant munitions response actions using the risk reduction option selected by the U.S. Navy;
- Perform risk evaluation of the site based on the potential response action options; and
- Provide a convenient record of the process for use in selecting an appropriate munitions response action that is protective of public safety with respect to future land use at the RG-01 project site.

3.1 PROJECT TEAM

As the development of this EE/CA is based on the historical data and previous reports available for RG-01 only, the project team participated in the development of this EE/CA is limited to USAE and NAVFAC NW.

3.2 COMMUNITY RELATIONS

The Navy, in coordination with ADEC, EPA and other involved stakeholders, has established several community relations vehicles to ensure that the local public has input to decisions and access to information on restoration efforts at the RG-01 site. These community relations vehicles include establishment of an Administrative Record at several information repositories, a Restoration Advisory Board (RAB), an Adak restoration Information Line, and an Adak restoration website.

3.2.1 INFORMATION REPOSITORIES

The Administrative Record, which contains all decision-making documents regarding environmental restoration at NAF Adak, is located at the University of Alaska, Reserve Room, 3211 Providence Drive, Anchorage, Alaska, and is open to the public. The official copy of the Administrative Record is located at the NAVFAC NW, in Silverdale, Washington. In addition, the majority of significant documents regarding environmental restoration of NAF Adak are available at the Adak Information Repository, located in Bob Reeves High School on Mechanic Road, Adak Island, Alaska. Documents are also available on the Web site at http://www.adakupdate.com.

3.2.2 RESTORATION ADVISORY BOARD

To ensure that local stakeholders have input to decisions regarding environmental restoration at NAF Adak, the U.S. Navy formed a RAB in 1996. The RAB is comprised of local community members and representatives from the Adak City Council, the Aleut Corporation (TAC), the Aleutian/Pribilof Islands Association (A/PIA), other community organizations. The RAB serves to advise the U.S. Navy on decisions regarding cleanup, while considering local concerns and community impacts. An important role of the RAB has been to review project plans and reports and provide comments to the U.S. Navy.

The RAB meets twice a year unless a special occasion brings up the need to meet otherwise. Meetings are held at Anchorage, Alaska or on Adak Island and facilities are provided to allow interested parties to participate by telephone, if desired. Citizens can call the toll-free RAB information line (1-800-360-1561) to obtain meeting dates and times. All RAB meeting information is also regularly posted on the Web site at http://www.adakupdate.com. Since 1996, there have been numerous RAB meetings with the most recent RAB meeting held on April 19, 2006.
3.2.3 INFORMATION LINE

To proactively support Local Reuse Authority and the RAB, the U.S. Navy established an information line. RAB members and citizens interested in reuse or environmental restoration of Adak are encouraged to call 1-866-239-1219 and leave a message regarding their questions or concerns. These messages are forwarded to a U.S. Navy staff person at NAVFAC NW and responses are made as soon as possible, generally within 3 days.

3.2.4 PROJECT WEB SITE

A project Web site for Adak Island is on-line at www.adakupdate.com. The site is easily accessed through common Internet search engines and comes up in the top ten sites when “Adak” is searched. Although the site is fully developed, information is still being added.

The Web site contains all project newsletters, presentation materials prepared for RAB, fact sheets, and news releases. The Web site will also provide an opportunity for stakeholders to interact with project team members using e-mail. Links to appropriate technical documents are also provided.

Information on RAB meetings, public meetings, and open houses; and links to state and federal agency sites are provided as well. The Web site also offers an interactive opportunity for the public to e-mail the web manager, who then forwards the comments and/or questions to the appropriate resources. To date, there have been numerous public interactions resulting from the Web site. This site has increasingly become a point of distribution for documents, newsletters, and information on the Adak project.

3.3 CONCERNS

Based on the RAB meeting minutes (available on the project website), the following concerns have been identified for MRS RG-01.

- The impact on drinking water as a result of MEC in the area.
- The schedule and duration of the selected response action.
- Post-response actions.

3.4 CONSTRAINTS

As the RG-01 has not been previously investigated, project constraints have yet to be tested or observed. The following project constraints and dependencies are anticipated:

- **Administrative Constraints and Dependencies**: No administrative constraints and dependencies on the RG-01 site have been identified.

- **Technical Constraints and Dependencies**: Technical constraints and dependencies that were identified include remoteness of the site, scheduling of activities to avoid extreme weather, heavy tundra vegetation on the entire 16-acre area that is potentially affecting safe and timely execution of field activities, limited road network, limited telephone communication services, and preservation of natural resources.

- **Legal and Regulatory Milestones and Requirements**: Legal and regulatory milestones and requirements identified include public, stakeholder, and regulatory involvement and review of key documents; preservation of natural resources; and whether the process would be conducted in a manner consistent with CERCLA and the NCP.
3.5 IDENTIFICATION OF POSSIBLE RESPONSE ACTION ALTERNATIVES

Due to technical limitations, complete removal of all MEC is not feasible. Conversely, permanent exclusion of the public from areas with potential MEC presence is also not feasible, given the potential for inadvertent and intentional entry. The purpose of an EE/CA is to evaluate potential MEC risk and develop alternative plans of action. Figure 3-1 depicts the chain of events leading to a MEC incident, which could result in injury or death.

![Figure 3-1: MEC Incident Chain of Events](image)

Breaking or weakening this chain of events is a major focus for developing alternatives that limit public exposure to MEC. The steps used in this process include:

- Document available information pertaining to the nature and extent of MEC.
- Identify areas where further investigation is warranted.
- Conduct an investigation of the project site to characterize the nature and extent of the MEC.
- Provide criteria for evaluating and recommending the most appropriate response alternatives.
- Utilize proven technologies and management strategies (short and long term) to manage MEC in a manner that will break or weaken the chain of events identified above.

Using these steps, the project team adopted five widely-accepted response action alternatives for the RG-01 NTRCA. These five munitions response alternatives include:

- No Action Indicated (NAI)
- Institutional Controls
- Surface Removal of MEC and MD
- Surface and Subsurface Removal of MEC and MD
- Construction Support

The project team evaluated these five munitions response alternatives for the ESHA to ensure that recommended munitions response alternatives are specifically tailored for the site.

3.6 PROJECT OBJECTIVES

The overall objective of the EE/CA process is to identify and recommend a feasible and cost effective response alternative to address MEC that may affect use of the RG-01 site; determine and recommend areas that warrants munitions response actions using the risk reduction option selected by the U.S. Navy; perform risk evaluation of the site based on the potential response action options; and provide a convenient record of the process for use in selecting an appropriate munitions response action that is protective of public safety with respect to future land use at the site.
The USAE project team developed several objectives to guide the development and focus the comparison of acceptable response action alternatives for the RG-01 Area. Project objectives identified and documented in the Project Objectives Worksheet are as follows:

- Objective 1 – Define current and future land use for RG-01;
- Objective 2 – Delineate MEC within RG-01;
- Objective 3 – Perform a qualitative risk analysis of RG-01;
- Objective 4 – Evaluate and recommend appropriate response actions for RG-01; and
- Objective 5 – Select the most appropriate response actions for RG-01.

The above objectives for the EE/CA of the RG-01 site have been met by:

- Performing a thorough review of the project site historical data to identify and confirm the presence of surface evidence of MEC data to support the qualitative risk analysis;
- Performing the qualitative MEC risk analysis using ESHA and evaluate various response action alternatives to determine the most appropriate response alternative for the RG-01 Area;
- Providing the public and local agencies the opportunity to review and comment on the recommended response actions provided in the Draft Final EE/CA Report; and
- Documenting the munitions response action decision in an Action Memorandum for the project site.

### 3.7 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements, as derived from the USEPA definition of a DQO that clarify the objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that were used as the basis for establishing the quality and quantity of data needed to support decisions. Table 3-1 lists the final DQOs developed for RG-01.

<table>
<thead>
<tr>
<th>Data Quality Objective 1:</th>
<th>To collect sufficient human activity data to define the current and future land use necessary to perform the MEC risk analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intended data use:</td>
<td>To define current and future land use (Objective 1). To perform impact analysis/ESHA (Objective 3).</td>
</tr>
<tr>
<td>Data need requirement:</td>
<td>Current and future land access, development, and use.</td>
</tr>
<tr>
<td>Data category:</td>
<td>Basic</td>
</tr>
<tr>
<td>Quantity of data:</td>
<td>Sufficient data to characterize current and projected human activity within the RG-01 site area.</td>
</tr>
<tr>
<td>Data collection method:</td>
<td>Thorough review of site historical data (Foster Wheeler Environmental, 2004).</td>
</tr>
<tr>
<td>DQO met?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Quality Objective 2:</th>
<th>To gather sufficient data within the RG-01 to assess the potential MEC risk.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intended data use:</td>
<td>To delineate the MEC at the RG-01 (Objective 2). To perform impact analysis/ESHA (Objective 3).</td>
</tr>
</tbody>
</table>
Data need requirement:  MEC potential within the project site, amounts and depth of MEC.

Data category:  Basic

Quantity of data:  Any presence or documented evidence of MEC on the surface or subsurface of the project site.

Data collection method:  Thorough review of the site historical data (i.e., EOD Incident Reports) and performed a site visit.

DQO attained?  Yes. ESHA was developed under 2004 RI/FS.

**Data Quality Objective 3:**

To provide recommendations on the most appropriate response actions for the RG-01, using the results of the risk assessment and response alternatives evaluation.

Intended data use:  To evaluate and recommended response actions (Objective 4). NAI/Remedial Action decision (Objective 5).

Data need requirement:  MEC risk within the RG-01 site.

Data category:  Basic

Quantity of data:  Any confirmed presence or evidence of MEC on the surface or subsurface within the 16-acre area on the RG-01 site, or data to support no MEC risk.

Data collection method:  ESHA and Response Alternatives Evaluation.

DQO attained?  Yes

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4.0 SITE CHARACTERIZATION

Development of this EE/CA is based almost entirely on the site historical data, since it was not possible to conduct a site characterization (i.e., site visits, geophysical prove-out, instrument-assisted visual reconnaissance, digital geophysical mapping, and intrusive investigations) due to the catastrophic nature of the ordnance present. The project team reviewed records of previous investigations and EOD reports for the RG-01 site area to extract useful MEC data to support the characterization of the EE/CA.

4.1 SITE VISIT

The USAE technical team performed a site visit of RG-01 on 20-23 October 2005. The following people attended the site visit.

- Mark Murphy, NAVFAC NW Remedial Project Manager
- George Spencer, USAE Program Manager
- Cheryl Riordan, USAE MEC Safety Officer
- Amadeo Rossi, CH2MHILL Subcontractor Project Manager

The team was equipped with Level D personal protective equipment (PPE) and a White all-metals detector for MEC avoidance. The team visited RG-01 on Friday, 21 October 2005. Due to the high MEC hazard associated with this range, no one on the team entered the RG-01 site area. The team visually performed a reconnaissance of the site from the safe access roads and trails. Photographs of the site conditions were taken. The team estimated that tundra cover at RG-01 varies from no cover to a thin mat of 2 to 4 inches. Upon completion of the site visit, the team met with island personnel to identify available facilities and resources.

4.2 SOURCE, NATURE, AND EXTENT OF MEC

Based on a thorough review of the historical data, it is confirmed that there have been no munitions response actions or investigation of the RG-01 site area. However, MEC items have been reportedly encountered and/or recovered on or near the surface by local range personnel and were reported by local EOD units. Final disposition of the MEC items encountered are unknown or were not reported. There is a possibility that these MEC items were left in place and may still exist on site. Table 4-1 summarizes the MEC items reported to exist on RG-01.

