Final
9 Dec 2015

# Engineering Evaluation/ Cost Analysis

## Naval Defensive Sea Area
## Kiska Island
Alaska

**Department of the Navy**
**Naval Facilities Engineering Command Northwest**
1101 Tautog Circle
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# FINAL
# ENGINEERING EVALUATION/COST ANALYSIS
# NAVAL DEFENSIVE SEA AREA

## KISKA ISLAND, ALASKA

**Prepared for**
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**U.S. Navy Contract No. N44255-09-D-4001**
**Delivery Order 0080**

**December 11, 2015**

# EXECUTIVE SUMMARY

This engineering evaluation/cost analysis (EE/CA) has been prepared to evaluate potential removal action alternatives for the Naval Defensive Sea Area (NDSA) Kiska Island. The document follows the format outlined in the U.S. Environmental Protection Agency's (EPA's) guidance for non-time-critical removal actions under the Comprehensive Environmental Response, Compensation, and Liability Act.

This evaluation was prepared based on the results of the 2013 preliminary assessment (PA). The PA was performed as part of the Navy's Munitions Response Program (MRP) to address the National Defense Authorization Act of 2000 that required the Department of Defense (DoD) to establish a program that addresses the potential explosive's safety, health, and environmental issues caused by munitions and explosives of concern (MEC) and munitions constituents (MC) used or released on sites from past operations and activities. The PA identified evidence of in-water ranges within the NDSA at Kiska Island, and the likely presence of legacy ordnance in the water, thus the Navy initiated this EE/CA. The U.S. Army Corps of Engineers (USACE) evaluated the terrestrial environment at Kiska and Little Kiska Islands under the Formerly Used Defense Sites program.

Based on the 2013 PA results and limited site data, the exposure pathways evaluation concluded that complete exposure pathways are present at NDSA Kiska Island for human exposure to explosive blasts and ecological receptors through dermal exposure and ingestion of MC in sediment. The removal action alternatives presented in this EE/CA focus on reducing exposure to MEC in Kiska Harbor and the in-water ranges surrounding Kiska Island through informational methods and devices. The objective of the removal action is to protect human health from MEC by reducing the potential for an explosive blast while maintaining the current commercial and recreational fishing, research, and recreational diving opportunities in the waters of Kiska.

This EE/CA identifies, describes, and evaluates the following non-time-critical removal action (NTCRA) alternatives against effectiveness, implementability, and cost criteria:

- **Alternative 1 – No Action**: This alternative does not include additional institutional controls/land use restrictions or an engineered remedy. The current site conditions and land uses would remain unchanged. The estimated total cost of Alternative 1 is $0.

- **Alternative 2 – Institutional Controls/Land Use Restrictions**: This alternative includes conducting a NTCRA to memorialize the establishment of institutional controls/land use restrictions. The Navy would request that National Oceanic and

Atmospheric Administration (NOAA) have the National Geospatial-Intelligence Agency (NGA) publish a United States of America (U.S.) Notice to Mariners (NM) on navigational charts for Kiska Island. In addition, the Seventeenth U.S. Coast Guard District would be informed to publish a Local Notice to Mariners (LNM) with the same information. The Navy would prepare a brochure for land management agencies to provide with permits/information requests. The estimated total present worth cost to implement Alternative 2 (including operation and maintenance [O&M] for 30 years) is estimated at $250,000.

- **Alternative 3 – Institutional Controls/Land Use Restrictions with Physical Controls**: This alternative includes conducting a NTCRA to memorialize the establishment of institutional controls/land use restrictions and physical controls. The Navy would request that National Oceanic and Atmospheric Administration (NOAA) have the National Geospatial-Intelligence Agency (NGA) publish a United States of America (U.S.) Notice to Mariners (NM) on navigational charts for Kiska Island. The Seventeenth U.S. Coast Guard District would be informed to publish a Local Notice to Mariners (LNM) with the same information. The Navy would prepare a brochure for land management agencies to provide with permits/information requests. In addition, informational methods and devices would be used to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. Warning signs would be installed on the beaches and buoys moored in areas shallower than 20 fathoms to notify people that potential danger exists, and any MEC encountered must remain in place. The estimated total present worth cost to implement Alternative 3 (including operation and maintenance [O&M] for 30 years) is estimated at $15,800,000.

Based on the evaluation of effectiveness, implementability, and cost, Alternative 2 is the recommended alternative. Alternative 2 is the most cost effective alternative that meets both the removal action objectives to maintain the recreational opportunities for people who visit Kiska Island and protect human health and the environment from MEC in the long-term. Alternative 2 is readily implementable, cost-effective, and has no short-term impacts to construction workers and the environment during implementation. Alternative 2 maintains the current recreational opportunities at the site and, based on exposure pathways evaluation, is protective of human health and the environment under current restricted and future land uses. Comments on the Final EE/CA during public review will be considered in the final selection of the alternative in the Action Memorandum, and comment responses will be included in the administrative record file. The implementation of the selected alternative is intended to be the final action, unless changes to the current or reasonably anticipated future land use are identified.

## DOCUMENT IDENTIFICATION

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|---|---|
| **Document Title:** | Final Engineering Evaluation/Cost Analysis |
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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| AA | antiaircraft |
| AMTB | antimotor-torpedo-boat |
| ARAR | applicable or relevant and appropriate requirement |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CSM | conceptual site model |
| DERP | Defense Environmental Restoration Program |
| DMM | discarded military munitions |
| DoD | Department of Defense |
| EE/CA | engineering evaluation/cost analysis |
| EPA | U.S. Environmental Protection Agency |
| GIS | geographic information system |
| LNM | Local Notice to Mariners |
| LUC | land use control |
| LUC Plan | Land Use Control Implementation Plan |
| MC | munitions constituent |
| MEC | munitions and explosives of concern |
| MRP | Munitions Response Program |
| NAAF | Naval Auxiliary Air Facility |
| NAVFAC NW | Naval Facility Engineering Command Northwest |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NDSA | Naval Defensive Sea Area |
| NGA | National Geospatial-Intelligence Agency |
| NM | Notice to Mariners |
| NOAA | National Oceanic and Atmospheric Administration |
| NTCRA | non-time-critical removal action |
| O&M | operation and maintenance |
| PA | preliminary assessment |
| SARA | Superfund Amendments and Reauthorization Act |
| SI | site investigation |
| TBC | to be considered |
| URS | URS Group, Inc. |
| U.S. | United States of America |

# 1.0 INTRODUCTION

This engineering evaluation/cost analysis (EE/CA) has been prepared to evaluate potential removal action alternatives for the former Naval Defensive Sea Area (NDSA), Kiska Island which is located in the Rat Island Group of the Aleutian Islands (Figure 1-1).

The NDSA is a water area set aside by executive order of the President of the United States because of its strategic nature, or for purposes of defense. The NDSA at Kiska Island (Figure 1-2) was established on February 14, 1941, by Executive Order 8680. This NDSA includes the territorial waters between the extreme high-water marks and the 3-mile marine boundaries around Kiska and Little Kiska Islands.

The Navy's Munitions Response Program (MRP) implements the National Defense Authorization Act of 2000 that required the Department of Defense (DoD) to establish a program that addresses the potential explosive's safety, health, and environmental issues caused by munitions and explosives of concern (MEC) and munitions constituents (MC) used or released on sites from past operations and activities (MCs are munitions-related chemical contaminants). Because there is evidence of historic use of ordnance within in-water ranges within the NDSA at Kiska Island, the Navy initiated a PA. The U.S. Army Corps of Engineers (USACE) performed a site inspection of the terrestrial environment at Kiska and Little Kiska Islands under the Formerly Used Defense Sites program. Therefore, this EE/CA does not include the terrestrial portions of Kiska Island.

The Navy research presented in the PA for NDSA for Kiska Island (U.S. Navy 2013) confirmed the presence of MEC in the water, so the Navy initiated this EE/CA to evaluate removal action options. In addition, previous environmental and ordnance investigations conducted in similar water body areas have identified the potential for waters of NDSAs to be contaminated with MEC. These activities include practice firing of coastal defense and antiaircraft (AA) guns at fixed and towed targets, aerial gunnery firing practice at surface targets, aerial bombing practice at fixed targets, ordnance lost overboard during handling activities, and in-water ordnance disposal.

This EE/CA has been prepared to evaluate potential removal action alternatives to protect human health from MEC at the NDSA, while maintaining the current recreational opportunities for people who visit Kiska Island. The site is currently used for recreational purposes (e.g., bird watching and diving by the public); research; and commercial and recreational fishing.

## 1.1 EE/CA ORGANIZATION

This EE/CA follows the format outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for a non-time-critical removal action and the applicable U.S. Environmental Protection Agency (EPA) guidance (USEPA 1993). This document contains the following sections:

- Section 1 – Introduction
- Section 2 – Site characterization
- Section 3 – Identification of applicable or relevant and appropriate requirements (ARARs) and removal action objectives
- Section 4 – Identification of removal action alternatives
- Section 5 – Evaluation of removal action alternatives
- Section 6 – Comparative analysis of alternatives
- Section 7 – Recommended removal action alternative
- Section 8 – References