<table>
<thead>
<tr>
<th>MEC/UXO</th>
<th>Qty</th>
<th>Date</th>
<th>EOD Incident Number</th>
<th>Final Disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projectile, 40mm (Dud-Fired Grenade)</td>
<td>4</td>
<td>10 Jul 1973</td>
<td>73-115A</td>
<td>Unknown</td>
</tr>
<tr>
<td>Projectile, 40mm (Dud-Fired Grenade)</td>
<td>1</td>
<td>12 Aug 1980</td>
<td>80-16D</td>
<td>Unknown</td>
</tr>
<tr>
<td>Projectile, 40mm (Dud-Fired Grenade)</td>
<td>2</td>
<td>20 Aug 1980</td>
<td>80-16F</td>
<td>Unknown</td>
</tr>
<tr>
<td>3-Lb. TNT</td>
<td>1</td>
<td>20 Aug 1980</td>
<td>80-16F</td>
<td>Detonated</td>
</tr>
<tr>
<td>60mm, Mortar</td>
<td>1</td>
<td>31 Oct 1989</td>
<td>89-19</td>
<td>Unknown</td>
</tr>
<tr>
<td>81mm, Mortar</td>
<td>1</td>
<td>31 Oct 1989</td>
<td>89-19</td>
<td>Unknown</td>
</tr>
<tr>
<td>TOTAL</td>
<td>9</td>
<td></td>
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</tbody>
</table>
5.0 RISK EVALUATION

For the risk assessment element of this EE/CA for RG-01, USEE utilized the Explosive Safety Hazard Assessment (ESHA) process. The ESHA methodology is an Adak-specific hazard assessment tool that analyzes the results of data collection, determines the potential magnitude of the risk/hazard present, and determines the need for further investigation or remediation of sites. The ESHA developed for Adak is a site-specific hazard assessment process for explosive dangers that addresses the unique character of the Island and is both consistent with CERCLA principles and acceptable to Adak stakeholders. The methodology is qualitative in nature, but makes use of both qualitative and quantitative inputs in a framework that reflects established scientific and engineering principles.

5.1 DESCRIPTION OF CONCEPTUAL SITE MODEL AND DEVELOPMENT

The Conceptual Site Model (CSM) is a representation of the site that shows the relationship between the former military use of the site, current and proposed future land use, ways in which people may encounter MEC and environmental features that may have an impact on proposed site activities and/or decisions. The CSM provides the basis for identifying and evaluating potential risks to the public from potential MEC within RG-01. In addition, the CSM communicates current site conditions to the project team members and stakeholders, and identifies data gaps that typically define the data collection goals of the EE/CA. The CSM is updated as new information about the site becomes available. Table 5-1 and Figure 5-1 provides the CSM for the EE/CA of RG-01.

<table>
<thead>
<tr>
<th>Acreage:</th>
<th>16 acres</th>
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<tbody>
<tr>
<td>Site Type:</td>
<td>Former U.S. Naval Air Facility with potential MEC risk.</td>
</tr>
</tbody>
</table>
| Past DOD Activities: | • Used by U.S. Navy as 40mm Rifle Grenade Training Range during WWII.  
• The west end of the site, where the targets were located, is characterized by a relatively steep hillside serving as a backstop for this former training range.  
• There is no evidence to support other DoD use of the site. |
| Source: | The U.S. Military used the RG-01 area as a training range during and after WWII. The Air Force used the site until 1951, when it was turned over to the Navy. The military mission at Adak ended in 1997. Previous EOD incident reports have identified several MEC items were encountered and/or reported. Among these MEC items were seven 40mm grenades, one 60mm mortar, and one 81mm mortar. |
| Pathways: | Human activities (e.g., recreational, hiking, and working at the site) and natural events (e.g., fires, floods) may expose and detonate these MEC items resulting in injury/harm to land users and/or natural resources.  
• The reported 40mm grenades encountered within RG-01 have a catastrophic hazard rating, due to the high sensitivity to vibration and possibility to detonate if disturbed.  
• The 60mm and 81mm mortars are an unknown hazard, since it cannot be established whether they were fired or merely abandoned. |
<table>
<thead>
<tr>
<th>Receptors</th>
<th>Public or site workers may be exposed to MEC and injured if items are disturbed.</th>
</tr>
</thead>
</table>
| Current and Future Land Use: | Current: The current and likely near-term land use is a Restricted Access Military Reservation. There is a locked gate at the south end of Andrew Lake preventing the public from entering the former range areas west of the lake and also blocking access to the road leading out to the RG-01. Since the access is restricted, there is currently no public use of the site.  
Future: Recreation, Subsistence, Wildlife Management are anticipated. Future construction activities are not anticipated within the RG-01 area. |
| Ways to Encounter MEC: | There is a locked gate located at the south end of Andrew Lake blocking access to the gravel road leading out to the RG-01. Although the gate limits vehicular activities, the RG-01 is accessible by foot.  
Surface MEC: Public or site workers walking within the RG-01 boundary can encounter surface MEC.  
Subsurface MEC: Public or site workers performing excavation or intrusive actions can encounter subsurface MEC. |
| Recommendations: | Perform 100% surface and subsurface removal of MEC and MD, from the entire 16 acres of the RG-01 project area.  
Use metal detectors to assist in the identification of surface and subsurface MEC and MD.  
Remove all detectable surface and subsurface MEC and MD to the depth of detection, but not to exceed the depth to bedrock or 2 feet. |

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5.2 DESCRIPTION OF THE MEC RISK ASSESSMENT METHODOLOGY

The discussion in this section is excerpted from Draft Final Remedial Investigation/Feasibility Study (RI/FS), OU B-2 Sites located at the former Naval Air Facility, Adak, Alaska (Foster Wheeler, 2004).

A baseline risk assessment should be performed for all sites being addressed under the CERCLA process NCP 300.430(d)(1). The baseline risk assessment is an analysis of the potential adverse health effects (current or future) caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases (Human Health Evaluation Manual, 1989). The baseline risk assessment contributes to the site characterization and subsequent development, evaluation, and selection of appropriate response alternatives. The results of the baseline risk assessment are used to:

- Document the magnitude of the risk at a site and the primary causes of that risk;
- Help determine whether additional response action is necessary at the site;
- Help support selection of the no action remedial alternative (where appropriate); and
- Modify preliminary remediation objectives and cleanup goals.

Baseline risk assessments are site specific and may vary in both detail and the extent to which qualitative and quantitative inputs and analyses are used. The characteristics of the baseline risk assessment depend on the complexity and particular circumstances of the site, as well as the availability of applicable or relevant and appropriate requirements (ARARs) and other criteria, advisories, guidance, and the specific concerns of the site stakeholders. The baseline risk assessment should consider the potential risks associated with current land use and activities, as well as reasonably anticipated future land use.

At a site like Adak, the potential adverse health effects that should be considered under CERCLA include explosive hazards (those associated with potential exposures to any energetic ordnance items present) and the "conventional" risk because of potential exposures to the chemical components and residues that may be associated with these items. Each type of hazard should be assessed and considered.

At this time, CERCLA has no special provisions for dealing with ordnance explosive safety aspects. The processes that have been developed and applied for many years for chemical contaminants do not lend themselves directly to ordnance explosive safety aspects. Ordnance has unique properties that influence their release and transport mechanisms. The potential for contact and the potential effects of ordnance exposure need to be evaluated differently than the processes developed for chemical contaminants.

During the planning for the RI/FS for OU B, it became apparent that CERCLA Risk Assessment Guidance could not be applied directly to the Adak project for UXO explosive safety aspects. Ordnance-specific (and site-specific) assessment and evaluation procedures had to be developed to support decision making for remedial action at the Adak sites. In August 1999, as a result of formal dispute proceedings initiated by USEPA and ADEC under the FFA provisions regarding UXO investigation methods, a working group (referred to as the project team) was formed that includes the USEPA, ADEC, USFWS, A/PIA, TAC, and other stakeholders in the redevelopment process. Their goal was to design a site-specific, CERCLA-consistent process for the investigation, evaluation, and remediation of sites on Adak that are potentially contaminated with ordnance.

5.3 RG-01 EXPLOSIVE SAFETY HAZARD ASSESSMENT METHODOLOGY

The hazard assessment methodology developed for Adak is a site-specific process developed as part of an overall framework for assessing and managing potential threats to human health and the environment on Adak due to the presence of UXO (hazard assessment) and the potential release of hazardous chemical substances related to that ordnance (risk assessment).
The potential for exposure and the effects associated with ordnance exposure are also an influence from its unique properties. No risk assessment guidance is available for ordnance explosive safety and there is no consensus as to an acceptable risk or hazard range for explosive hazards. Because Adak is a CERCLA site having ordnance contamination at numerous locations, and because the Island has unique physical and environmental characteristics, it poses a unique risk assessment and management problem. The ESHA developed for Adak is a site-specific hazard assessment process for explosive dangers that addresses the unique character of the Island and is both consistent with CERCLA principles and acceptable to Adak stakeholders. The methodology is qualitative in nature, but makes use of both qualitative and quantitative inputs in a framework that reflects established scientific and engineering principles.

The Adak ESHA is based on four primary factors:

• Ordnance Search/Removal Status (i.e., what is known about the likely presence and distribution of ordnance in a given area)
• Ordnance Characteristics (i.e., the explosive properties of the MEC/UXO)
• Ordnance Accessibility (i.e., the potential for direct contact with ordnance items)
• Public Exposure (i.e., the status of public access and the activities typically performed in the area)

This breakdown of factors reflects the following premises about ordnance risk/hazard on Adak:

• Areas where MEC are known or indicated to be present have higher potential for explosive hazards than areas where MEC have been searched for and not found, or where all known ordnance items have been removed.
• Different types of ordnance have different potential for detonation when disturbed and, if detonated, can produce a range of potential consequences.
• The potential for explosive hazards is created when energetic ordnance items are located at a depth where they would likely be disturbed by current or future land use activities.
• A greater potential for explosive hazards occurs when the opportunity for public exposure is greatest (e.g., when people interact with the land more intensively or more frequently).

Each of the four primary factors is broken down into subfactors, which represent the various elements that contribute to the primary factor. These subfactors are weighted in the calculation of the primary factor to reflect the relative importance of each element. For example, public exposure is influenced by:

• The ease of public access (Are roads or trails present in the area? What is the planned future use for the land?);
• The intensity of public activity (How much energy will be imparted to the ground?); and
• The portability of ordnance items present in the area (How easily can the items be transported by a child?).

All three subfactors influence public exposure hazard; however, the ease with which people may reach and utilize an area and the purpose for which they will use that area, are considered more important in the overall evaluation of public exposure than the other two subfactors. Therefore, the Adak-specific ESHA places more weight on that subfactor when developing the public exposure primary factor. Future land use is an important factor in the overall Adak hazard assessment. The ordnance accessibility factor plays a role in the evaluation because different activities involve varying levels of subsurface intrusion and influence the potential for exposure to ordnance items.

The primary hazard factors not only include weighted subfactors, but are also weighted themselves in the final calculation of the explosive hazard to ensure that factors with more influence in creating risk are more significant in the calculation. The presence or absence of ordnance and the relative hazard of that ordnance are far more important in assessing the overall risk to future residents of Adak. If there is no
ordnance present, based on the results of an approved investigative approach, then there is little risk no matter how intensively an area is used.

Table 5-2 contains all possible combinations of primary risk factors for the ESHA scoring and the overall qualitative hazard associated with each combination of primary risk factors. The primary factors and subfactors for the RG-01 ESHA and the resulting Explosive Safety Hazard Score are provided on the ESHA scoring sheet presented in Table 5-3. A more detailed description of the development and application of the ESHA is presented in the ADAK OU B ESHA Methodology, Version 11 (Foster Wheeler Environmental 2000g).

<table>
<thead>
<tr>
<th>Ordnance Characteristics Score</th>
<th>Ordnance Accessibility Score</th>
<th>Public Exposure</th>
<th>Ordnance Search/Removal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Least Potential for Contact</td>
<td>B C B C B C B C B C B C B C</td>
<td>Least Potential Exposure</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>B C B C B C B C B C B C B C</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>B C B C B C B C B C B D B D</td>
<td>Not Found or Detected and Removed</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>B C B C B C B C B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>E Most Potential for Contact</td>
<td>B C B C B D B D B D B E B E</td>
<td>Not Found or Detected and Removed</td>
<td></td>
</tr>
<tr>
<td>A Least Potential for Contact</td>
<td>B C B C B C B C B C B C B C</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>B C B C B C B C B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>B C B C B C B C B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>B C B C B C B C B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>E Most Potential for Contact</td>
<td>B C B D B D B D B E B E B E</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>A Least Potential for Contact</td>
<td>B C B C B C B C B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>B D B D B D B D B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>B D B D B D B D B D B D B D</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>B D B D B D B E B E B E B E</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
<tr>
<td>E Most Potential for Contact</td>
<td>B D B D B E B E B E B E B E</td>
<td>Known or Indicated to be Present</td>
<td></td>
</tr>
</tbody>
</table>
### Notes:

1. **Scores A and B (shaded):** These are the lowest hazard levels. All cases where the Ordnance Characteristics Scores are A and B result in Overall Hazard Scores of A and B. A and B scores result in the AOC not being sent for further evaluation, using the matrix below.

2. **Scores C, D, and E (unshaded):** These are the highest hazard levels. C, D, and E scores result in the Area of Concern (AOC) being sent on for further evaluation. The evaluation process will be the same regardless of whether an AOC has received an Explosives Safety Hazard Score of C, D, or E. These three category levels are included to provide a rough qualitative scale for judging the degree to which the various candidate response alternatives reduce the level of explosives hazard.

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>General Management Response Option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Actual Responses to be Identified through AOC-specific Evaluation in the FS)</td>
</tr>
<tr>
<td>A (Lowest Hazard Level)</td>
<td>Adak NOFA/Baseline Institutional Controls</td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Further Evaluation</td>
</tr>
<tr>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

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### Table 5-3: ESHA Scoring Sheet for Area RG-01 (2004 RI/FS Report)

<table>
<thead>
<tr>
<th>SUBFACTOR / COMPONENT</th>
<th>SUBFACTOR COMPONENT VALUE</th>
<th>COMPONENT SCORE</th>
<th>SUBFACTOR SCORE</th>
<th>FACTOR SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEC SEARCH / REMOVAL STATUS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEC Search / Removal Status</td>
<td>Limited UXO removal</td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No formal investigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEC CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEC Hazard Severity</td>
<td>Catastrophic (fuzing)</td>
<td></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Amount of Energetic Material (Impact Scale)</td>
<td>0.5 to 1 lb</td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>MEC ACCESSIBILITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of Public Activity (Intrusive Depth)</td>
<td>Non-Intrusive</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Depth Below Ground Surface</td>
<td>0 to 1 foot</td>
<td></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Migration/Erosion Potential (Due to Nature of Processes)</td>
<td>Low</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td><strong>PUBLIC EXPOSURE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of Public Access</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of Access</td>
<td>Gravel Road</td>
<td></td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Current and/or Future Land Use</td>
<td>Recreation Inside Core</td>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>Intensity of Public Activity (Energy Imparted to the Ground)</td>
<td>Low</td>
<td></td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td>Easy Portable</td>
<td></td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>EXPLOSIVES SAFETY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HAZARD SCORE</strong></td>
<td></td>
<td></td>
<td></td>
<td>D</td>
</tr>
</tbody>
</table>
5.4 RESULT OF ESHA ANALYSIS

Based on the ESHA process, the RG-01 received a score of D, indicating that remedial action of some type may be needed to reduce risk to the public.

The RG-01 Area is relatively flat and marshy with areas of standing (or running) water throughout. The west end of the site where the targets were located encompasses a relatively steep hillside serving as a backstop for the range. Access to the rifle grenade range is provided by a gravel road running up to the firing line area. This road branches from the access road to the larger range area on the west side of Andrew Lake. Currently, there is a locked gate at the south end of Andrew Lake preventing vehicles from entering the former range areas west of the lake and also blocking access to the road leading out to the rifle grenade range. Since the access is restricted, there is currently no public use of the site. The ultimate future land use is currently not identified but will likely be recreational related to access for hiking on Mount Moffett. The property may also be utilized for wildlife management activities. The current and likely near-term land use is a Restricted Access Military Reservation.

This site has not been the subject of any formal investigation to date. The specific types of munitions used in the rifle grenade range are considered very sensitive and extremely dangerous. Although there may be specific investigative techniques available that are applicable to the site, to date the area has generally been considered too hazardous to enter. Historically, the EOD activity on Adak has responded to reports of dud-fired rounds within this range. On 10 July 1973, four dud-fired 40mm grenades were reported and not located. On 12 August 1980, one dud-fired 40mm grenade was reported, and again not located. On 20 August 1980, two dud-fired 40mm grenades were reported as part of the Marine training exercise. The report also indicated that 3 pounds of TNT were set off near the area where the grenades were thought to have fallen. On 31 October 1989, EOD personnel found one 60mm mortar and one 81mm mortar while clearing a path for target construction. It has been assumed that all MEC items encountered, remained on the RG-01 site because their final dispositions are unknown or not reported. The techniques used for entry into the range and removal of the items (if items were recovered), are not known.

Area RG-01 was retained as a single area for the purposes of conducting the ESHA analysis and, if necessary, the FS. There is no evidence to suggest that any portion of the current area has different munitions characteristics or historical uses that would necessitate segregation of the AOC for appropriate analysis. Table 5-4 summarizes the site characteristics relevant to the ESHA scoring sheets.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Site-Specific Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordnance Presence (MEC)</td>
<td>MEC may not have been removed; to date no investigation</td>
</tr>
<tr>
<td>Ordnance Hazard Category</td>
<td>Catastrophic (sensitive fuzing)</td>
</tr>
<tr>
<td>Amount of Energetic Material</td>
<td>0.5 to 1 pound</td>
</tr>
<tr>
<td>Depth of Ordnance</td>
<td>Unknown, but suspected to be from 0 to 1 feet</td>
</tr>
<tr>
<td>Access to Area</td>
<td>Gravel Road to the firing line; range area currently gated and</td>
</tr>
<tr>
<td></td>
<td>posted for restricted entry</td>
</tr>
<tr>
<td>Current (and Likely Near-Term Future)</td>
<td>Restricted Access Military Reservation</td>
</tr>
<tr>
<td>Land Use</td>
<td></td>
</tr>
<tr>
<td>Future Land Use</td>
<td>Subsistence, Recreation, or Wildlife Management</td>
</tr>
<tr>
<td>Final ESHA Score: D</td>
<td>Disposition: Further Evaluation</td>
</tr>
</tbody>
</table>

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6.0 RESPONSE ALTERNATIVES EVALUATION

6.1 IDENTIFICATION OF POSSIBLE ALTERNATIVES

Based on a review of the site characterization and risk assessment results, response action alternatives were identified and recommended as alternative responses for addressing risks at the project site. The five possible response alternatives considered for the RG-01 site include:

- **Alternative 1** - No Action Indicated (NAI);
- **Alternative 2** - Institutional Controls;
- **Alternative 3** - Surface Removal of MEC and MD;
- **Alternative 4** - Surface and Subsurface Removal of MEC and MD; and
- **Alternative 5** - Construction Support.

The five categories of munitions response actions served as a basis for determining the most appropriate munitions response action alternative for the RG-01 site. These alternatives are consistent with those considered at other MEC sites throughout the United States.

The project team screened each of the five response alternatives for applicability to the RG-01 Area and then analyzed each of the remaining alternatives to determine the most appropriate munitions response actions for the site.

The project team did not evaluate the implementation of a recurring review program as a separate alternative, but as an integral part of any alternative (i.e., Institutional Controls and both MEC removal alternatives).

As part of the recurring review, visual surveys will be performed on a proposed schedule. The visual surveys will consist of the inspection of the project site to determine the effectiveness of the munitions response action alternatives implemented. This visual survey will be concentrated in areas most susceptible to weathering and other disturbances, such as construction of buildings or structures. During the periodic inspections, changes in the land-uses will be assessed. The first visual inspection would occur within the first five years following the start of munitions response actions. After this initial inspection, the inspections will continue at a minimum of five-year intervals and will assess the need for further reviews. If the results of these inspections indicate that the conditions of the project site have changed significantly, the recommendations of the EE/CA will be revisited and revised as warranted.

6.1.1 ALTERNATIVE 1: NO ACTION INDICATED

The NAI alternative involves no active response or land use restrictions (i.e., Institutional Controls) to locate, remove, dispose of, or limit the exposure to any potential MEC present within a specific area at the project site. In addition, the government would assume no responsibility for public awareness or education concerning the potential MEC risk within the area. The No Action approach is routinely retained in the EE/CA evaluation of alternatives in accordance with the requirements of the NCP to provide a baseline for comparison of other response technologies and alternatives.

The NAI alternative assumes continued use of the area in its present state. If the potential exposure and hazards associated with the area are compatible with current and future developments in the area, as well as the munitions response action objectives, then NAI may be warranted. It is important to note that the government will respond to any future MEC discovery at RG-01 regardless of whether the area was designated for NAI. However, the NAI alternative is not an acceptable candidate alternative for the RG-01 Area because the ESHA score of D indicates a requirement for further action.
6.1.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS

Institutional Controls involve implementation of physical and administrative measures to limit the access or use of the RG-01 Area. Instead of direct removal of the MEC from the area, the Institutional Controls response action relies on behavior modification and access control strategies to reduce or eliminate MEC risk. For example, an educational program may be required to warn the visiting public (e.g., hikers, hunters, and/or campers) of the potential presence of ordnance and the importance of not disturbing (yet reporting) suspect items observed within the project site. The educational program would provide guidance on public safety and prudent actions should an individual discover MEC material.

Institutional Controls may include land use restrictions and regulatory controls, educational controls, and engineering controls. The overall effectiveness of Institutional Controls depends on local agencies and private landowner support, involvement, and willingness to enforce and maintain Institutional Controls implemented to minimize public exposure to MEC.

The implementation of Institutional Controls would involve coordination with the stakeholders in an effort to affect the behavior of site visitors, employees, and residents to reduce MEC exposure risk. The Institutional Controls alternative can be used in combination with other munitions response actions or in cases where it may not be possible or practical to physically clear MEC from the RG-01 Area.

6.1.2.1 Land Use Restrictions and Regulatory Controls

Land Use Restrictions and Regulatory Controls provide the primary Institutional Control that can be exercised over areas where MEC may be present. For instance, if the State of Alaska controls access to the Island of Adak, the State can control access to RG-01. The Navy already controls access to the site by virtue of their regulations. Either approach can be used to control the type of development that will occur within the site and the methods in which that development occurs.

6.1.2.2 Educational Controls

Educational controls can be undertaken in a number of formal and informal methods including both printed media and visual media.

Printed Media: Ordnance awareness, respect for the explosive risks, and educational refreshers are key ingredients in minimizing MEC risks to the public. One of the major avenues available to facilitate this awareness and understanding is through printed media in the form of brochures, fact sheets, newspaper articles, and other information packages. The opportunity to disseminate information through printed media is readily available and can be easily facilitated. Many of the local residents and property owners near the project site are aware of the potential ordnance risks associated with the former use of the property. However, area residents should still be reminded of the potential presence of ordnance items on a regular basis. In addition, providing information to new residents, businesses, and visitors of the area is of primary importance. The addition, reinforcement, and augmentation of current knowledge are desirable in order to keep the realization of MEC risks and potential hazards in the minds of people at all times.

Brochures: Brochures can be very effective educational tools and could be prepared and distributed through local agencies. Brochures could describe the history of the site, how to identify ordnance, safety procedures associated with avoidance of ordnance items, instructions for notifying appropriate authorities in the event that MEC are encountered, or if questions need to be answered.

Newsletter: A newsletter can be printed to further educate the public concerning the MEC risk at the project site. This approach can be very informative and can effectively reduce the risk of improper handling of ordnance.
Visual Media: Ordnance awareness, respect for the risk involved, and reinforcement of the message are key ingredients in minimizing the risk associated with MEC. Visual media in the form of videotape programs for use during presentations and for broadcast on local television and radio stations could be a major avenue available to facilitate this awareness and understanding. The opportunity to disseminate information through the visual media is readily available and can be easily facilitated.

Two visual media programs, one as a 30-minute television special and one as a 5 to 7 minute professional videotape for classroom or other use, would be highly effective tools in educating the public about ordnance safety. These videos could describe the history of the project site, how to identify ordnance, safety procedures associated with avoidance of ordnance items, instructions for dealing with ordnance if encountered, and telephone numbers to contact the appropriate agency if ordnance is encountered or if questions need to be answered. Videotapes can be shown in classrooms throughout the region. Copies could also be provided to the local library and/or school; and the stakeholders could make the videotapes a part of permanent exhibits/displays.

Other Educational Controls: Other Institutional Controls, such as exhibits/displays could be prepared and placed in the local public library and other areas where the public will be exposed to educational information. In addition, the creation of a web page on the Internet could also be an effective method of raising and preserving general awareness and educating the public about the site.

6.1.2.2 Engineering Controls

A number of different engineering controls can be undertaken in support of an MEC Institutional Control program. For the purpose of this EE/CA project, two specific types of engineering controls are discussed for illustrative purposes – signage and fencing.

Signage: Signs can be posted along the perimeter of specific areas to warn the public about the risk of exposure to MEC items. Signage can also include information regarding site access restrictions, how to respond to discoveries of ordnance items, telephone numbers and addresses to contact the appropriate agency with questions or concerns, and any other applicable site-specific information.

Fencing: Fencing would provide a physical barrier to prevent the public from entering specific areas and inadvertently encountering ordnance. However, construction of fencing is generally considered only as a last resort Institutional Control strategy due to generally negative public acceptance.