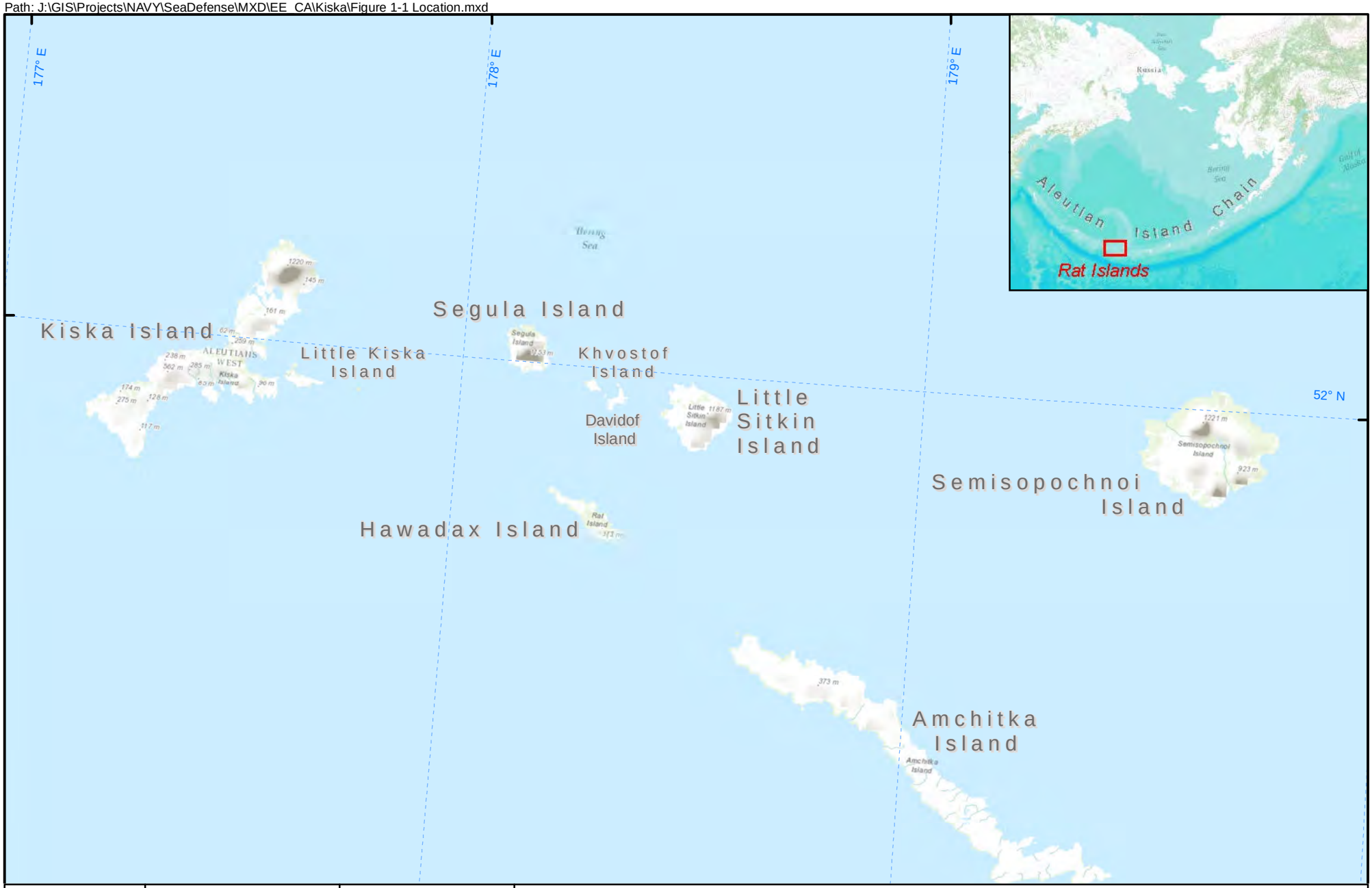
The following potential removal action alternatives are evaluated for the NDSA Kiska Island:

- Alternative 1 – No Action
- Alternative 2 – Institutional Controls/Land Use Restrictions (also referred to as Land Use Controls [LUC])
- Alternative 3 – Institutional Controls/Land Use Restrictions with Physical Controls

## 1.2 LIMITATIONS

The evaluations described in this EE/CA were conducted based on a review of the 2013 PA (U.S. Navy 2013.). The information included in the PA is not all inclusive and may not be complete.

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 1-1 Location.mxd

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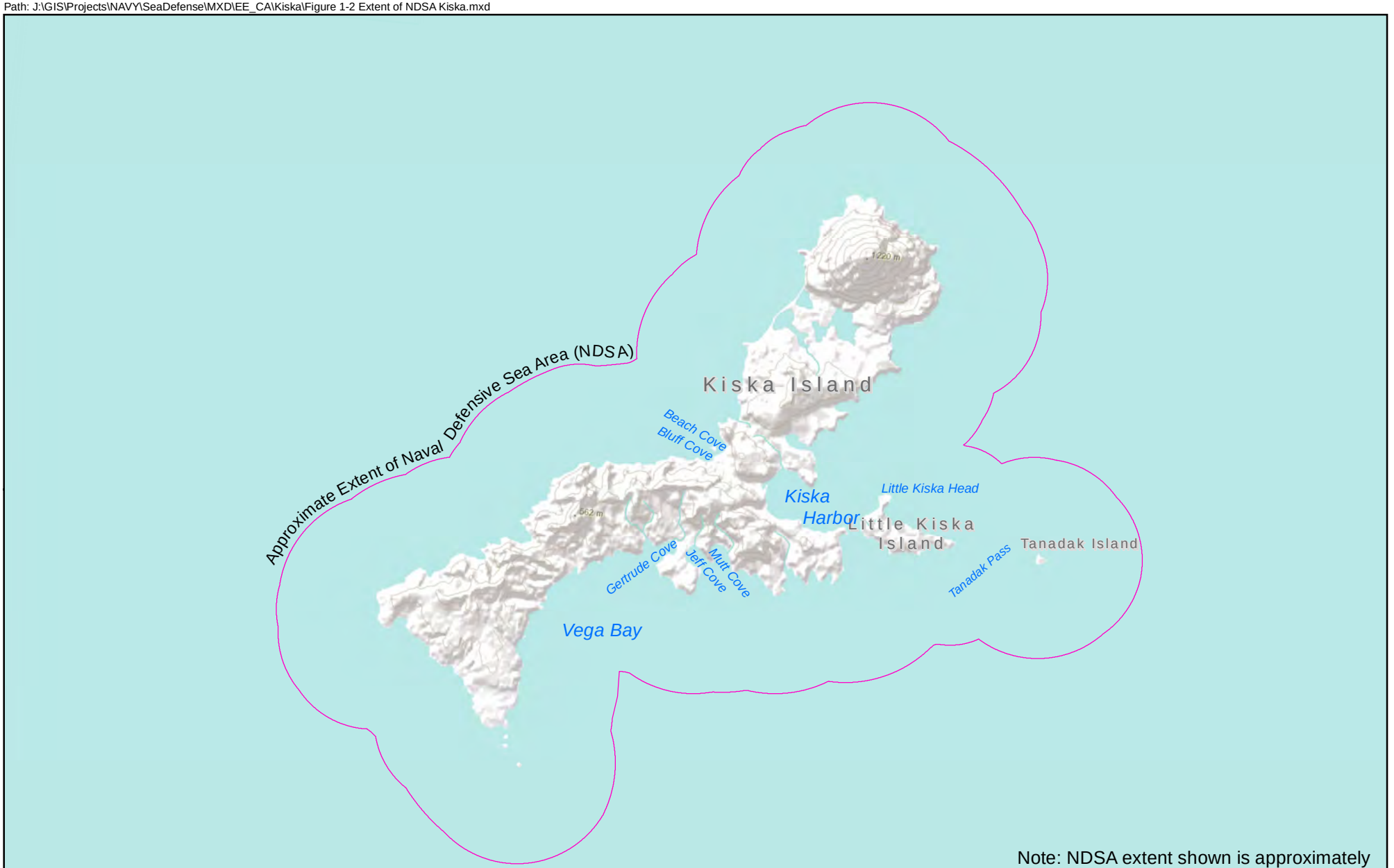
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 6 12<br>Scale In Miles | **Figure 1-1**<br>**Location and Relative Position of the Islands in the Rat Island Group**<br>**Aleutian Islands, Alaska** |

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 1-2 Extent of NDSA Kiska.mxd

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| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 2.5 5<br>Scale In Miles | **Figure 1-2**<br>**Extent of the Naval Defensive Sea Area Surrounding Kiska and Little Kiska Islands** |

# 2.0 SITE CHARACTERIZATION

This section provides site-specific information about the NDSA at Kiska Island, Alaska, including site location; description and background; current and future land use; previous investigations; identified sources; areas potentially containing noncombat MEC in the marine environment; and an exposure pathway evaluation. The information and references provided in Section 2 were obtained from the 2013 PA (U.S. Navy 2013).

## 2.1 SITE LOCATION AND DESCRIPTION

Kiska and Little Kiska are islands in the Rat Island group of the Aleutian Island chain in Alaska. The Rat Islands are a group of volcanic islands located between Buldir Island to the west and Amchitka Pass to the east. The largest islands in the group from west to east are Kiska; Little Kiska; Segula; Hawadax; Khvostof; Davidof; Little Sitkin; Amchitka; and Semisopochnoi. Figure 1-1 shows the location of the Rat Island group and the relative positions of the individual islands. Kiska Island is approximately 22 miles long, and varies in width from 1.5 to 6 miles. It is located at 51° 57′ 51″ north latitude, 177° 27′ 36″ east longitude.

This EE/CA focuses on the known in-water range areas established for target firing of the costal artillery and AA batteries installed on Kiska and Little Kiska Islands by Allied forces, known in-water practice bombing targets, and on-water ordnance handling locations within the 3-nautical-mile limit of the NDSA. Figure 1-2 shows the extent of the NDSA surrounding Kiska and Little Kiska Islands.

## 2.2 SITE BACKGROUND

This section provides background information on the NDSA at Kiska Island, including site history and ownership.

The U.S. purchased Alaska (which includes the Aleutians) from Russia in 1867. Kiska Island and Little Kiska Island were withdrawn from the public domain for naval purposes in 1903. A Navy weather station was the only U.S. military presence on the islands prior to the Japanese occupation in 1942. Ten men were working at the station at the time when the Japanese invaded Kiska Island on June 7, 1942 during World War II. The Empire of Japan occupied Kiska Island from June 7, 1942, until July 28, 1943. The Allied (U.S. and Canadian) forces began bombing the Japanese positions on and around Kiska on June 12, 1942. By the end of the April 1943, 640 tons of bombs had been dropped on Kiska Island (Naval Historic Center 1993). The Japanese

abandoned the island at the end of July 1943, and Allied forces retook possession of the island on August 15, 1943.

The U.S. Army and Navy established defensive operations on Kiska for approximately 1-year. As part of defensive operations, six in-water ranges with mobile guns were established (Figure 2-1). The U.S. Army established the Kiska Island Garrison Site and Little Kiska Island Harbor Defense Site, while the U.S. Navy established the Kiska Naval Auxiliary Air Facility (NAAF) in September 1943. The Navy decommissioned NAAF Kiska Island on September 19, 1944, as the Army declared the Kiska Island Garrison and Little Kiska Harbor Defense Sites as excess and placed them in inactive status on December 3, 1945. The Army had no permanent interest in Kiska Island, so it returned control of these sites to the Department of the Navy on May 2, 1949. The Navy formally returned Kiska and Little Kiska Islands to the Department of the Interior on February 23, 1951. However, the NDSA Kiska Island remains under the purview of the Navy.

## 2.3 CURRENT AND FUTURE LAND USE

Kiska and Little Kiska Islands remain undeveloped and uninhabited since their abandonment in 1951. The Japanese Occupation Site on the island (including surrounding waters) was designated a national historic landmark (the highest level of recognition accorded to U.S. historic sites) on February 4, 1985, and is protected under federal law. According to the drawing submitted with the National Register of Historic Places Inventory - Nomination Form (Thompson 1984), the boundaries of the national landmark site encompass most of Kiska Island, all of Little Kiska Island, and portions of all six in-water ranges (Figure 2-1) except for the furthest extents of in-water range areas 4, 5, and 6. Cultural resources within the national historic landmark include items on land and in the water (i.e., sunken ships and other cultural items); removing these archeological resources on public land is illegal. The Archeological Resources Protection Act of 1979 provides criminal and civil penalties for looting.

In 2008 President George W. Bush established the Valor in the Pacific National Monument (Presidential Proclamation 8327) which includes preserved WWII battlefields (5 areas) on Kiska Island totaling 2,345 acres. None of these areas include offshore waters.