6.1.3 ALTERNATIVE 3: SURFACE REMOVAL OF MEC AND MD

The Surface Removal of MEC and MD alternative may be used when the risk assessment indicates that the public may be exposed to MEC frequently on the ground surface, and infrequently to MEC in the subsurface. If the risk assessment indicates that there is a high number of anticipated exposures to MEC by the public on the ground surface and a low risk of exposure to subsurface MEC, Surface Removal of MEC may be a viable munitions response alternative. Ground surface is defined as the top of the mineral soil layer.

In this case, surface MEC removal would be completed by experienced UXO-qualified personnel who would visually search the ground surface of 100 percent of the area for any MEC. In addition, UXO-qualified personnel would use metal-detection devices to ensure that any MEC items, which may exist on the surface of the ground or are protruding from the ground, are located during the sweep and subsequently removed by the clearance team.

A land surveyor or qualified GPS technician would establish control points for a grid system that would cover the area where surface removal was required. UXO-qualified personnel mark lanes 5 feet wide, or some other comparable width depending on the sweep reach of the type of metal detection equipment.
used, to ensure complete surface coverage. The clearance team would perform the clearance, identifying and removing all potential MEC contacts on the ground surface or protruding from the ground surface. Where necessary, vegetation clearing crews would remove enough tundra grass so that the clearance teams could adequately perform the work. Vegetation clearing would be limited to only those areas where the vegetation prevents the effective use of the metal-detection instrument. Institutional Controls could be implemented in conjunction with this alternative to further decrease the estimated number of annual exposures in the area.

6.1.4 ALTERNATIVE 4: SURFACE AND SUBSURFACE REMOVAL OF MEC AND MD

Surface and Subsurface Removal of MEC and MD may be used when the risk assessment indicates that the public may be frequently exposed to MEC below the ground surface.

In this case, the removal would extend to the depth of detection, but not exceed the depth of bedrock or a maximum depth of 2 feet below ground surface. Land surveying and vegetation clearing operations would be necessary as described in Alternative 3. Under Alternative 4, 100 percent of an area would be cleared of surface and subsurface MEC items to the detection depth of the metal detectors to a maximum depth of 2 feet or bedrock, whichever is encountered first. This alternative is the most ambitious of the five alternatives identified for consideration in the EE/CA. Experienced UXO-qualified personnel would perform removal activities associated with this alternative.

During the investigation phase, UXO Technicians would use metal-detection instruments to perform surveys over established grids to identify subsurface anomalies and any surface anomalies not identified during the vegetation-clearing activities. In this way, both the surface and subsurface surveys could be performed simultaneously saving time and money. The primary difference in performing this kind of survey over that described in Alternative 3 is that instead of relying primarily on visual identification and near surface detection, a marking/locating system is used to relocate the subsurface anomalies for subsequent intrusive investigation and removal. All surface anomalies uncovered during the performance of the survey would be immediately identified and removed/disposed from the area to ensure that only subsurface anomalies remain for further investigation.

The second phase to this approach includes the intrusive investigation of all subsurface anomalies identified during the metal detection survey to determine their exact nature. Following removal of the item identified, the intrusive investigated area will be restored as close as possible to its original state.

6.1.5 ALTERNATIVE 5: CONSTRUCTION SUPPORT

Development-related construction activities at the project site may require UXO support to minimize potential explosive hazards. There are two types of potential construction support: UXO safety support and UXO construction support. If the probability of encountering UXO is low, only UXO safety support would be required. Once a determination is made that the probability of encountering MEC is moderate to high (e.g., MEC was employed or disposed of in the area), UXO-qualified personnel would conduct a Subsurface Removal of MEC to the depth of detection of the known construction footprint and remove all discovered MEC. The level of effort for construction support is both site-specific and task-specific and would need to be determined on a case-by-case basis. In the case of RG-01, construction support is not a realistic alternative, as the site is a Restricted Access Military Reservation and there are no plans for development of this property.

6.2 DESCRIPTION OF THE ALTERNATIVES SCREENING PROCESS

This section describes the alternatives evaluation process used to determine the most appropriate munitions response actions for the RG-01 site. The project team used the results of the ESHA as a basis for screening out Alternative 1 (NAI), and current and future land use as a basis for screening out
Alternative 5 (Construction Support). The following paragraphs now use the ESHA and other known data as a basis for evaluation of the three remaining munitions response action alternatives. The evaluation and determination of the most appropriate munitions response action alternative for the RG-01 Area forms the basis for the specific recommendations made for the RG-01 site.

For the RG-01 Area, munitions response action alternatives are first evaluated in terms of effectiveness, implementability, and cost. The purpose of this evaluation is to identify the most appropriate munitions response action alternatives for the evaluation area based on current and projected future land use. For effectiveness, the ranking considers protection of human safety, compliance with ARARs, and long-term and short-term effectiveness. For implementability, the alternatives are ranked by technical and administrative feasibility, agency and community acceptance, and availability of services and materials. Cost considerations are made using detailed costing assumptions and costing backup.

6.2.1 Effectiveness

Effectiveness is a measure of an alternative’s ability to reduce the potential for exposure to MEC. It is generally a measure of an alternative’s ability to meet the criteria of protecting public safety and compliance with identified ARARs. The results of the MEC risk assessment of the selected alternatives are applied directly to the protection of public safety criterion. Effectiveness is also evaluated in terms of long-term and short-term practicability.

6.2.1.1 Protection of Public Safety

The protection of public safety criterion is a measure of how well the alternative reduces public exposure to MEC, the reduction in terms of possible injury or death, and protection of the environment. This criterion is based on the ESHA scoring previously obtained in Section 5.

6.2.1.2 Compliance with ARARs

The compliance with ARARs criterion is a measure of how well the alternative meets the identified chemical-specific, location-specific, and action-specific ARARs (federal, state, and local). Currently, no chemical-specific ARARs exist for the site.

6.2.1.3 Long-Term Effectiveness

The long-term effectiveness criterion is a measure of how well the munitions response action alternative protects public safety once it has been implemented. The remaining potential for exposure or interaction with MEC is characterized by the following factors:

- The magnitude of potential exposures and interaction following implementation of the selected alternative;
- The permanence of the exposure and interaction reduction due to implementation of the selected alternative; and
- The reliability of the controls and maintenance measures in managing residual MEC following implementation of the selected alternative.

6.2.1.4 Short-Term Effectiveness

The short-term effectiveness criterion is a measure of how well the munitions response action alternative meets the exposure and interaction reduction objectives during implementation. This includes:
The ability of the alternative to reduce risk during implementation;

The potential for adverse effects on the environment during implementation of the alternative;

The time required to implement the alternative; and

The potential for adverse effects on the public, including the community and personnel involved in implementation of the alternative.

6.2.2 IMPLEMENTABILITY

Implementability is a measure of whether a munitions response action alternative can be physically and administratively implemented, such as the ability to construct, excavate, or demolish. It is also a measure of the availability of the services and materials needed to implement the alternative. Other considerations regarding implementability include state agency and community acceptance of a given alternative. A concise interpretation of the criteria governing implementability is described in the following subsections.

6.2.2.1 Technical Feasibility

The technical feasibility criterion refers to the following:

The reliability of the action with regard to implementation;

The actual ease of field implementation (e.g., construction, removal action);

The ease in undertaking future actions related to the initial undertaking; and

The ability to monitor the effectiveness of the action.

6.2.2.2 Administrative Feasibility

The administrative feasibility criterion is a measure of the ease with which an alternative can be implemented in terms of permits and rights-of-entry, coordination of services to support the action (e.g., legal services), or the arrangement of delivery of security services.

6.2.2.3 Availability of Services and Materials

The availability of services and materials criterion is a measure of the availability of goods and services needed to support implementation of the alternative. Examples of this criterion include the availability of specialized personnel (i.e., UXO-qualified technicians) and equipment (e.g., geophysical instruments), availability of explosives for demolition purposes, availability of a suitable disposal facility for the ordnance scrap (i.e., proximity of local scrap metal recycling facility), and the condition of the existing infrastructure to allow ingress and egress of personnel and material to and from the project site.

6.2.2.4 Local Agency Acceptance

The local agency acceptance criterion deals with the acceptance of the alternative by applicable state, county, and city agencies, as expressed by representatives of the agency. Local agency acceptance has been sought during meetings and interaction with state agency representatives. To date, state agency representatives have made no statement of support for this process. This criterion may be updated at any time during the EE/CA review process.
6.2.2.5 Community Acceptance

The community acceptance criterion relates to the degree of acceptance of the alternative by the community, including owners of properties adjacent to the area. Public sentiment expressed during town hall meetings, public workshops, city council or county supervisor meetings, or in the institutional analysis, is a means of determining community acceptance. Community acceptance will also be established as a result of community meetings and the public comment period provided for the EE/CA report, and may be updated at any time during the EE/CA review process.

6.2.3 Cost

The cost of implementing each of the three munitions response action alternatives has been estimated. A detailed summary of these costs and costing assumptions is presented in Appendix B. For the Institutional Controls alternative (Alternative 2), the costs include expanding the community awareness outreach programs (e.g., periodic community awareness meetings, informational pamphlets, and landowner notifications) to include MRS RG-01 as well as administration and maintenance costs associated with these activities. For the Surface Removal of MEC alternative (Alternative 3) and Subsurface Removal of MEC alternative (Alternative 4) the costs include the one-time capital costs and do not include monitoring for sensitive species or habitat restoration.

Examples of capital costs include those costs incurred by the UXO contractor for conducting field activities (e.g., surface removal, geophysical mapping, intrusive MEC sampling, construction support, and demolition activities) associated with implementing a response action.

The cost of implementing each alternative is weighed against the overall reduction in risk to the public. For example, if two alternatives provide an equal or comparable amount of protection, the less expensive alternative would provide the greatest benefit for the dollars spent and, therefore, would be ranked as the better alternative in terms of cost.

6.2.4 Applicable or Relevant and Appropriate Requirements

Section 121 of CERCLA requires that site cleanups comply with Federal ARARs, or state ARARs in cases where these requirements are more stringent than Federal requirements. ARARs are derived from both Federal and state laws. Under CERCLA Section 121(d)(2), the Federal ARARs for remedial action could include requirements under any of the Federal environmental laws (e.g., Resource Conservation and Recovery Act (RCRA)). State ARARs include promulgated requirements under state environmental or facility siting laws that are more stringent than Federal ARARs and that have been identified in a timely manner, according to 40 CFR Part 300.400(g)(4). A requirement may be either “applicable” or “relevant and appropriate.” Applicable requirements are defined as those cleanup or control standards, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state laws. Applicable requirements are identified on a site-specific basis by determination of whether the jurisdictional prerequisites of a requirement fully address the circumstances at the site or the proposed remedial activity. All pertinent jurisdictional prerequisites must be met for the requirement to be applicable. These jurisdictional prerequisites are as follows:

- The party must be subject to the law;
- The substances or activities must fall under the authority of the law;
- The law must be in effect at the time the activities occur; and
- The statute or regulation requires, limits, or protects the types of activities.

A requirement is applicable if the specific terms (or jurisdictional prerequisites) of the statute or regulation directly address the circumstances at the site. If not applicable, a requirement may be relevant and
appropriate if circumstances at the site are sufficiently similar to the problems or situations regulated by
the requirement. “Relevant and appropriate” refers to those clean-up standards, or other substantive
environmental protection requirements, criteria, or limitations promulgated under Federal or state law,
which, while not necessarily applicable, address problems or situations sufficiently similar to those
encountered at the CERCLA site, and whose use is well suited to the particular site (USEPA, 1993). The
relevance and appropriateness of a requirement can be judged by comparing a number of factors
including the characteristics of the remedial action, the items in question, or the physical circumstances
of the site, with those addressed in the requirement. If there is sufficient similarity between the requirements
and circumstances at the site, determination of the requirement as relevant and appropriate may be
made. Determining whether a requirement is both relevant and appropriate is a two-step process. First, to
determine relevance, a comparison is made between the response action, location, or chemicals covered
by the requirement and related conditions at the site, release, or potential remedy. A requirement is
relevant if it generally pertains to these conditions. Second, to determine whether the requirement is
appropriate, the comparison is further refined by focusing on the nature of the items, the characteristics of
the site, the circumstances of the release, and the proposed response action. The requirement is
appropriate if, based on such comparison; its use is well suited to the particular site. The facility must
comply with requirements that are determined to be both relevant and appropriate.

In addition to ARARs, nonpromulgated advisories or guidance referred to as “to be considered” (TBC)
materials may also apply to the conditions found at a site. TBCs are not legally binding.