Kiska and Little Kiska Islands are also part of the Alaska Maritime National Wildlife Refuge (AMNWR) that is managed by the U.S. Fish and Wildlife Service (USFWS). Activities at or near Kiska and Little Kiska Islands may include:

- historical research
- sight-seeing
- bird watching

- camping
- photography
- hiking
- fishing
- diving
- mooring to wait out heavy seas

None of these activities are prohibited. However, because of the remoteness of these islands, they are not frequently visited. A danger sign posted on land at Kiska Harbor warns visitors of the presence of MEC and prohibits digging.

Special Use Permits are required for commercial operations, scientific research, and some other uses of refuge lands and waters. Examples of uses requiring special use permits are commercial filming, salvage operations, sand and gravel removal, guiding and transporting, archeological and biological studies. Cruise ships and tour boats that bring visitors ashore also require special use permits that can be obtained through the Alaska Region section of the USFWS website.

## 2.4 PREVIOUS INVESTIGATIONS

As discussed in Section 1, a PA was conducted for NDSA Kiska Island (U.S. Navy 2013). The PA included a description of historical activities at the site based on records review and interviews and provided a summary of MEC sources and areas where it likely exists. This section summarizes the purpose and scope of the PA performed to provide a basis for decisions made in this EE/CA.

### 2.4.1 Purpose of the Preliminary Assessment

The purpose of the PA performed at NDSA Kiska Island was to differentiate sites that pose little or no potential threat to human health and the environment from sites that warrant further investigation (USEPA 1991). The Navy completed the PA report to evaluate the potential for releases that may pose a potential threat to human health or the environment as a result of historical operations at in-water ranges and other areas suspected of containing MEC within NDSA Kiska Island. The findings in the PA report were used to make recommendations for addressing potential action at NDSA. The potential presence of MEC within the NDSA beyond the known limits of in-water ranges resulting from combat activities during World War II were beyond the scope of the PA.

### 2.4.2 Scope of the Preliminary Assessment

The scope of the PA consisted of completing a records review and preparing a report. The records review included an extensive search for information regarding historical operations of in-water practice ranges and ordnance handling points located within NDSA Kiska Island. The PA report included a summary of information assembled during a review of pertinent books, reports, public historical records, web sites, and aerial photographs. Interviews were conducted with individuals knowledgeable of MEC finds or historical ordnance activities.

The PA is based on review of records conducted onsite at facilities in the Seattle, Anchorage, and Washington, D.C. areas. Records that might exist at the Museum of the Aleutians on Unalaska Island and Kodiak Military History Museum located in Kodiak, Alaska, were not evaluated because project funding was not available to review records at these locations.

The records review consisted of information held by the following agencies or facilities:

- USACE, Alaska District
- National Archives and Records Administration (NARA) II, College Park, Maryland
- NARA, Regional Branch, Seattle, Washington
- NARA, Regional Branch, Anchorage, Alaska
- Naval History and Heritage Command, Washington Navy Yard, Washington, D.C.
- Navy Department Library, Washington Navy Yard, Washington, D.C.
- 3rd Wing U.S. Air Force History Office, Anchorage, Alaska
- Anchorage Museum, Anchorage, Alaska
- University of Alaska Anchorage Consortium Library, Anchorage, Alaska
- Z.J. Loussac Library–Main Branch, Anchorage, Alaska

## 2.5 SUMMARY OF SOURCES AND AREAS POTENTIALLY CONTAINING MEC

The source and extent of MEC discussed in this section is based on the results of the 2013 PA. No chemical sampling of sediment or surface water has been performed. Therefore, concentrations of chemicals cannot be compared to screening values to determine the levels of MC at the site; chemical-specific ARARs for sediment and surface water have not been included in this EE/CA. Chemical-specific ARARs for sediment and surface water are beyond the scope of this EE/CA.

### 2.5.1 Identified Sources

The sources of MEC released into the marine environment at NDSA Kiska Island by Allied forces consists of coastal defense and AA gun batteries, supply transfer points, air combat training by units of the 11th Air Force, and air combat training by units of the U.S. Navy. Additional MEC may be present in the six NDSA in-water ranges resulting from combat activities during World War II near Kiska and Little Kiska Islands from ordnance dropped or fired by Allied forces. It is possible that ordnance dropped during combat activities is the predominant source of MEC and is likely present outside of the in-water ranges.

Two piers were constructed in the northwest portion of Kiska Harbor and were used by Allied forces during their operations on-island to offload supplies, including ordnance (Figure 2-2). Information obtained during an interview conducted during the 2013 PA indicates the presence of "thousands of small arms shells on the seafloor off the Kiska Docks." Remnants of one of these piers are still visible in Kiska Harbor today. Select site photographs are included in Appendix A.

Records from May 1950 indicate that Patrol Squadron Two of the U.S. Pacific Fleet Air Force conducted nine rocket and bombing strikes against stranded and abandoned ship targets in Kiska Harbor (Figure 2-3) (U.S. Pacific Fleet Air Force 1950). No information was discovered to indicate if this was an isolated or common occurrence.

The 2013 PA identified the Allied coastal and AA gun batteries on Kiska and Little Kiska Islands consisting of 1, 90-mm antimotor-torpedo-boat (AMTB) gun (e.g. a gun designed to destroy fast moving torpedo boats and aircraft); 1, 37-mm AMTB gun; 4, 40-mm M-1 AA guns; 6, 20-mm Mk-4 AA guns; 10, .50-caliber water-cooled machine guns; and 4 guns of unknown size. The exact locations of the Allied gun batteries were not determined during this investigation. However, information obtained indicates that defensive guns were installed in the vicinity of North Head, Kiska Harbor, Mutt Cove, Jeff Cove, Gertrude Cove, Beach Cove, Bluff Cove, and Little Kiska Head and that regular practice firing occurred at these locations (Figure 2-1).

Other sources of MEC may include Japanese or Allied troops who may have disposed of or lost ordnance items overboard in the water, particularly in Kiska Harbor, while they were present on the island. MEC of Japanese origin was photographed in 1993 on the bottom of Kiska Harbor to confirm this source (Cohen 1993).

### 2.5.2 Areas Potentially Containing MEC in the Marine Environment

Five areas with a total of six former in-water ranges within NDSA Kiska Island have been identified as potentially containing discarded military munitions (DMM), practice-fired unexploded ordnance (UXO), or practice-dropped UXO. To be consistent with the Navy MRP, each area contains known or suspected munitions releases that occurred prior to September 30, 2002, where Navy actions were responsible for the release and the site is not covered by water deeper than 20 fathoms (120 feet). These individual areas are defined as follows:

- Kiska Harbor and Former In-Water Range Area 1 including the former ship pier, barge pier (Figure 2-2), three rocket/bombing targets (Figure 2-3), and the seafloor within the former gun range extending northeast, as shown on Figure 2-4. This area is 7.6 square miles in size and 5.4 square miles is less than 20 fathoms in depth.

- Former In-Water Range Area 2 and 3 off Little Kiska Island, as shown on Figure 2-5. This area is 5.8 square miles in size and 1.5 square miles is less than 20 fathoms in depth.

- Former In-Water Range Area 4 including all of Mutt and Jeff Coves and the adjacent seafloor between Bukhti and Hatchet Points, as shown on Figure 2-6. This area is 4.4 square miles in size and 3.7 square miles is less than 20 fathoms in depth.

- Former In-Water Range Area 5 including all of Ethel and Gertrude Coves and the adjacent seafloor extending southwest, as shown on Figure 2-7. This area is 4.1 square miles in size and 1.6 square miles is less than 20 fathoms in depth.

- Former In-Water Range Area 6 including all of Barley, Beach, and Bluff Coves and the adjacent seafloor, as shown on Figure 2-8. This area is 12 square miles in size and 3.9 square miles is less than 20 fathoms in depth.

The Navy MRP does not address MEC that is in water greater than 20 fathoms (120 feet). Commercial and recreational fishers can encounter MEC at depths greater than 20 fathoms (120 feet).

## 2.6 SUMMARY OF EXPOSURE PATHWAYS

Exposure pathways were assessed during the PA to determine whether they are complete, possibly complete, or incomplete. An exposure pathway describes where and how a human or ecological receptor is likely to be exposed to MEC or MCs from the site. No site-related chemical data are available for NDSA Kiska Island, so a qualitative evaluation was not conducted to assess the likelihood that a health risk is present from the site-related chemicals.

Kiska Island is uninhabited and remote; therefore, the only two populations of potential human exposure to MEC in the water are commercial or recreational fishers and recreational or research divers. The physical explosive hazard is a complete pathway for fishers and divers who may accidently detonate MEC. Commercial fishers have been known to unintentionally haul up MEC in their fishing nets or attached to their traps. In addition, a commercial vessel's anchor could potentially detonate or get caught on MEC on the seafloor. Therefore, potential physical explosive hazards for commercial fishers are considered complete and could potentially be significant.

Recreational or research divers will not typically descend deeper than a maximum of 20 fathoms (120 feet). MEC could be encountered in these shallow waters by a diver, particularly within Kiska Harbor, Gertrude Cove, Mutt Cove, and Jeff Cove. These areas are relatively protected and are not marked for rip tides on nautical charts. Divers may be drawn to known wrecked ships in Kiska Harbor and Gertrude Cove. The wrecked ships in Kiska Harbor were known targets for aerial rocket/bombing training in the 1950s. Because the waters of Kiska Harbor, Gertrude Cove, Mutt Cove, and Jeff Cove were designated danger areas during gun training conducted during 1943, the potential pathway for a physical explosive hazard to a diver is still considered complete in these areas.

Exposure to MCs within ordnance can be considered a potentially complete pathway as the marine environment slowly consumes the metal casings. The major environmental concern associated with releases of MCs in the underwater environment is the impact to sediments. Sediments support biological communities that are the food for marine life. However, the MCs are likely to present low ecological risk under expected exposure scenarios in the marine environment because of massive dilution and mixing. The exposures of terrestrial and aquatic populations to MCs via sediment and surface water within the Kiska Island NDSA are considered complete, but insignificant.

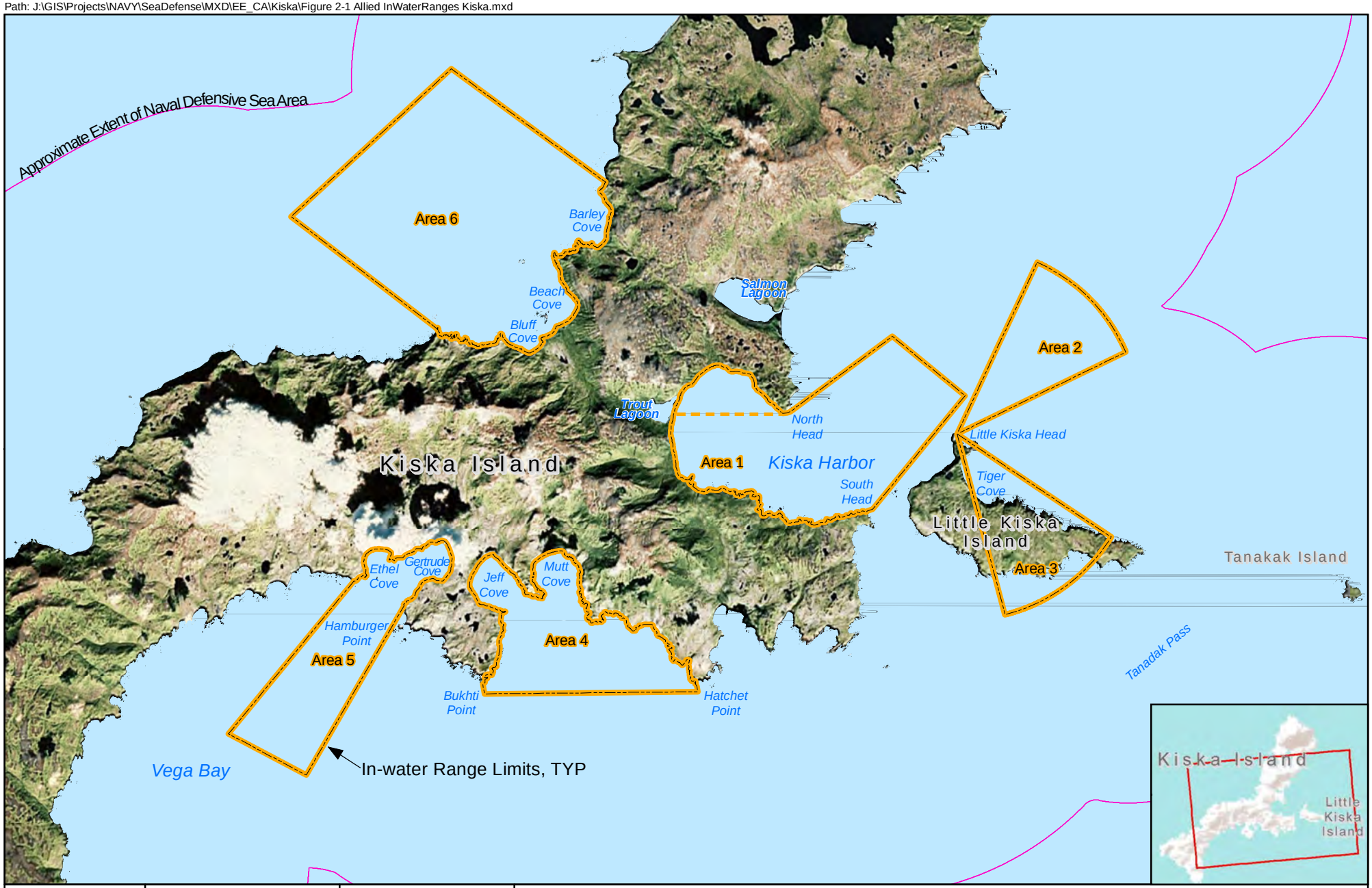
A conceptual site model (CSM) developed for the site in the 2013 PA (U.S. Navy 2013) is presented in Figure 2-9. This figure illustrates the exposure pathway from MEC to potential receptors. Complete pathways were considered to exist for NDSA Kiska Island, but it is not

clear how significant they are. The following are complete pathways for both human and ecological receptors:

- Human Health:
  - **UXO-DMM.** Explosive blast safety
- Ecological Health
  - **MCs in Sediment.** Incidental ingestion and direct contact

In conclusion, potentially complete human health and ecological exposure pathways were identified; however, it is likely that no unacceptable risk to human or ecological receptors is present at the sites based on available site data and proper hazard awareness to site visitors.

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-1 Allied InWaterRanges Kiska.mxd

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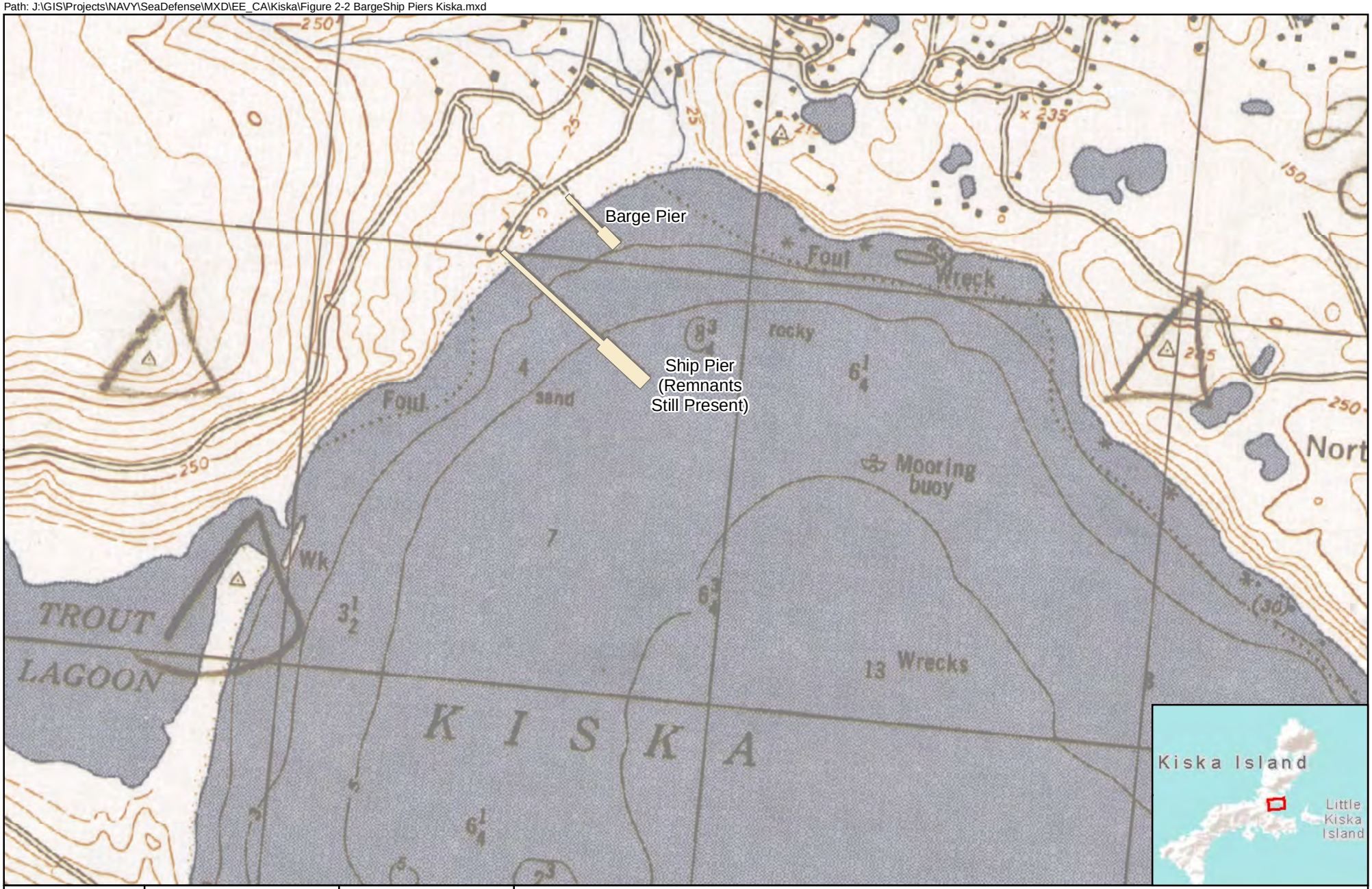
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1 2<br>Scale In Miles | **Figure 2-1**<br>**Locations of Known U.S. In-water Ranges in October 1943**<br>**Kiska and Little Kiska Islands** |

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-2 BargeShip Piers Kiska.mxd

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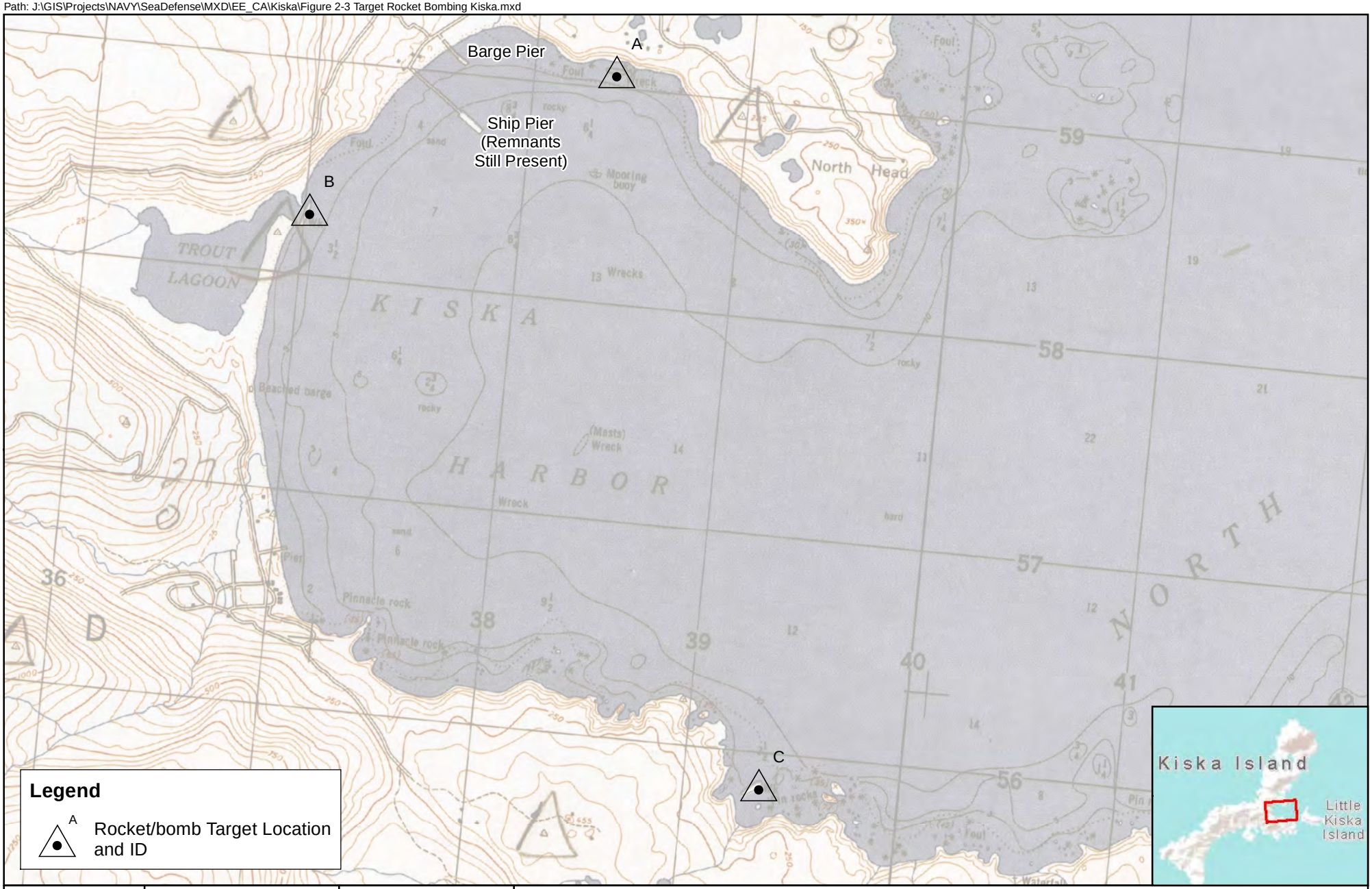
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 500 1,000<br>Scale In Feet | **Figure 2-2**<br>**Locations of Former Barge and Ship Piers in February 1944**<br>**Kiska Harbor, Kiska Island** |