Removal actions, pursuant to CERCLA sections 104 (Superfund financed) and 106, shall attain ARARs
“to the extent practicable considering the exigencies of the situation…” 40 CFR § 415(j). In determining
whether compliance with ARARs is practicable, the urgency of the situation, the scope of the removal
action, and other appropriate factors shall be considered. In addition, all removal actions may result in the
selection of alternatives that will not attain ARARs if any of six conditions for a waiver of ARARs exists.
However, the selected alternative must be protective even if an ARAR is waived. Only five of the
conditions for a waiver may apply to a Department of Defense (DOD) site. The six conditions for a waiver
are as follows:

- The removal action selected is only part of a total response action that will attain such level or
  standard of control when completed;
- Compliance with such a requirement at a particular site will result in greater risk to public safety and
  the environment (i.e., worker safety) than alternative options;
- Compliance is technically impracticable from an engineering perspective;
- The removal action selected will result in a standard of performance that is equivalent to an
  applicable requirement through the use of another method or approach;
- A state requirement has not been equitably applied in similar circumstances on other removal actions
  within the state; and
- ARARs that govern actions at CERCLA sites fall into three broad categories based upon the chemical
  contaminants present, site characteristics, and alternatives proposed for cleanup. These three
categories (chemical specific, location specific, and action specific) are described in the following
subsections.

6.2.4.1 Chemical-Specific ARARs

Chemical-specific ARARs include those environmental laws and regulations that regulate the release to
the environment of materials with certain chemical or physical characteristics or that contain specified
chemical compounds. These requirements generally set health- or risk-based concentration limits or
discharge limits for specific hazardous substances by media. Chemical-specific ARARs are triggered by
the specific chemical contaminants found at a particular site. As the removal of MEC is the sole aim of
this project, no chemical-specific ARARs or TBCs have been identified for this project.
6.2.4.2 Location-Specific ARARs

Location-specific ARARs govern activities in certain environmentally sensitive areas. These requirements are triggered by the particular location and the proposed activity at the site. Location-specific ARARs, for example, focus on wetland or floodplain protection areas, or on archaeologically significant areas.

6.2.4.3 Action-Specific ARARs

Action-specific ARARs are restrictions that define acceptable treatment and disposal procedures for hazardous substances. These ARARs generally set performance, design, or other similar action-specific controls or restrictions on particular activities. An example might be a state Air Quality Management Authority that sets limitations on fugitive dust generated during grading and excavation activities during a removal action.

6.2.4.4 To Be Considered

TBCs are non-promulgated criteria, advisories, guidance, and policies. Unlike ARARs, identification of and compliance with TBCs are not mandatory. However, where a TBC is used as a cleanup level, its use for this purpose should be explained and justified.

In determining whether a requirement was pertinent to future munitions response actions, potential ARARs were initially screened for applicability. If determined not to be applicable, the requirement was then reviewed for both relevance and appropriateness. Requirements that are considered relevant and appropriate command the same importance as applicable requirements. Potential Federal ARARs determined to be specific to the RG-01 site are listed in Table 6-1.

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Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
<thead>
<tr>
<th>ARAR/TBC TYPE</th>
<th>CITATION</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL-SPECIFIC ARARs</td>
<td></td>
<td></td>
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<tr>
<td>FEDERAL</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
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<tr>
<td>STATE</td>
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<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCATION-SPECIFIC ARARs</td>
<td></td>
<td></td>
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<tr>
<td>FEDERAL</td>
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</tr>
<tr>
<td>Clean Water Act (CWA)</td>
<td>40 CFR 320.1 et seq., 401, 404 et seq.</td>
<td>Establishes criteria for evaluating effects to waters of the U.S. (including wetlands) and sets factors for considering mitigation measures.</td>
<td>Potential ARAR for material stockpiling, placement of equipment, UXO/MEC detonation, and any site excavation work within rivers, streams, tidal areas, and wetlands.</td>
</tr>
<tr>
<td>Federal Coastal Zone Management Act</td>
<td>16 USC 1451 et seq., 15 CFR 923</td>
<td>Requires federal agencies conducting activities affecting the coastal zone must be consistent with the approved state coastal zone management program.</td>
<td>Potential ARAR for material stockpiling, placement of equipment, UXO/MEC detonation, and any site excavation work within the coastal management zone.</td>
</tr>
<tr>
<td>Endangered Species Act (ESA)</td>
<td>16 USC 1531; 50 CFR 200-402</td>
<td>Establishes requirements for the protection of federally listed threatened and endangered species and their habitat.</td>
<td>Potential ARAR for activities that may affect threatened or endangered species and their habitat.</td>
</tr>
<tr>
<td>Safe Drinking Water Act</td>
<td>40 CFR 141.1 et seq.</td>
<td>Establishes requirements for the protection of public water supply systems.</td>
<td>Potential ARAR for surface water sources that are used as a drinking water supply.</td>
</tr>
<tr>
<td>Fish and Wildlife Coordination Act (FWCA)</td>
<td>16 USC 661 (FWCA)</td>
<td>Prohibits water pollution from any substance that might affect fish, plant life, or bird life.</td>
<td>Potential ARAR for activities that may affect essential fish and wildlife and their habitat.</td>
</tr>
<tr>
<td>Protection of Wetlands</td>
<td>Executive Order 11990</td>
<td>Requires consideration of effects to wetlands in order to minimize their destruction, loss, or degradation and to preserve/enhance wetland values.</td>
<td>Potential TBC for material stockpiling, placement of equipment, MEC detonation, and any site excavation work within tidal areas and wetlands.</td>
</tr>
<tr>
<td>Federal Magnuson-Stevens Fishery</td>
<td>16 USC Section 1851 et seq.</td>
<td>Requires project activities to minimize adverse effects on fish habitat.</td>
<td>Potential ARAR for activities that may affect fish habitat including water quality. Activities will be</td>
</tr>
<tr>
<td>ARAR/TBC TYPE</td>
<td>CITATION</td>
<td>DESCRIPTION</td>
<td>COMMENTS</td>
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</tr>
<tr>
<td>Conservation and Management Act (1996)</td>
<td></td>
<td>Managed to minimize adverse effects to fish, habitat, and water quality.</td>
<td></td>
</tr>
<tr>
<td>The Migratory Bird Treaty Act</td>
<td>16 USC 701-712</td>
<td>Requires project activities to minimize adverse effects on migratory birds.</td>
<td>Potential ARAR for activities that may affect migratory birds or their habitat.</td>
</tr>
<tr>
<td>The Bald and Golden Eagle Protection Act</td>
<td>16 USC 668-668(d)</td>
<td>Requires project activities to protect and preserve eagle habitat found at Adak.</td>
<td>Potential ARAR for activities that may affect bald and golden eagles or their habitat.</td>
</tr>
<tr>
<td>Marine Mammals Protection Act</td>
<td>16 USC 1361, 50 CFR 12</td>
<td>Requires project activities to protect marine mammals.</td>
<td>Potential ARAR for activities in marine waters, coastal zones, and aquatic areas that may affect marine mammals or their habitat.</td>
</tr>
<tr>
<td>Archaeological Resources Protection Act (ARPA)</td>
<td>16 USC 470aa</td>
<td>Provides for the protection of archaeological resources located on public lands.</td>
<td>Potential ARAR for the management of any archaeological resources encountered on site.</td>
</tr>
<tr>
<td>National Historic Preservation Act (NHPA)</td>
<td>USC 470 et seq.</td>
<td>Requires consideration of affects to historic and cultural resources.</td>
<td>Potential ARAR for site activities, which could affect historic and cultural resources.</td>
</tr>
<tr>
<td>Federal Water Quality Act</td>
<td>Federal Water Quality Act (Section 304)</td>
<td>Requires attaining water quality criteria where they are relevant based on designated water use. Levels are provided for the protection of human health and aquatic life.</td>
<td>Potential ARAR for chemical releases from UXO items.</td>
</tr>
<tr>
<td>Coastal Zone Management Act</td>
<td>(16 USC 1451-1464; 15 CFR 921-933)</td>
<td>Federal projects that are anticipated to affect a coastal zone of a state with an approved State coastal zone management program (all coastal states except Georgia, Texas, Ohio, Indiana, Illinois, and Minnesota) must be consistent with the state’s plan.</td>
<td>Potential TBC for activities that could impact coastal resources including material stockpiling, vegetation clearing, MEC detonation and excavation/soil disturbances impacting onsite coastal resources.</td>
</tr>
<tr>
<td>Endangered Species Act (ESA)</td>
<td>(16 USC 1531-1544; 50 CFR 17, 401-424, 450-453)</td>
<td>Requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat.</td>
<td>All NTCRAs must be performed in accordance with these requirements through completion of a species presence determination, performance of a biological assessment, completion of a biological opinion, and if required due to expected impacts, completion of an application of exemption.</td>
</tr>
</tbody>
</table>
Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
<thead>
<tr>
<th>ARAR/TBC TYPE</th>
<th>CITATION</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATE of ALASKA</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Alaska Water Quality Standards</td>
<td>18 AAC 70</td>
<td>Specifies standards for fresh and marine water including inorganics, hydrocarbons, and other toxic substances. (Based on Federal maximum contaminant levels and Alaska drinking water standards.)</td>
<td>Potential ARAR for UXO chemical releases.</td>
</tr>
<tr>
<td>Alaska Oil and Hazardous Substances Pollution Control Regulations</td>
<td>18 ACC 75</td>
<td>A release of a hazardous substance must be cleaned up to the most stringent cleanup level listed.</td>
<td>Potential ARAR for UXO chemical releases.</td>
</tr>
<tr>
<td>Alaska Coastal Management Program administered by Alaska Department of Fish and Game</td>
<td>6 AAC 50</td>
<td>Specifies the policies, standards, and limitations applicable to effects to coastal resources.</td>
<td>Potential TBC for activities that could impact coastal resources including material stockpiling, vegetation clearing, MEC detonation and excavation/soil disturbances impacting onsite coastal resources.</td>
</tr>
<tr>
<td>Alaska Wetlands Management Program</td>
<td></td>
<td>Specifies requirements for disturbances to freshwater wetlands and their buffers.</td>
<td>Potential TBC for material stockpiling, vegetation clearing, MEC detonation and excavation/soil disturbances within the on-site freshwater wetlands and buffer areas.</td>
</tr>
<tr>
<td><strong>ACTION-SPECIFIC ARARs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CERCLA</td>
<td>CERCLA Section 121</td>
<td>Remedial action conducted on a CERCLA site must satisfy the substantive requirements of an ARAR.</td>
<td>Potential ARAR when following CERCLA procedural and administrative requirements.</td>
</tr>
<tr>
<td>Clean Air Act</td>
<td>40 CFR 51.40 et seq.</td>
<td>National Ambient Air Quality Standard for Particulate Matter.</td>
<td>Potential ARAR for detonation activities that may generate particulate matter emissions.</td>
</tr>
<tr>
<td>DoD Ammunition and Explosives Safety Standards</td>
<td>DoD 6055.9 STD</td>
<td>DoD standard issued under the DDESB which establishes policies and procedures necessary to provide protection to personnel as a result of DoD ammunition, explosives, or chemical agents and contamination of real property currently or formerly owned, leased, or used by DoD.</td>
<td>Potential TBC for identifying default clearance depths.</td>
</tr>
</tbody>
</table>
Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
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<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Waste Generation</td>
<td>40 CFR 261</td>
<td>Requirements for the identification of hazardous waste.</td>
<td>Potential ARAR for the identification of potentially contaminated materials, including MEC as a potentially reactive (D003) or toxic (D008) hazardous waste.</td>
</tr>
<tr>
<td></td>
<td>40 CFR 262</td>
<td>Requirements for generators of hazardous waste.</td>
<td>Potential ARAR for the generation, storage, and packaging of contaminated material, including MEC as a potentially reactive (D003) or toxic (D008) hazardous waste.</td>
</tr>
<tr>
<td>Transportation of Hazardous Waste</td>
<td>40 CFR 263</td>
<td>Requirements applicable to transporters of hazardous waste.</td>
<td>Potential ARAR for the on-site transportation of MEC as hazardous waste.</td>
</tr>
<tr>
<td>Storage of Hazardous Waste</td>
<td>40 CFR 265.250</td>
<td>Specifies requirements for the design and operation of hazardous waste stockpile/storage areas.</td>
<td>Potential ARAR for the on-site stockpiling of contaminated materials.</td>
</tr>
<tr>
<td>RCRA Management of Military Munitions</td>
<td>Military Munitions Rule (40 CFR 260 through 265 and 270)</td>
<td>Amendments to hazardous waste identification and management rules for military munitions, and definition of explosive emergencies.</td>
<td>Potential ARAR for removal and management of unexploded ordnance pursuant to RCRA.</td>
</tr>
<tr>
<td></td>
<td>49 CFR 172.700-704</td>
<td>Requirements for DOT training.</td>
<td>Potential ARAR for on-site workers engaged in a DOT function.</td>
</tr>
<tr>
<td></td>
<td>49 USC 1803, 1804, 1808</td>
<td>Establishes guidelines for the transport of hazardous materials and substances by land, sea, or air.</td>
<td>Potential ARAR for transport of hazardous materials and substances by land, sea, or air, if off-site transport should become necessary.</td>
</tr>
</tbody>
</table>
# Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
<thead>
<tr>
<th>ARAR/TBC TYPE</th>
<th>CITATION</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean Water Act (CWA)</td>
<td>40 CFR 401, et seq.</td>
<td>Establishes criteria and requirements for protection of storm water discharges.</td>
<td>Potential ARAR for discharge of materials into storm water associated with disrupting ground surface during excavation activities.</td>
</tr>
<tr>
<td>Environmental and Natural Resources Program Manual (Navy)</td>
<td>OPNAVINST 5090.1B</td>
<td>Navy guidance manual on environmental and natural resources operations.</td>
<td>Potential TBC for operations that may impact environmental and natural resources.</td>
</tr>
<tr>
<td>Hazardous Waste Generation</td>
<td>18 AAC 62.010</td>
<td>Requirements for the identification of hazardous waste.</td>
<td>Potential ARAR for the identification of potentially contaminated materials, including MEC as a potentially reactive (D003) or toxic (D008) hazardous waste.</td>
</tr>
<tr>
<td></td>
<td>18 AAC 62.200</td>
<td>Requirements for generators of hazardous waste.</td>
<td>Potential ARAR for the generation, storage, and packaging of potentially contaminated materials, including MEC as a potentially reactive (D003) or toxic (D008) hazardous waste.</td>
</tr>
<tr>
<td>Storage and Treatment of Hazardous Waste</td>
<td>18 AAC 62.400</td>
<td>Specifies requirements for the design and operation of hazardous waste stockpile/storage areas and for the thermal treatment of hazardous waste.</td>
<td>Potential ARAR for the stockpiling of contaminated materials and detonation of MEC/UXO.</td>
</tr>
<tr>
<td>Transportation of Hazardous Waste</td>
<td>18 AAC 62.300</td>
<td>Requirements applicable to transporters of hazardous waste.</td>
<td>Potential ARAR for the on-site transportation of MEC as hazardous waste.</td>
</tr>
<tr>
<td></td>
<td>RCRA</td>
<td>Requirements applicable to transporters of hazardous waste</td>
<td>Potential ARAR for off-site transportation.</td>
</tr>
<tr>
<td>Hazardous Waste Land Disposal Regulations</td>
<td>18 AAC 62.600</td>
<td>Requirements for the land disposal and storage of hazardous waste, and treatment standards for hazardous waste.</td>
<td>Potential ARAR for the disposal of any MEC/UXO that is designated as a hazardous waste.</td>
</tr>
<tr>
<td>Air Quality Protection</td>
<td>18 AAC 50.110</td>
<td>Requirements for the prevention of any air emissions that may be injurious to human health or welfare, animal or plant life, or property, or which would unreasonably interfere with the</td>
<td>Potential ARAR for the detonation activities that may generate particulate matter emissions.</td>
</tr>
<tr>
<td></td>
<td>18 AAC 50.030</td>
<td></td>
<td>Potential ARAR for the project activities that may generate particulate matter emissions, including dust.</td>
</tr>
</tbody>
</table>
### Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
<thead>
<tr>
<th>ARAR/TBC TYPE</th>
<th>CITATION</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solid Waste</strong></td>
<td><strong>Transportation</strong></td>
<td>18 AAC 60</td>
<td>Requires the registration of solid waste transporters and their vehicles.</td>
</tr>
<tr>
<td><strong>Water Quality</strong></td>
<td>18 AAC 70</td>
<td>Requires protection of groundwater and surface water from discharges of water containing contaminants.</td>
<td>Potential ARAR for the MEC/UXO excavation and disposal activities.</td>
</tr>
<tr>
<td><strong>STATE ACTION-SPECIFIC ARARs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Emissions Control</td>
<td></td>
<td>Requires control of air emissions of volatile organics, particulates, and gaseous contaminants.</td>
<td>Would apply to response actions involving earthworks and generation of dust and particulates.</td>
</tr>
<tr>
<td><strong>CONTAMINANT–SPECIFIC ARARs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Air Act (CAA)</td>
<td>(42 USC 1857-18571; 40 CFR 50-100)</td>
<td>CAA regulates releases of specific substances into the air. Pursuant to the CAA, USEPA has promulgated National Ambient Air Quality Standards (40 CFR 50), National Emission Standards for Hazardous Air Pollutants (40 CFR 61), and New Source Performance Standards (40 CFR 60, 63).</td>
<td>These standards must be consulted to identify those applicable to expected air releases resulting from MEC response actions, which utilize commercially available equipment to demilitarize explosives.</td>
</tr>
<tr>
<td>Clean Water Act</td>
<td>(33 USC 1251-1387; 40 CFR 100-149)</td>
<td>The objective of CWA is to restore and maintain the chemical, physical, and biological integrity of the nation's waters.</td>
<td>The CWA regulations that are most likely to apply to MEC response actions include: surface water quality standards, permitting for direct discharges into surface waters, standards for indirect discharges into surface waters, standards for indirect discharges to Publicly Owned Treatment Works, control of discharges of dredge and fill materials into surface waters, and storm water management requirements.</td>
</tr>
<tr>
<td>Fish and Wildlife Coordination Act</td>
<td>(16 USC 661-666)</td>
<td>A project, which will result in the structural modification of a natural stream or body of water, must conform to the requirements of the Fish and Wildlife Coordination Act.</td>
<td>The statute requires consultation with the USFWS to develop any appropriate protective measures before implementation of the project.</td>
</tr>
</tbody>
</table>
### Table 6-1: ARARs and TBCs Applicable for RG-01