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-3 Target Rocket Bombing Kiska.mxd

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|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,000 2,000<br>Scale In Feet | **Figure 2-3**<br>**Target Locations for a Rocket and Bombing Exercise Conducted by Patrol Squadron Two in May 1950**<br>**Kiska Harbor, Kiska Island** |


Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-4 Expanded Range Area1.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,000 2,000<br>Scale In Feet | Kiska Island | **Figure 2-4**<br>**Expanded Former In-water Range Area 1 and Target Locations Potentially Containing MEC at Kiska Harbor, Kiska Island** |

CP2-2

3 Nautical Miles Limit

Area 2

CP2-3

CP2-1/CP3-1

*Little Kiska Head*

20 fathoms

20 fathoms

*Tiger Cove*

Little Kiska Island

CP3-2

*Tanadak Pass*

Area 3

CP3-3

**Legend**

20 Fathoms Contour

Control Points

Former In-Water Gun Range With Water Depths Less Than 20 Fathoms

Former In-Water Gun Range Limits

Note: In-water Range Area 1 not shown for clarity

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-5 MEC Little Kiska Island.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 1,000 2,000<br>Scale In Feet | *Kiska Island* | **Figure 2-5**<br>**Former In-water Range Area 2 and 3 Potentially Containing MEC at Little Kiska Island** |

Kiska Island

Gertrude Cove

Jeff Cove

Mutt Cove

Area 4

Bukhti Point

CP4-1

CP4-2

Hatchet Point

20 fathoms

**Legend**

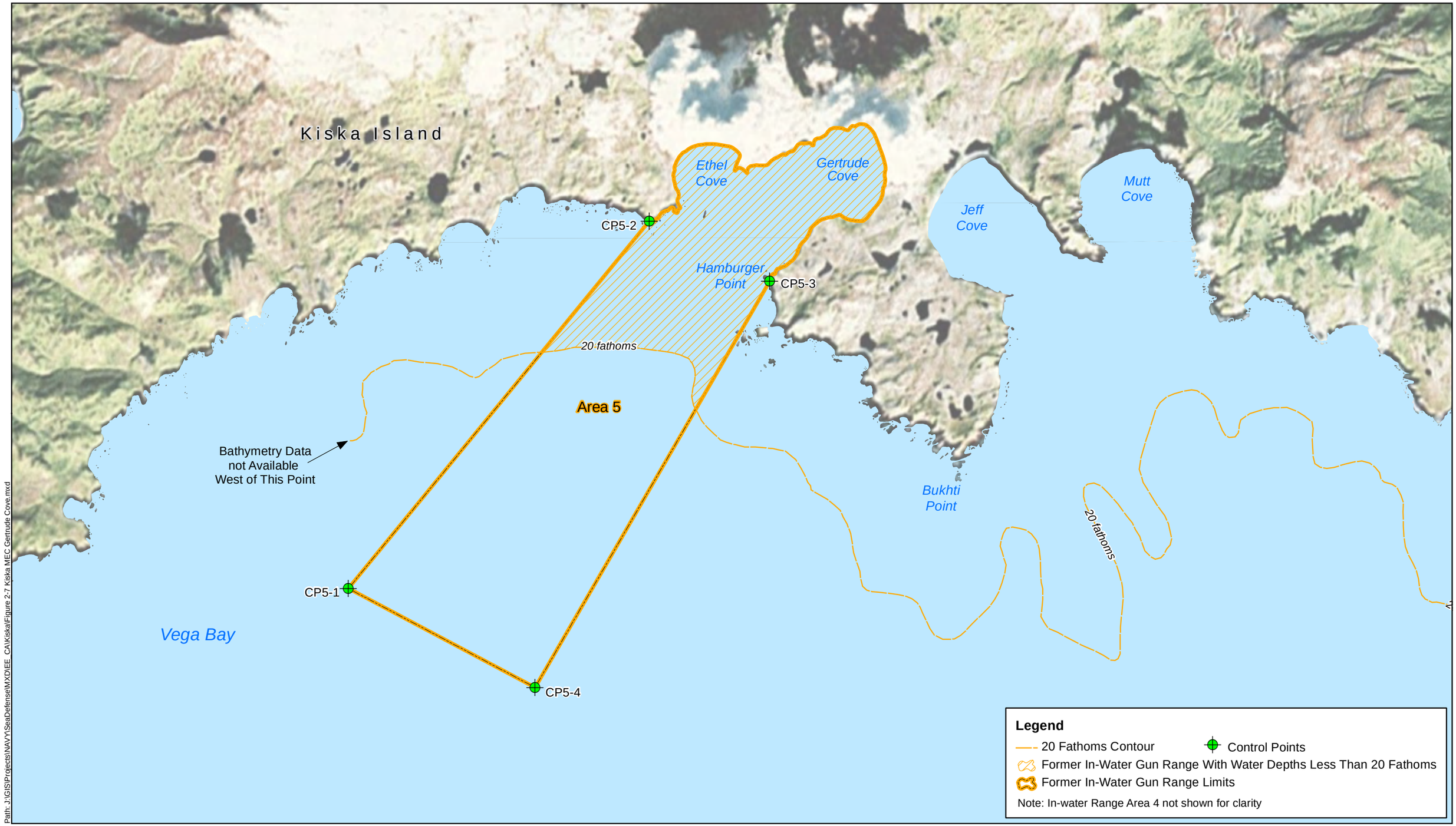
- 20 Fathoms Contour
- Control Points
- Former In-Water Gun Range With Water Depths Less Than 20 Fathoms
- Former In-Water Gun Range Limits

Note: In-water Range Area 5 not shown for clarity

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-6 Kiska MEC Mutt Jeff.mxd

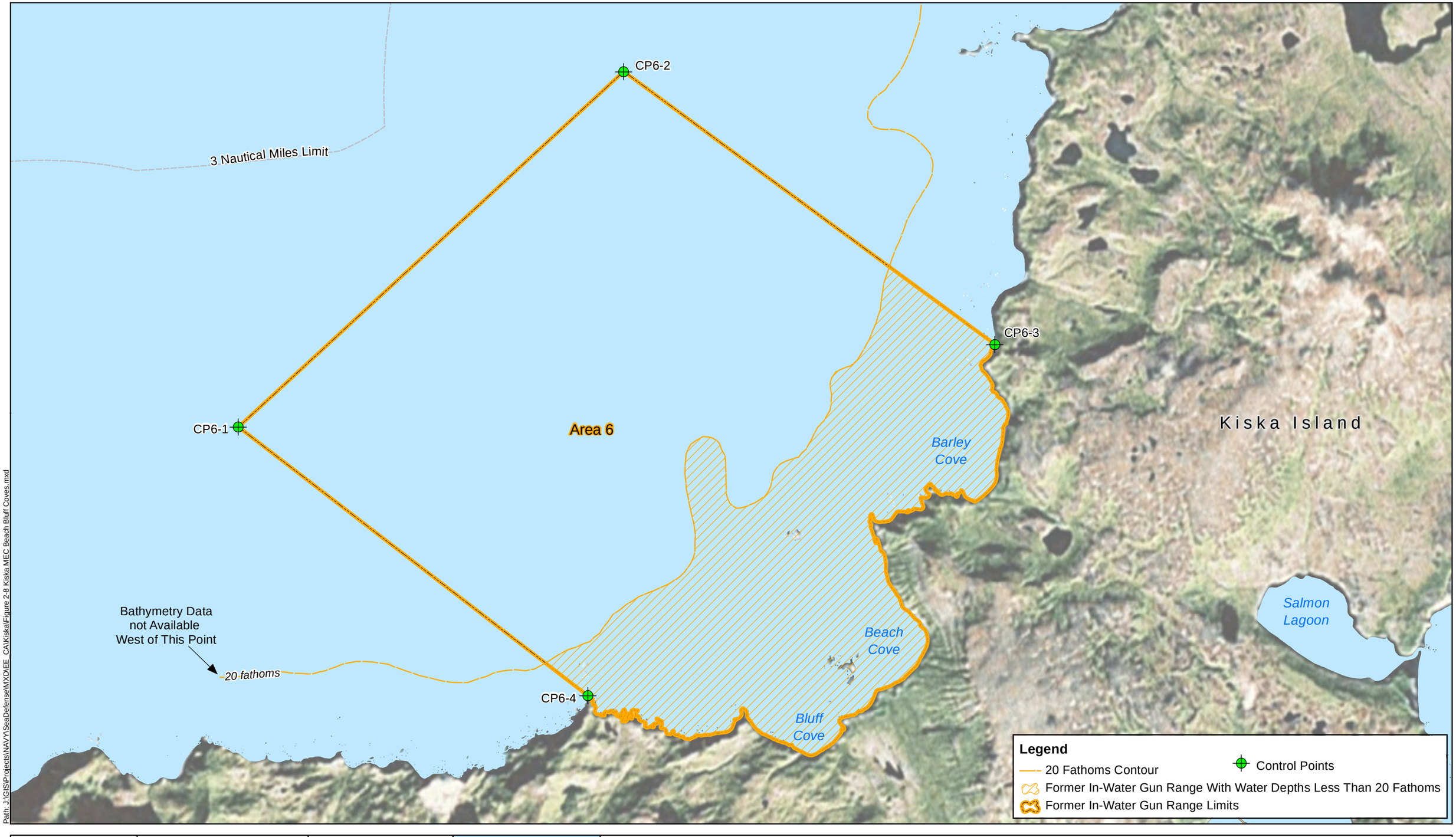
| | | | |
|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,000 2,000<br>Scale In Feet | Kiska Island |

**Figure 2-6**
**Former In-water Range Area 4 Potentially Containing MEC Off Jeff and Mutt Coves, Kiska Island**




Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 2-7 Kiska MEC Gertrude Cove.mxd