<table>
<thead>
<tr>
<th>ARAR/TBC TYPE</th>
<th>CITATION</th>
<th>DESCRIPTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATE of ALASKA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alaska Water Quality Standards</td>
<td>(18 AAC 70)</td>
<td>Substances may not exceed specified standards for both fresh and marine waters for parameters such as inorganics, hydrocarbons, and toxic substances. (Based on Federal maximum contaminant levels and Alaska drinking water standards.)</td>
<td>Potential ARAR for UXO chemical releases</td>
</tr>
<tr>
<td>Alaska Oil and Hazardous Substances</td>
<td>(18 AAC 75.330)</td>
<td>A discharge or release of a hazardous substance must be cleaned up to the most stringent cleanup level listed.</td>
<td>Potential ARAR for UXO chemical releases</td>
</tr>
<tr>
<td>Pollution Control Regulations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Acronyms and Abbreviations

- **ARAR** = Applicable or Relevant and Appropriate Requirement
- **ARPA** = Archaeological Resources Protection Act
- **CAA** = Clean Air Act
- **CFR** = Code of Federal Regulations
- **DOD** = Department of Defense
- **DOT** = Department of Transportation
- **EO** = Executive Order
- **ESA** = Endangered Species Act
- **NAGPRA** = Native American Graves Protection and Repatriation Act
- **MEC** = Munitions and Explosive of Concern
- **RCRA** = Resource Conservation and Recovery Act
- **TBC** = To Be Considered
- **USC** = U.S. Code
- **USEPA** = U.S. Environmental Protection Agency
- **UXO** = Unexploded Ordnance
6.3 COMPARATIVE SCREENING OF THE SELECTED ALTERNATIVES

This section describes the results for the screening of the three selected alternatives against the evaluation criteria. The ESHA risk level determined in Section 5 for the RG-01 Area was used as the basis for the effectiveness rankings throughout this comparative analysis of the three munitions response action alternatives.

Under the system used to rank the response action alternatives, each alternative is ranked numerically from 1 to 3 for each criterion. The NAI and Construction Support alternatives are rated as Not Applicable (NA). The alternative that is determined to be the best alternative, when assessed with the criterion, receives a numerical ranking of 1. The second best alternative receives a numerical ranking of 2, and so forth. Once the numerical ranking has been determined for the three criteria (effectiveness, implementability, and cost) the overall score is determined by adding up the individual numerical rankings for each alternative. An alternative ranked “3” for effectiveness, “1” for implementability, and “3” for cost would have an overall score of “7”. The overall scores are used to arrange the alternatives in rank order, with the lowest score being ranked the highest.

Using this comparative evaluation and ranking process, an analysis of the three selected munitions response alternatives was performed for RG-01.

Institutional Controls, although evaluated as a separate munitions response action alternative in this comparative analysis, may be recommended in conjunction with a surface and/or subsurface removal action or may be recommended as a site-wide munitions response action.

6.3.1 EFFECTIVENESS

Table 6-2 provides the ranking of effectiveness criteria of the five alternatives.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Protective of Public Safety</th>
<th>Compliance with ARARs</th>
<th>Long-Term</th>
<th>Short-Term</th>
<th>Overall Score</th>
<th>Overall Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Action Indicated</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Alternative 3: Surface Removal of MEC and MD</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Alternative 4: Surface and Subsurface Removal of MEC and MD</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Alternative 5: Construction Support</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Ranking from best to worst; best = 1.

**Protection of Public Safety:** Because the ESHA risk level of D indicates a need to protect public safety, Alternative 4 receives the highest ranking. Subsurface removal is more protective of public safety than
the other alternatives. Although the Institutional Controls alternative would educate the public concerning the risk associated with MEC, it does not provide sufficient protection of public safety.

**Compliance with ARARs:** Subsurface removal is ranked best because it meets more ARARs than a surface clearance or Institutional Controls. Surface removal meets more ARARs than Institutional Controls and is ranked second.

**Long-term Effectiveness:** The subsurface removal alternative is ranked best because it would eliminate any buried MEC in the area. The surface removal alternative is ranked second. Institutional Controls provide protection over the long term by encouraging avoidance of the hazards, but do not ensure such avoidance.

**Short-term Effectiveness:** The Institutional Controls alternative is ranked best because it reduces risk upon implementation, requires little time to implement, and has minimal adverse effects on the public and the environment. The surface removal alternative is ranked second best as it reduces risk upon implementation, requires less time and effort to implement than subsurface removal, and results in few public and environmental impacts. The subsurface removal alternative is ranked third because it requires more planning and has more of an impact on the environment.

**Overall Effectiveness Ranking:** Because it is the most protective of public safety over the long term, Alternative 4 receives the highest ranking. Surface removal is slightly less protective of public safety over the long term than subsurface removal, but more so than Institutional Controls. Although the Institutional Controls alternative would provide advantages of educating the public over the short term concerning the risk associated with MEC, it does not provide sufficient protection of public safety.

### 6.3.2 IMPLEMENTABILITY

Table 6-3 provides the implementability criteria of the three alternatives for RG-01. The evaluation of each of these alternatives is presented below.

#### Table 6-3: Implementability Criteria Evaluation

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Technical Feasibility</th>
<th>Admin Feasibility</th>
<th>Services and Materials</th>
<th>State Agency Acceptance</th>
<th>Community Acceptance</th>
<th>Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Action Indicated</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Alternative 3: Surface Removal of MEC and MD</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Alternative 4: Surface and Subsurface Removal of MEC</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>
Alternative 5: 
Construction Support

| NA | NA | NA | NA | NA | NA | NA | NA |

Note: Ranking from best to worst; best = 1.

Technical and Administrative Feasibility: Implementing Alternative 2 would be easier than implementing any of the other alternatives, from both an administrative and a technical feasibility perspective. The supplies and personnel needed to conduct educational programs, and implement and oversee use restrictions are currently in place and readily available. Alternative 2 could be accomplished in a relatively shorter length of time than that required to implement a removal action. Since an ordnance awareness program is already in place that executes Alternative 2, administratively this alternative should be the easiest. Therefore, Alternative 2 is ranked first from a technical and administrative feasibility standpoint.

From technical and administrative perspectives, implementation of a subsurface removal is the least feasible. Unlike surface removal, a subsurface removal requires excavation equipment (in addition to specially trained and qualified personnel and a means of MEC disposal, which is required for all removal actions). Work plans and removal reports are more difficult to document. The subsurface removal alternative generally requires more logistical and management support than the surface removal alternative. Therefore, subsurface removal is ranked last in terms of technical feasibility, as it would take more time and effort to implement than surface removal.

Services and Materials: Alternative 2 is ranked first because the supplies and personnel needed to conduct educational programs and oversee the use restrictions are readily available. Unlike a surface removal (Alternative 3), implementation of a subsurface removal requires excavation equipment (in addition to specially trained and qualified personnel and a means of MEC disposal). Therefore, Alternative 4 is ranked last for availability of services and materials.

State Agency Acceptance: Based on interaction with agency representatives to date and considering the high MEC risk level and the land use, it was determined that the regulatory agencies are likely to consider the subsurface removal alternative as the most acceptable alternative in this area. Therefore, the subsurface removal alternative is ranked best in terms of state agency acceptance. Surface removal is ranked second in terms of state agency acceptance, as state agencies are likely to be less enthusiastic about a clearance that does not address subsurface risks. Institutional Controls are ranked third, as state agencies are likely to prefer a response action that addresses removal of the hazards.

Community Acceptance: Based on stakeholder concerns, the community is likely to consider Alternative 4 as the most acceptable alternative since the MEC risk level is high in this area. Therefore, Alternative 4 is ranked best in terms of community acceptance. Alternative 3 is ranked second in terms of community acceptance. The community acceptance ranking has been assumed based on a general perception of the requirements of the local stakeholders and regulators. Any comments received from the public during the public comment period that are different from the assumptions listed in this discussion will result in reassessment of these assumptions.

Overall Implementability Ranking: Alternative 2 is ranked highest due to its relative ease of implementation. Alternative 3 is ranked as second highest. Although it scores last because of its requirement for significant resources, Alternative 4 is probably the most acceptable alternative for stakeholders.
6.3.3 Cost

Table 6-4 provides the cost criteria of the three alternatives. The evaluation of each of these alternatives is presented below.

Table 6-4: Cost Criteria Evaluation

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Cost</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Action Indicated</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls (Based on site wide - $50K/Yr, for 30 years)</td>
<td>$68,182</td>
<td>1</td>
</tr>
<tr>
<td>Alternative 3: Surface Removal of MEC and MD</td>
<td>$635,180</td>
<td>2</td>
</tr>
<tr>
<td>Alternative 4: Subsurface Removal of MEC</td>
<td>$849,809</td>
<td>3</td>
</tr>
<tr>
<td>Alternative 5: Construction Support</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Ranking from best to worst; best = 1

Overall Cost Ranking: Alternative 2 Institutional Controls is ranked best in terms of cost.

6.4 OVERALL RANKING OF ALTERNATIVES

The overall ranking of the different alternatives in terms of their effectiveness, implementability, and cost is presented in Table 6-5. The alternative with the lowest score is considered best for each criterion (effectiveness, implementability, and cost) evaluated.

Table 6-5: Alternatives Evaluation

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Effectiveness Rank</th>
<th>Implementability Rank</th>
<th>Cost Rank</th>
<th>Overall Score</th>
<th>Overall Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Action Indicated</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Alternative 3: Surface Removal of MEC and MD</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Alternative 4: Subsurface Removal of MEC</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Alternative 5: Construction Support</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Note: Ranking from best to worst; best = 1.

Alternative 2 Institutional Controls has the best overall ranking. Alternative 3 Surface Removal ranks second. Alternative 4 is ranked third as recommended alternatives for RG-01. Specific recommendations for RG-01 are provided in Section 8.0.

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7.0 INSTITUTIONAL CONTROL PLAN

Institutional Controls are mechanisms that protect property owners and the local community from residual risks associated with MEC potentially remaining at the site. Institutional Controls utilize education and land use restrictions to minimize or eliminate public exposure to MEC. Institutional Control strategies are appropriate where risk to the public has been documented as low and can be managed without the removal of MEC.

Because of the remoteness of the site, existing access controls, and the potential types of MEC that may be present, the most practical and effective access control is a behavior modification alternative that may include establishment of warning signs, as well as informing the public of potential MEC items and the threat associated with those items. Other access-control alternatives, such as dedication of property to appropriate land uses, land-use restrictions, training or educating facility users/managers, and fencing or barriers, may also be considered as potential Institutional Controls.

The overall effectiveness of Institutional Controls depends entirely on local agencies and private landowner support, involvement, and willingness to enforce and maintain Institutional Controls that are implemented as a means to eliminate public interaction with MEC.

As Institutional Controls for the formal Naval Air Facility have already been established and are currently in place, an Institutional Analysis of the RG-01 site was not performed as part of this EE/CA. Institutional Controls for RG-01 will be incorporated into and implemented in the existing Institutional Controls Plan for the formal Naval Air Facility.

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8.0 RECOMMENDED RESPONSE ACTION ALTERNATIVES

This section presents the recommendations for reducing MEC risk at the RG-01 site. Munitions response alternatives were evaluated using the following data:

- The type, quantity, location, and depth of MEC and MD;
- Past, current, and future land use; and
- Input from local agencies, stakeholders, and the community.

Based on this evaluation, it was determined that the implementation of Alternative 4 (Surface and Subsurface Removal) supplemented with Alternative 2 (Institutional Controls) represents the best approach for RG-01. Alternative 3 was considered in place of Alternative 4 in this evaluation, but since the additional cost was only 17%, Alternative 4 was selected over Alternative 3. As such, the recommended response action alternatives for the RG-01 Area are summarized in Table 8-1.

Table 8-1: Recommended Response Actions

<table>
<thead>
<tr>
<th>Area</th>
<th>Recommended Response Alternative(s)</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former Rifle Grenade Range (RG-01)</td>
<td>Alternative 4: Surface and Subsurface Removal of MEC and MD: 100 percent removal of surface and subsurface MEC and MD to the depth of detection, but not to exceed the depth to bedrock or 2 feet. Alternative 2: Institutional Controls: Continue to implement and modify the existing U.S. Navy established Institutional Controls and long-term management of the project site for the RG-01 Area.</td>
<td>$849,809</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$68,182</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$917,991</td>
</tr>
</tbody>
</table>

The recommended response alternatives are protective of the public and the environment and effectively manage the risk associated with exposures to MEC at RG-01. The selected response action alternatives will be published in a stand-alone Action Memorandum for the RG-01 site following receipt and consideration of public and state comments. Supporting information on the selection of the Recommended Response Action is presented in subsequent sections.

8.1 NO ACTION INDICATED

Based on the results of the ESHA, the NAI (Alternative 1) was not an acceptable alternative because it was not protective of the public, and was therefore not evaluated.
8.2 INSTITUTIONAL CONTROLS

Since site wide Institutional Controls (Alternative 2) for the formal Naval Air Facility have already been established and are currently active, an Institutional Analysis of the RG-01 site was not performed as part of this EE/CA. The U.S. Navy will continue maintaining the existing Institutional Controls of the entire project site after the MEC removal action is completed. In addition, the costs associated with the existing Institutional Controls are assumed to remain at the current levels incurred on Adak for the performance of MEC awareness programs at all sites including RG-01. This cost includes implementation of the program, ordnance awareness materials and updates, travel to the site as required, and maintenance of the Web page (Foster Wheeler Environmental, 2004).

Table 8-2 provides the estimated costs for the Institutional Controls for Area RG-01 for the next 30 years.

<table>
<thead>
<tr>
<th>Response Action: Alternative 2</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on $50,000/Yr, for 30 years, for 22 Operable Units (Foster Wheeler Environmental, 2004). Long Term Management - 30 years of Recurring Reviews at 5-year intervals for the RG-01</td>
<td>$1,500,000 / 22 = $ 68,182</td>
</tr>
</tbody>
</table>

8.3 PHYSICAL REMOVALS

8.3.1 SURFACE AND SUBSURFACE REMOVAL OF MEC AND MD

Although ranked as third in the alternatives analysis in Section 6, Alternative 4 is recommended as a response action to reduce the potential MEC risks at the former –RG-01. This response action includes 100% surface and subsurface removal of MEC and MD, down to maximum depth of detection, from the entire 16 acres of the RG-01 project site. The cost estimate for this recommended response action is provided in following sections. Detailed cost breakdowns for all response alternatives are provided in Appendix B. The recommendation of Alternative 4 as the response action for the RG-01 Area is based on the following:

- The presence of dangerous MEC (40mm grenades, 60mm mortars, and 81mm mortars) suggests a bias toward removal action.
- This alternative is ranked highest in terms of effectiveness and protection of public safety over the long term.
- This alternative can be obtained for a slightly higher cost (17 percent) than the Surface Removal alternative.
- Stakeholders and regulators would consider Alternative 4 as the most acceptable response alternative.

Table 8-3 provides estimated costs for the Surface and Subsurface Removal of MEC and MD, Alternative 4.
Table 8-3: Estimated Costs for Alternative 4

<table>
<thead>
<tr>
<th>Response Action: Alternative 4</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove all detectable surface and subsurface MEC and MD to the depth of detection of the metal detectors a, but not to exceed the depth to bedrock or 2 feet. (A total of 16 acres).</td>
<td>$849,809</td>
</tr>
</tbody>
</table>

8.3.2 SURFACE REMOVAL OF MEC AND MD

Although ranked higher than the Surface and Subsurface Removal response alternative, Surface Removal only is not recommended for RG-01 due to the potential for encounters with MEC below ground surface. The estimated cost for the Surface Removal of MEC and MD (Alternative 3) totals $611,272.

Table 8-4 provides the estimated cost for Surface Removal of MEC and MD.

Table 8-4: Estimated Costs for Alternative 3

<table>
<thead>
<tr>
<th>Response Action: Alternative 3</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetometer Assisted 100% Surface (only) Removal of MEC and MD in the RG-01 Area (a total of 16 acres).</td>
<td>$635,180</td>
</tr>
</tbody>
</table>

8.4 CONSTRUCTION SUPPORT

No future construction activities are anticipated at RG-01. Therefore, Alternative 5 was not evaluated.

8.5 IMPLEMENTATION OF THE RECURRING REVIEW PLAN

CERCLA, also known as the "Superfund Law," requires a review of cleanup actions at Superfund sites be conducted at least once every five years. The purpose of these five-year reviews is to ensure the cleanup solutions (remedies) chosen for a site are functioning properly and continue to protect human health and the environment.

CERCLA Section 121 states that remedial actions that result in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure will be reviewed every five years to ensure protection of human health and the environment. The U.S. Navy has started the process of gathering the information necessary for a second five-year review at the former Naval Complex on Adak Island. The former Naval Complex is divided into three "Operable Units": A, B-1, and B-2. OU A addresses hazardous substances and petroleum releases to the environment, while OU B-1 and OU B-2 address unexploded ordnance hazards. OU B-2 addresses explosive hazards for sites within Parcel 4, which is currently the only portion of the former Naval Complex where the U.S. Navy has retained ownership of the land. The sites that comprise OU A and OU B-1 (with the exception of portions of the Mt. Moffett area) are located on land where ownership has been transferred to various federal, state, and local entities. The U.S. Navy's first five-year review was completed in December of 2001 and focused on an assessment of remedies at OU A. Although much of the OU B-1 cleanup activities had not been completed at the time of the first review, the OU B-1 sites were also included in that first review report.
The government maintains responsibility for the residual risk at the site following implementation of the recommended munitions response actions by performing recurring reviews. The recurring reviews involve returning to the site five years after the recommended munitions response actions have been initiated to assess their effectiveness and reliability. After the initial review has been conducted, recurring reviews are performed at five-year intervals. The need for recurring reviews is coordinated with regulators and stakeholders and justified in each recurring review report.

The five-year review process evaluates how well the remedies selected in the RODs have performed over the past five years. The RODs are legal documents describing the selected cleanup actions, and provide a road map for petroleum, chemical, and ordnance cleanup in specific areas on the former military base. If the five-year review process identifies any problems related to these cleanup actions, recommendations for corrective measures are developed. An interim action ROD was signed in 1995 to address the Metals and Palisades landfills. The RODs for OU A and OU B-1 were prepared and signed by the U.S. Navy, the USEPA, and ADEC during 2000 and 2001, respectively. The ROD for OU B-2 has not yet been finalized. Therefore, while the five-year review will include some information on all three OUs, the focus of the second five-year review will be OU A and OU B-1.

The U.S. Navy is the lead agency for performing the five-year review, with USEPA and ADEC also participating in the review process. The U.S. Navy invites the City of Adak, TAC, and the Alaska Department of Transportation and Public Facilities to participate. Each of these entities own part of the former Adak Naval Complex. By including this diverse range of interests as part of the review team, the U.S. Navy expects to identify potential concerns regarding the protectiveness of the remedies at the former Naval Complex.