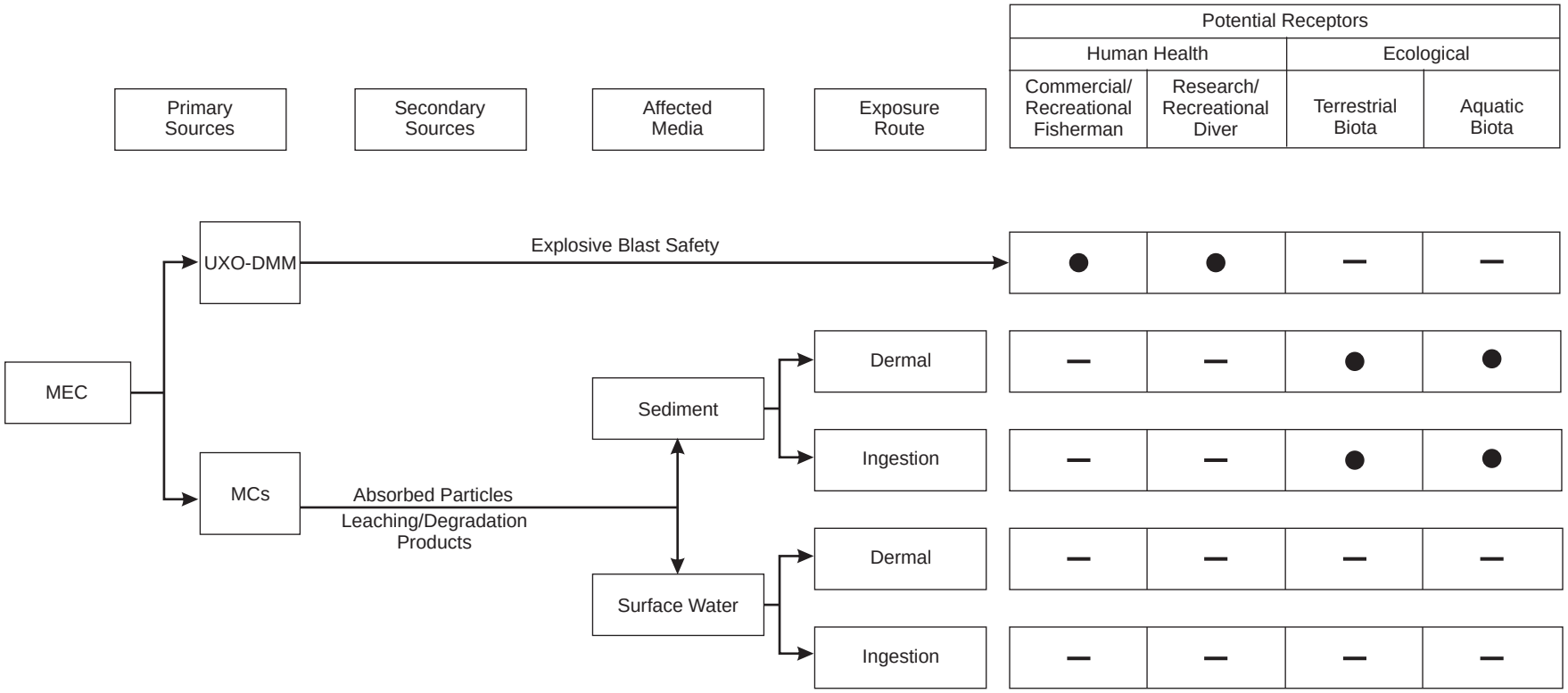
| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,500 3,000<br>Scale In Feet | Kiska Island | **Figure 2-7**<br>**Former In-water Range Area 5 Potentially Containing MEC Off Ethel and Gertrude Cove, Kiska Island** |




Path: J:\GIS\Projects\NAVY\SeaDefenseMXD\EE_CA\Kiska\Figure 2-8 Kiska MEC Beach Bluff Coves.mxd

| | | | |
|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 1,500 3,000<br>Scale In Feet | Kiska Island |

**Figure 2-8**
**Former In-water Range Area 6 Potentially Containing MEC Off Barley, Beach, and Bluff Coves, Kiska Island**




Legend

- ● Complete pathway
- — Incomplete pathway
- MEC - Munitions and explosives of concern
- DMM - Discarded military munitions
- UXO - Unexploded ordnance
- MCs - Munitions Constituents

U.S.NAVY

**Figure 2-9**
**Conceptual Site Model**

Delivery Order 0080
Naval Defensive Sea Area
EE/CA
Kiska Island, Alaska

# 3.0 IDENTIFICATION OF POTENTIAL ARARS AND REMOVAL ACTION OBJECTIVES

This section provides the regulatory framework, ARARs, removal action objectives, and schedule for conducting the EE/CA and the removal action.

## 3.1 REGULATORY FRAMEWORK

The National Defense Authorization Act of 2000 required the DoD to establish a program addressing military munitions as part of the Defense Environmental Restoration Program (DERP). The Navy's MRP complies with this requirement. The purpose of the MRP is to address potential explosive's safety, health, and environmental issues caused by MEC and MCs used or released on sites from past operations and activities. Based on Navy MRP policy (U.S. Navy 2007), the following criteria are used for inclusion of water sites in the MRP:

> Shallow water areas where munitions releases are known or suspected to have occurred prior to September 30, 2002, where Navy actions were responsible for the release, and where the site is not:
>
> - Covered by water deeper than 20 fathoms (120 feet)
> - Part of, or associated with, a designated operational range
> - A designated water disposal site
> - A Formerly Used Defense Site
> - A maritime wreck
> - An artificial reef

This EE/CA is being performed in accordance with the DERP (10 United States Code 2701, et. seq.) and DERP guidance (USDoD 2001a) because the NDSA Kiska Island has been identified as a MRP site. Munitions response actions conducted at MRP sites under DERP follow the response action process, including removal action process, outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), as authorized by CERCLA and amended by the Superfund Amendments and Reauthorization Act (SARA).

As previously discussed, a PA has been conducted for this site (U.S. Navy 2013). Based on the results of the PA, the Navy has decided to move forward with a non-time-critical removal action (NTCRA). This EE/CA follows the U.S. Environmental Protection Agency's (EPA) guidance for NTCRAs (USEPA 1993) and the requirements under CERCLA for an NTRCA (40 Code of Federal Regulations [CFR] 300.415).

## 3.2 IDENTIFICATION OF POTENTIAL ARARS

Removal actions under CERLCA must, to the extent practicable considering the urgent need of the situation, attain ARARs (40 CFR 300.415[j]). Under the NCP, applicable requirements are defined as:

> Those cleanup standards, standards of control and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site (40 CFR 300.5).

Relevant and appropriate requirements are promulgated federal or state laws that are not "applicable," but address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the site. Two types of potential ARARs are discussed in this section: location-specific and action-specific. Chemical-specific ARARs are not discussed because no chemical data is available from the site.

In addition to ARARs, many federal and state environmental and public health programs also have nonpromulgated advisories or guidance that are "to be considered" (TBC) in developing remedies. Although not legally binding, TBCs may provide information that is useful in the evaluation of proposed actions. Potential TBCs are discussed in Section 3.2.3.

### 3.2.1 Potential Location-Specific ARARs

Potential location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because the substances occur or activities are conducted in specified locations. These requirements may limit the type of potential removal action that can be implemented or may impose additional constraints on removal action alternatives. Potential location-specific ARARs were identified which may apply to Alternative 3 and are summarized in Table 3-1.

### 3.2.2 Potential Action-Specific ARARs

Potential action-specific ARARs are usually technology- or activity-based requirements or restrictions on actions taken with respect to hazardous substances. These potential requirements are triggered by the particular removal alternative and set performance, design, or other standards that will be used to implement the proposed action. Potential action-specific ARARs were not identified to apply only to Alternatives 1, 2, or 3.

### 3.2.3 Potential To Be Considereds

TBCs are nonpromulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. One TBC was identified related to USDoD policy on LUCs associated with Environmental Restoration Activities and is shown in Table 3-1.

## 3.3 REMOVAL ACTION OBJECTIVES

Based on the findings in the 2013 PA (U.S. Navy 2013), the removal action alternatives should focus on addressing explosive blast safety for humans who may potentially come in contact with MEC within former in-water ranges from diving or fishing at NDSA Kiska Island. It has been determined that only three of the six in-water ranges (Areas 1, 4, and 5) are suitable for diving, and only the portion of the range shallower than 20 fathoms may warrant additional protection. The preferred fishing grounds around Kiska Island are unknown.

The objectives of the removal action are:

- Protect human health from MEC by reducing the potential for an explosive blast
- Maintain the current recreational opportunities for visits to Kiska

These two objectives provide a basis for the evaluation of removal action alternatives and recommended alternative. The Navy will document the selection of the removal alternative in an Action Memorandum.

## 3.4 DETERMINATION OF REMOVAL ACTION SCHEDULE

The following milestone dates for the removal action include the EE/CA submittals, public comment period, Action Memorandum submittals, and the general time period for removal action implementation. Note that these dates are currently the best estimates at the current time and may be adjusted as the project progresses. The implementation of the alternative selected in this document is intended to be the final action, unless changes to the current or reasonably anticipated future land use are identified.

- Draft EE/CA – May 30, 2014
- Draft Final EE/CA – October 5, 2015
- Final EE/CA – December 12, 2015
- Public comment period – January 14, 2016 to February 13, 2016

- Internal Draft Action Memorandum – January 2016
- Draft Action Memorandum – March 2016
- Draft Final Action Memorandum – June 2016
- Final Action Memorandum – September 2016
- Removal Action implementation – 2016 or 2017

## Table 3-1
## Potential Location- and Action-Specific ARARs and TBCs for NDSA, Kiska Island

| Potential ARAR or TBC | Description | Applicability |
|---|---|---|
| **Potential Location-Specific ARARs** | | |
| Archaeological and Historical Preservation Act, 16 USC 469 | This act establishes procedures to provide for the preservation of historical and archeological artifacts that might be destroyed through alteration of terrain as a result of a federally licensed activity or program. Appropriate measures would be taken during activities to meet this potential location-specific ARAR, and appropriate tribal members (Aleut People) would be contacted in the event an artifact is encountered. | Intrusive work in areas where the potential for Native American artifacts exists. (Alternative 3 only) |
| Archaeological Resources Protection Act, 16 USC 470aa, 43 CFR 7 | This act and regulations specify the steps that must be taken to protect archaeological resources and sites that are on public and Native American lands and to preserve uncovered artifacts. Appropriate measures would be taken during activities to meet this potential location-specific ARAR, and appropriate tribal members (Aleut People) would be contacted in the event an artifact is encountered. | |
| Fish and Wildlife Coordination Act, 16 USC 661 | The potentially applicable portion of this act authorizes the preparation of plans to protect wildlife resources. If deemed necessary, a plan would be prepared prior to implementing actions at the site to meet this potential location-specific ARAR. | Intrusive work in areas where wildlife resources may be impacted. (Alternative 3 only) |
| National Wildlife Refuge Systems Regulations, 16 USC 688 | This act authorizes U.S. Fish and Wildlife to manage the National Wildlife Refuge System. The act specifies that a permit may be required for any use of a National Wildlife Refuge System. Additionally, anyone visiting the island shall not disturb, injure, cut, burn, remove, destroy, or possess any real or personal property of the United States, including natural growth, or take or possess animals. | Workers who may conduct work on the island (Alternative 3 only) |
| **To Be Considered (TBCs)** | | |
| Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities Resource Conservation and Recovery Act (USEPA 2015) | This policy establishes measures to be taken to ensure the short and long-term effectiveness of institutional controls being relied upon to protect human health and the environment at federal facility sites undergoing remedial action pursuant to CERCLA and/or corrective action pursuant to the Resource Conservation and Recovery Act. The policy is designed to ensure that RCRA and CERCLA decisions signed by EPA are protective and will remain so in the future. | Institutional controls (Alternatives 2 and 3) |