During the recurring review, the government assesses the continued effectiveness and reliability of the implemented munitions response actions by:

- Evaluating any changes that may have occurred in current and/or future land uses and their effect, if any, on the selected munitions response actions;
- Investigating reported MEC encounters that may have occurred since completion of the munitions response actions;
- Conducting interviews with local agencies regarding the effectiveness of public safety awareness programs and educational media; and
- Conducting visual spot inspections of the area to evaluate erosion effects (e.g., storms, wind, fires, and vegetation loss), display case condition, and the status of supplies and effectiveness of community awareness outreach programs and educational media.

The U.S. Navy continues to implement the existing recurring reviews and fund the implementation and update of Institutional Controls (i.e., educational media, notification letters, and public safety awareness meetings) for the former Naval Complex project site. Long-term implementation of Institutional Controls is the responsibility of landowners and local agencies.

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9.0 QUALITY CONTROL

Quality control management was performed during all aspects of the development of this EE/CA for the RG-01 project area. The methodology used was a system of final reviews utilizing different personnel within their area of expertise as it applies to each section of this document. Using this process instilled an approach that continuously improved the manner in which this document was developed. This process ensures that this document complies with the Data Item Descriptions for each section and the provisions of the contract. Following the peer review process, the QC Manager performed a review of the document for completeness and overall quality.

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10.0 REFERENCES


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A. COST BREAKDOWNS AND ASSUMPTIONS

A.1. COST ESTIMATES FOR COMPARATIVE ANALYSIS OF RESPONSE ALTERNATIVES

The following cost estimates were calculated for use in the comparative analysis of munitions response alternatives. They are not intended to represent actual costs of implementation. Estimated costs are based on the EE/CA site investigations, proven technologies, USACE procedures, and current MEC risk management. Table A-1 summarizes the estimated cost of each munitions response alternative.

A-1: ESTIMATED COST FOR EACH MUNITIONS RESPONSE ALTERNATIVE

<table>
<thead>
<tr>
<th>Munitions Response Alternatives</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: No Action Indicated</td>
<td>N/A</td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls (Based on $50K/Yr, for 30 years)</td>
<td>$68,182</td>
</tr>
<tr>
<td>Alternative 3: Surface Removal of MEC and Munitions Debris</td>
<td>$635,180</td>
</tr>
<tr>
<td>Alternative 4: Subsurface Removal of MEC</td>
<td>$849,809</td>
</tr>
<tr>
<td>Alternative 5: Construction Support</td>
<td>N/A</td>
</tr>
</tbody>
</table>

A.1.1. ALTERNATIVE 1: NO ACTION INDICATED

Under the No-Action Indicated alternative, no remedial activity would be attempted. There is no cost associated with Alternative 1.

A.1.2. ALTERNATIVE 2: INSTITUTIONAL CONTROLS

As the site wide Institutional Controls for the formal Naval Air Facility has already been established and currently active, an Intuitional Analysis of the RG-01 is not performed as part for this EE/CA. Currently, the costs associated with this alternative are assumed to remain at current levels (approximately $50,000 per year) being incurred on Adak for the performance of ordnance awareness programs. This cost includes implementation of the program, ordnance awareness materials and updates, travel to the site as required, and maintenance of the Web page, etc (Foster Wheeler Environmental, 2004). Table A-2 provides the fractional estimated costs associated with Institutional Controls for the RG-01 project site, projected for the next thirty years.

A-2: ESTIMATED COSTS FOR ALTERNATIVE 2

<table>
<thead>
<tr>
<th>Response Elements</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Action: Alternative 2: Based on $50,000/Yr, for 30 years, for 22 Operable Units (Foster Wheeler Environmental, 2004). Long Term Management - 30 years of Recurring Reviews at 5-year intervals for the RG-01</td>
<td>$1,500,000 / 22 = $ 68,182</td>
</tr>
</tbody>
</table>

A.1.3. ALTERNATIVE 3: SURFACE REMOVAL OF MEC AND MUNITIONS DEBRIS

Under this munitions response action, teams of UXO qualified technicians will remove and dispose of all surface MEC and munitions debris from the entire 16 acres of the RG-01 area. The UXO Team(s) will use metal detectors to aid the visual search. The teams will perform the surface removal under the direction of Project Management Team. Table A-3 provides cost details for the Surface Removal of MEC and munitions debris alternative.
## A-3: Alternative 3 Cost Estimates

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Team Personnel</th>
<th>Units</th>
<th>$/Unit</th>
<th>$/Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Management</td>
<td>Program Manager Contract Admin. Manager Contract Specialist Logistics Manager Program Health &amp; Safety Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer Support Equipment</td>
<td>1</td>
<td>$8,649.47</td>
<td>$8,649.47</td>
</tr>
<tr>
<td>2</td>
<td>General Work Plan</td>
<td>Program Manager Contract Administration Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$28,531.37</td>
<td>$28,531.37</td>
</tr>
<tr>
<td>3</td>
<td>Explosive Safety Submission</td>
<td>Program Manager Contract Administration Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$9,606.33</td>
<td>$9,606.33</td>
</tr>
<tr>
<td>4</td>
<td>EE/CA &amp; Memorandums</td>
<td>Program Manager Contract Administration Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$19,409.26</td>
<td>$19,409.26</td>
</tr>
<tr>
<td>5a</td>
<td>Adak Mobilization/Demobilization - Equipment</td>
<td>Equipment Specialist Contract Administration Manager</td>
<td>1</td>
<td>$150,326.50</td>
<td>$150,326.50</td>
</tr>
<tr>
<td>5b</td>
<td>Adak Mobilization/Demobilization - Personnel</td>
<td>Contract Administration Manager Senior UXO Supervisor UXO Safety Officer Program QC Manager UXO Quality Control Specialist 2 – UXO Technician Ills 9 – UXO Technician Ills Geophysical Instrument Operator Admin Specialist Emergency Medical Technician Support Equipment</td>
<td>1</td>
<td>$65,319.51</td>
<td>$65,319.51</td>
</tr>
<tr>
<td>6</td>
<td>CTO Kick-Off Meeting (Seattle) (Optional)</td>
<td>Contract Administration Manager Program QC Manager Program MEC Safety Officer Prime Project Manager Sub Project Manager</td>
<td>-</td>
<td>$11,196.49</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Regulatory Meeting (Anchorage)</td>
<td>Contract Administration Manager Program QC Manager Program MEC Safety Officer Prime Project Manager Sub Project Manager</td>
<td>1</td>
<td>$21,782.00</td>
<td>$21,782.00</td>
</tr>
<tr>
<td>7a</td>
<td>Regulatory &amp; Public Meetings (Anchorage) (Optional)</td>
<td>Contract Administration Manager Support Equipment</td>
<td>-</td>
<td>$3,710.48</td>
<td>-</td>
</tr>
</tbody>
</table>

**Phase 1 Subtotal** | **$303,624.44**
### A-1.4. ALTERNATIVE 4: SURFACE AND SUBSURFACE REMOVAL OF MEC AND MUNITIONS DEBRIS

Under this munitions response action, teams of UXO qualified technicians will use metal detectors to remove and dispose of all surface and subsurface MEC and munitions debris, down to the depth of detection, from the entire 16 acres of the RG-01 area. The teams will perform the surface and subsurface removal under the direction of Project Management Team. Table A-4 provides cost details for the Alternative 4.

#### A-4: ALTERNATIVE 4 COST ESTIMATES

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Team Personnel</th>
<th>Units</th>
<th>$/Unit</th>
<th>$/Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Project Management</td>
<td>Program Manager Contract Admin. Manager Contract Specialist Logistics Manager Program Health &amp; Safety Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$8,649.47</td>
<td>$8,649.47</td>
</tr>
<tr>
<td>2</td>
<td>General Work Plan</td>
<td>Program Manager Contract Admin. Manager Contract Specialist Logistics Manager Program Health &amp; Safety Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$28,531.37</td>
<td>$28,531.37</td>
</tr>
<tr>
<td>3</td>
<td>Explosive Safety Submission</td>
<td>Program Manager Contract Admin. Manager Contract Specialist Logistics Manager Program Health &amp; Safety Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$9,606.33</td>
<td>$9,606.33</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td>Team Personnel</td>
<td>Units</td>
<td>$/Unit</td>
<td>$/Extended</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------</td>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>4</td>
<td>EE/CA &amp; Memorandums</td>
<td>Program Manager Contract Administration Manager Senior Engineer Program MEC Safety Officer Program QC Manager Project Manager Staff Engineer GIS Manager Technical Writer Word Processor Support Equipment</td>
<td>1</td>
<td>$19,409.26</td>
<td>$19,409.26</td>
</tr>
<tr>
<td>5a</td>
<td>Adak Mobilization/Demobilization - Equipment</td>
<td>Equipment Specialist Contract Administration Manager</td>
<td>1</td>
<td>$150,326.50</td>
<td>$150,326.50</td>
</tr>
<tr>
<td>5b</td>
<td>Adak Mobilization/Demobilization - Personnel</td>
<td>Contract Administration Manager Senior UXO Supervisor UXO Safety Officer Program QC Manager UXO Quality Control Specialist 2 – UXO Technician IIs 9 – UXO Technician IIs Geophysical Instrument Operator Admin Specialist Emergency Medical Technician Support Equipment</td>
<td>1</td>
<td>$65,319.51</td>
<td>$65,319.51</td>
</tr>
<tr>
<td>6</td>
<td>CTO Kick-Off Meeting (Seattle) (Optional)</td>
<td>Contract Administration Manager Program QC Manager Program MEC Safety Officer Prime Project Manager Sub Project Manager</td>
<td></td>
<td>$11,196.49</td>
<td>$0</td>
</tr>
<tr>
<td>7</td>
<td>Regulatory Meeting (Anchorage)</td>
<td>Contract Administration Manager Program QC Manager Program MEC Safety Officer Prime Project Manager Sub Project Manager</td>
<td>1</td>
<td>$21,782.00</td>
<td>$21,782.00</td>
</tr>
<tr>
<td>7a</td>
<td>Regulatory &amp; Public Meetings (Anchorage) (Optional)</td>
<td>Contract Administration Manager Support Equipment</td>
<td></td>
<td>$3,710.48</td>
<td>$0</td>
</tr>
</tbody>
</table>

Phase 1 Subtotal $303,624.44

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A.1.5. **ALTERNATIVE 5: CONSTRUCTION SUPPORT**

As the entire Parcel 4 of the former Naval Air Facility is expected to remain as Access Restricted Navy Exclusion Area, no construction activities are anticipated and cost estimate for action is not provided.

**A.2. COST ESTIMATES FOR RECOMMENDED RESPONSE ALTERNATIVES**

Although ranked as third in the alternatives analysis in Section 6, Alternative 4 is recommended as a response action to reduce the potential MEC risks at the former Rifle Grenade Range - 01. This response action includes 100% surface and subsurface removal of MEC and munitions debris, down to maximum depth of detection, from the entire 16 acres of the RG-01 project site. The cost estimate for this recommended response action is provided in following sections. Detailed cost breakdowns for all response alternatives are provided in Appendix B. The recommendation of Alternative 4 as the response action for the RG-01 Area is based on the following:

- Based on the historical data, multiple MEC items were encountered. Among these MEC items were 40mm grenades, 60mm mortars, and 81mm mortars.
- This alternative is ranked highest in terms of effectiveness and protection of public safety over the long term.
- This alternative can be obtained for a slightly higher cost than the Surface Removal alternative.
- Stakeholders and regulators would consider Alternative 4 as the most acceptable response alternative.
The Navy will continue maintaining the existing Institutional Controls of the entire project site after the MEC removal action is completed. Table A-5 provides the estimated costs for the recommended response alternatives for the RG-01 site area.

**A-5: COST SUMMARY FOR RECOMMENDED RESPONSE ACTIONS**

<table>
<thead>
<tr>
<th>Response Elements</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 4: Subsurface Removal of MEC and Munitions Debris</td>
<td>$849,809</td>
</tr>
<tr>
<td>Magnetometer Assisted 100% Surface and Subsurface Removal of MEC and Munitions Debris down to the depth of detection but not to exceed bedrock or 2-feet depth in the RG-01 ESHA Area (a total of 16 acres).</td>
<td></td>
</tr>
<tr>
<td>Alternative 2: Institutional Controls</td>
<td>$68,182</td>
</tr>
<tr>
<td>Based on $50K/Yr, for 30 years (Foster Wheeler Environmental, 2004) for Area RG-01</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL ESTIMATED COST**

$917,991