## Table 3-1 (Continued)
## Potential Location- and Action-Specific ARARs and TBCs for NDSA, Kiska Island

| Potential ARAR or TBC | Description | Applicability |
|---|---|---|
| Policy on LUCs Associated with Environmental Restoration Activities (US DoD 2001b) | This policy and attached guidance describes the Department of Defense framework for implementing, documenting, and managing LUCs for real property affected by environmental restoration activities at active installations. The intent of the policy is to ensure land use activities in the future remain compatible with the land use restrictions imposed on the property during the environmental restoration. | Implementing LUCs under applicable alternatives with intrusive work (Alternative 3 only) |

Notes:
ARAR - applicable or relevant and appropriate requirement
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
TBC – to be considered
USC - United States Code
U.S. DoD – United States Department of Defense

# 4.0 IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

Based on the analysis of the historic site use, the removal action objectives discussed in the previous sections, and the current and future land use, this section identifies three alternatives appropriate for addressing the removal action objectives. Only three alternatives were developed, because of the low risk present at the site. An alternative to detect and remove MEC present in the waters within NDSA Kiska was not developed because the cost is prohibitively high. The action selected from this evaluation will be considered the final action.

Kiska Island is uninhabited, extremely remote, and rarely has visitors. Therefore, potential encounters with MEC are limited. In addition, the risk to ecological receptors is considered low because of the massive dilution from sea water and strong currents in the area. The three alternatives considered include no action, institutional controls/land use restrictions, and institutional controls/land use restrictions with physical controls. Land use restrictions are considered to be LUCs, and administrative mechanisms were included in Alternatives 2 and 3. Physical controls were included in Alternative 3 only. Alternatives 1, 2, and 3 are discussed in detail below and apply to all six in-water range areas and Kiska Harbor which were identified as having potential MEC within NDSA, Kiska Island. The alternative selected is intended to be the final action for these sites.

## 4.1 ALTERNATIVE 1 – NO ACTION

The No Action Alternative is included pursuant to CERCLA guidance as a baseline from which other alternatives may be evaluated. This alternative does not include any additional LUCs or an engineered remedy. The current site conditions and land uses would remain unchanged. Kiska Island would continue to be used for recreational purposes and off-shore commercial fishing. No warning notifications would be made and no signs would be added to the site to notify users of the dangers of MEC present in the waters surround the site. Site access would remain unrestricted.

## 4.2 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS/LAND USE RESTRICTIONS

Alternative 2 includes conducting a NTCRA to memorialize the establishment of institutional controls/land use restrictions. Informational devices such as the “Follow the 3Rs” (Appendix B) would be used to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. NM would be published and navigational charts for Kiska

Island updated. The administrative controls/mechanisms used in this alternative are defined and described in greater detail below.

The U.S. DoD defines LUCs (described as land use restrictions in Alternative 2) as:

> Any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property to prevent or reduce risks to human health and the environment. Physical mechanisms encompass a variety of engineered remedies to contain or reduce contamination and/or physical barriers to limit access, such as fences or signs. Legal mechanisms include restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land use plans and ordinances, construction permitting or other existing land use management systems that may be used to ensure compliance with use restrictions (USDoD 2001b).

Alternative 2 only includes administrative controls to impose land use restrictions at NDSA Kiska Island. Physical controls were not included because the site is so remote and people who make the effort to visit Kiska Island are likely to be informed about the site history, presence of MEC, and its inherit dangers. Additional legal mechanisms are not included because the site is designated a national historic landmark and is already protected under federal law. Removing these archeological resources on public land is illegal according to the Archeological Resources Protection Act of 1979. Specific administrative mechanisms included in Alternative 2 are as follows.

Administrative Mechanisms

Informational devices would be used to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. Alternative 2 includes the following specific administrative actions to distribute the MEC warning information:

- Request that the National Oceanic and Atmospheric Administration (NOAA) have the NGA publish a NM.
- Advise the Seventeenth US Coast Guard District to publish a Local Notice to Mariners (LNM).
- Request that navigational charts for Kiska Island be updated with the MEC information. This includes Electronic Chart Display and Information Systems (ECDIS). The ECDIS is currently required on all passenger ships greater than 500 gross tons and by July 2018 on most cargo and tanker vessels greater than

3,000 gross tons. Ships equipped with ECDIS will automatically get a notification when they enter designated MEC areas shown on NOAA charts around Kiska Island. Smaller passenger ships typically used for recreational purposes and commercial fishing vessels may have ECDIS on board but are not required to have it.

- Provide MEC awareness information to post in public facilities in the Aleutian Islands, such as airports; ports; town halls; post offices etc.; that infrequent visitors to Kiska would likely pass through.

- Research companies and organizations which are likely to visit the waters of Kiska Island and provide them awareness information. These are likely to include select commercial fishing companies, charter vessels providing transport for research or recreational bird watching, and diving activities.

- Prepare brochure for land management agencies to provide with permits/information requests.

To document and enforce these new LUC requirements, a Land Use Control Implementation Plan (LUC Plan) would be prepared for NDSA Kiska Island. The plan would include details of the LUC implementation, enforcement, and reporting which would be applicable. The Navy would maintain a GIS database with a layer that identifies all areas around Kiska at which LUCs apply and their boundaries based on the information provided in the PA report (Navy 2013). The Navy will distribute MEC awareness information for NDSA Kiska Island once every 5 years.

## 4.3 ALTERNATIVE 3 – INSTITUTIONAL CONTROLS/LAND USE RESTRICTIONS WITH PHYSICAL CONTROLS

Alternative 3 includes conducting a NTCRA to memorialize the establishment of institutional controls/land use restrictions with the support of physical controls. This alternative includes administrative and physical controls to impose land use restrictions at NDSA Kiska Island. Additional legal mechanisms are not included because the site is designated a national historic landmark and is already protected under federal law. Removing archeological resources on public land is illegal according to the Archeological Resources Protection Act of 1979. Specific administrative mechanisms and physical controls included in Alternative 3 are as follows.

Informational devices such as the “Follow the 3Rs” (Appendix B) would be used to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. NM would be published and navigational charts for Kiska Island updated. The

administrative mechanisms would be identical to those described in Alternative 2. In addition, this alternative includes physical controls in the form of warning signs which would be installed on the beaches and on buoys moored in select harbors/coves to notify people that potential danger exists and MEC encountered must remain in place.

To document and enforce these new LUC requirements, a Land Use Control Implementation Plan (LUC Plan) would be prepared for NDSA Kiska Island. The plan would include details of the LUC implementation, enforcement, and reporting which would be applicable. The Navy would maintain a GIS database with a layer that identifies all areas around Kiska at which LUCs apply and their boundaries based on the information provided in the PA report (Navy 2013). The Navy will distribute MEC awareness information for NDSA Kiska Island once every 5 years. The Navy will maintain the physical controls (signage and buoys) every 5 years. This alternative conservatively assumes that each sign will need to be replaced every 5 years and two buoys will be completely replaced.

Physical Controls

The Navy would install warning signs on some of the beaches and anchor buoys in areas shallower than 20 fathoms to notify people that potential danger exists, and any MEC encountered must remain in place. A minimum of one buoy will be located in each of the six in-water ranges. Examples of what might be displayed on the signs and buoys are presented in Appendix C. Physical controls are included for all six in-water ranges; however, signs will only be installed in three (1, 4, and 5) of the six in-water range areas because they are the most likely to be used for recreational purposes. These areas have the highest prevalence of historical artifacts present, and have soft beaches where a small skiff can easily land. The other in-water range areas (2, 3, and 6) are believed to have strong currents present which would make diving difficult and provide fewer landing options, so only one buoy will be installed. Signs would be installed above the high water line only on portions of the beach which are likely to be used for landings; these correspond to sandy or soft beach areas. A total of seven signs are assumed. They would be spaced approximately 1-mile apart and have the following features:

- Waterproof Di-Bond (two laminated sheets of aluminum) material a minimum of 3 feet tall by 5 feet wide, mounted approximately 2 feet above ground surface.
- Full color sign wrapped in high-visibility control tack vinyl which is readily available. This type of sign is estimated to last for 10 to 15 years in a marine environment. Consideration should also be given to designing a sign that will last for 30 years and has features that are suitable for use in windy locations.
- Consideration would be given to designing slots to reduce wind loading.

- Stainless steel posts (three per sign) set in rapid set concrete.
- Stainless steel connection hardware (e.g., nuts, bolts, and washers) will be used to connect the sign to the posts.

A minimum of one buoy will be installed in each of the six in-water range areas. Buoys would be located in approximately 100 feet of water near the entrance to the shallow coves where vessel access is most likely to occur. Buoys would be spaced so a vessel would have to pass within 1-mile from a buoy to enter the shallow portion of the in-water range area. In addition, one buoy would be located at the end of the ship pier remnants where MEC has been documented. Manufacture examples of signs and buoys readily available are provided in Appendix C. A total of nine buoys are assumed and each buoy deployment would have the following features:

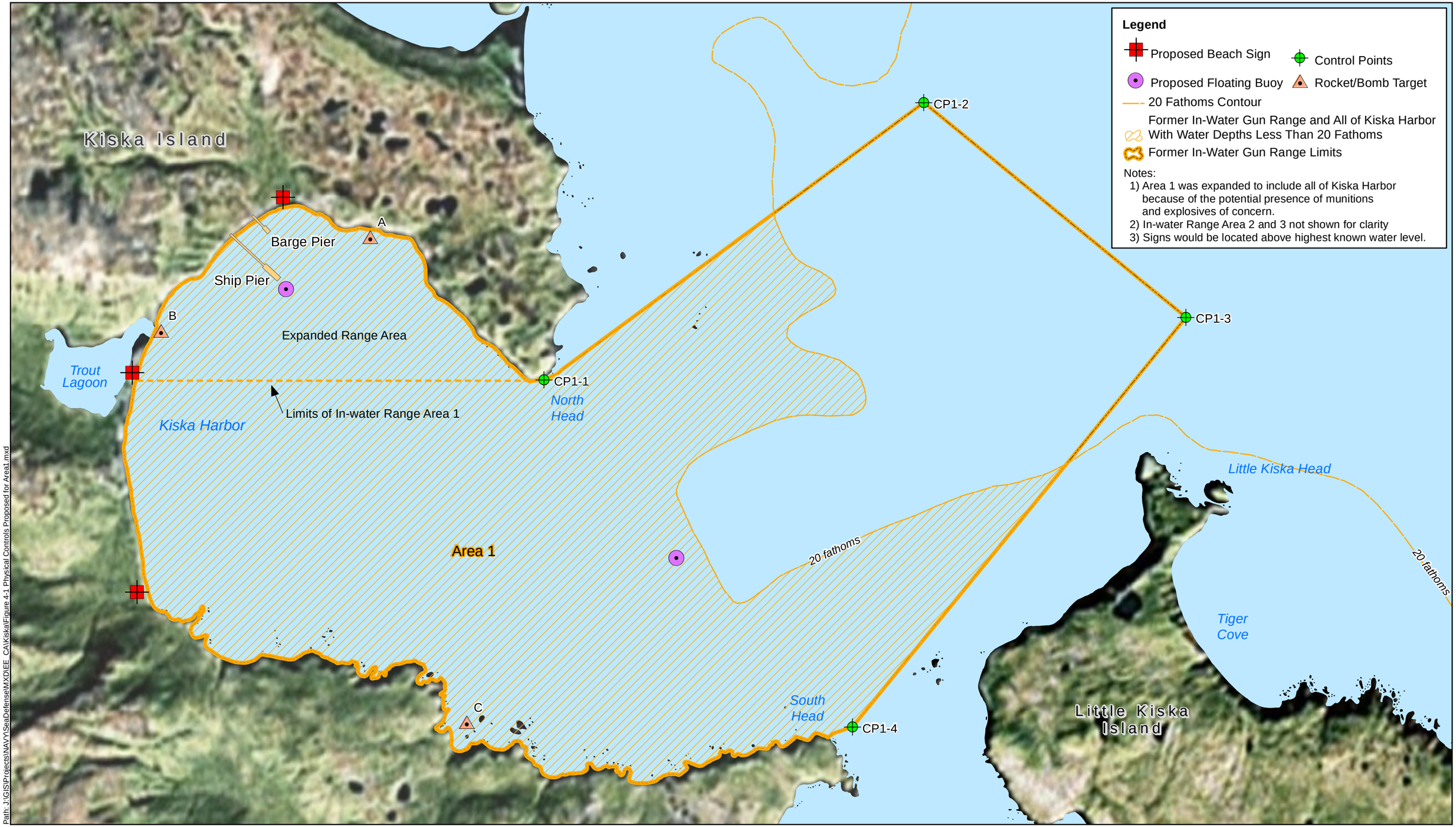
- Floating USCG rated navigational buoy 8-feet diameter and 26-feet long
- Anchor weight rated to hold the buoy in place
- Stainless steel or galvanized metal chain, 1.5-inch diameter and 100 feet long
- Misc. 316 stainless steel shackles and connection hardware

The locations of physical controls for the six in-water ranges are shown in Figures 4-1 through 4-5. A table summarizing the quantity and location of signs and buoys included in Alternative 3 is presented in Table 4-1.

The Navy would perform maintenance or replace signs and buoys every 5 years after their initial installation at NDSA, Kiska Island. It is likely that a standard quality signs would become faded or unreadable after a few years; therefore, we have assumed that a more durable sign would be installed that could last up to 15 years. Custom fabrication of specialty signs which last longer would reduce sign maintenance. This would reduce the total operation and maintenance (O&M) costs for a modest increase in sign cost. However, this alternative conservatively assumes each sign will be replaced every 5 years. Alternative 3 assumes that the connection posts, foundations, and hardware for signs will remain viable for longer than the sign mounted to it. This alternative assumes that the mounting system for two signs will be completely replaced every 5 years. Therefore, after 20 years of maintenance each sign mounting system will have been replaced at least once.

This alternative assumes that two buoys would be completely replaced with new ones every 5 years and two additional buoys would be refurbished. A large buoy tender vessel approximately 200 feet long would be used for the initial installation and subsequent O&M visits. The vessel is assumed to be based out of Kodiak, Alaska which is located approximately 1,200 miles from

Kiska Island. All sign and buoy materials purchased would be shipped to Kodiak, loaded on the vessel for transport to Kiska. The vessel would take approximately 100 hours to make the one way journey and be used to complete the buoy installation. In addition to the vessel crew one more person would be needed to perform buoy installation oversight and two people would complete sign installation. O&M visits for site inspection and maintenance would be completed every 5 years by the same type of vessel and staff with the findings documented in a letter report and forwarded to Alaska Department of Environmental Conservation (ADEC). The inspection would document current land use and the condition of signs and buoys. Representative photographs would be taken to document site conditions and document visual evidence of the LUC.




Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 4-1 Physical Controls Proposed for Area1.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 1,000 2,000<br>Scale In Feet | Kiska Island | **Figure 4-1**<br>**Alternative 3 Physical Controls Proposed for Kiska Harbor and Former In-water Range Area 1 Sign and Buoy Locations** |

CP2-2

3 Nautical Miles Limit

Area 2

CP2-3

CP2-1/CP3-1

*Little Kiska Head*

20 fathoms

20 fathoms

*Tiger Cove*

Little Kiska Island

CP3-2

*Tanadak Pass*

Area 3

CP3-3

**Legend**

- Proposed Floating Buoy
- Control Points
- 20 Fathoms Contour
- Former In-Water Gun Range With Water Depths Less Than 20 Fathoms
- Former In-Water Gun Range Limits

Note: In-water Range Area 1 not shown for clarity

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 4-2 Physical Controls Proposed for Area 2 and 3.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 1,000 2,000<br>Scale In Feet | *Kiska Island* | **Figure 4-2**<br>**Alternative 3 Physical Controls Proposed for Former In-water Range Areas 2 and 3 Buoy Locations** |

Kiska Island

Gertrude Cove

Jeff Cove

Mutt Cove

Area 4

Bukhti Point

CP4-1

CP4-2

Hatchet Point

20 fathoms

**Legend**

- Proposed Beach Sign
- Proposed Floating Buoy
- Control Points
- 20 Fathoms Contour
- Former In-Water Gun Range With Water Depths Less Than 20 Fathoms
- Former In-Water Gun Range Limits

Notes:
1) In-water Range Area 5 not shown for clarity
2) Signs would be located above highest known water level.

Path: J:\GIS\Projects\NAVY\SeaDefenseMXD\EE_CA\Kiska\Figure 4-3 Physical Controls Proposed for Area4.mxd

| | | | |
|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | N<br>0 1,000 2,000<br>Scale In Feet | Kiska Island |

**Figure 4-3**
**Alternative 3 Physical Controls**
**Proposed for Former In-water Range Area 4**
**Sign and Buoy Locations**

Kiska Island

Ethel Cove

Gertrude Cove

Mutt Cove

Jeff Cove

CP5-2

Hamburger Point

CP5-3

20 fathoms

Area 5

Bathymetry Data not Available West of This Point

Bukhti Point

20 fathoms

CP5-1

Vega Bay

CP5-4

**Legend**

- Proposed Beach Sign
- Proposed Floating Buoy
- Control Points
- 20 Fathoms Contour
- Former In-Water Gun Range With Water Depths Less Than 20 Fathoms
- Former In-Water Gun Range Limits

Notes:
1) In-water Range Area 4 not shown for clarity
2) Signs would be located above highest known water level.

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 4-4 Physical Controls Proposed for Area5.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,500 3,000<br>Scale In Feet | Kiska Island | **Figure 4-4**<br>**Alternative 3 Physical Controls Proposed for Former In-water Range Area 5 Sign and Buoy Locations** |

CP6-2

3 Nautical Miles Limit

CP6-1

Area 6

CP6-3

Barley Cove

Kiska Island

Salmon Lagoon

Beach Cove

Bluff Cove

Bathymetry Data not Available West of This Point

20 fathoms

CP6-4

**Legend**

- Proposed Floating Buoy
- Control Points
- 20 Fathoms Contour
- Former In-Water Gun Range With Water Depths Less Than 20 Fathoms
- Former In-Water Gun Range Limits

Path: J:\GIS\Projects\NAVY\SeaDefense\MXD\EE_CA\Kiska\Figure 4-5 Physical Controls Proposed for Area 6.mxd

| | | | | |
|---|---|---|---|---|
| U.S. NAVY | Delivery Order 0080<br>NDSA EE/CA<br>Kiska Island, Alaska | 0 1,500 3,000<br>Scale In Feet | Kiska Island | **Figure 4-5**<br>**Alternative 3 Physical Controls Proposed for Former In-water Range Area 6 Buoy Location** |

## Table 4-1
## Alternative 3 - Summary of Proposed Signs and Buoys

| In-Range Area ID | In-Range Description | Proposed Signs (#) | Proposed Buoys (#) | Comments |
|---|---|---|---|---|
| 1 | Kiska Harbor | 3 | 2 | 1 large beach area and wrecked ships are present which may attract divers |
| 2 | NE of Little Kiska Head | 0 | 1 | Area not suitable for diving |
| 3 | SE of Little Kiska Head | 0 | 1 | Area not suitable for diving |
| 4 | Jeff and Mutt Coves | 2 | 3 | 2 small beach areas |
| 5 | Ethel and Gertrude Coves | 2 | 1 | 2 small beach areas and at least 1 ship wreck which may attract divers |
| 6 | Barley, Beach, and Bluff Coves | 0 | 1 | Area not suitable for diving |
| **All** | **Combined** | **7** | **9** | |

# 5.0 EVALUATION OF REMOVAL ACTION ALTERNATIVES

This section evaluates the removal action alternatives according to effectiveness, implementability, and cost criteria pursuant to CERCLA guidance (USEPA 1993). The alternatives are evaluated on a stand-alone basis. Section 6 provides a comparative analysis of each alternative based on these three criteria.

Cost estimates were developed for each alternative and provided in Tables 5-1, 5-2, and 5-3. Table 5-4 summarizes the total estimated capital and O&M costs. Cost estimate backup materials are provided in Appendix D. The estimated costs for the alternatives are provided for decision-making purposes only and are consistent with the +50/-30 percent accuracy typically associated with feasibility studies. Costs presented are suitable for comparison purposes; the actual costs to complete the work may be higher or lower than estimated. Detailed cost estimates should be further developed for the remedy after selection.

## 5.1 ALTERNATIVE 1 – NO ACTION

### 5.1.1 Effectiveness

This alternative meets the removal action objective to maintain the recreational opportunities for Kiska Island, but may not meet the objective of long-term protection of human health and the environment from MEC. The site is a designated national historic landmark, so visitors are prohibited from removing artifacts from the site. However, it is unclear how informed commercial fishing companies and recreational users of Kiska are that MEC is present and may pose a significant danger if removed from the site. Given this uncertainty, there is a potential risk to the uniformed person who may encounter MEC in the NDSA of Kiska Island.

The exposure pathways evaluation is summarized in Section 2.6. The likelihood of encountering MEC or being exposed to MCs is low based on current or reasonably foreseeable future land use at this remote site. Therefore, this alternative protects human health and the environment from MCs but would not be protective of human health if an explosion were to occur.

No action- or location-specific ARARs apply to Alternative 1. This alternative would have no short-term impacts to construction workers, the community, or the environment during implementation since no action would be performed.

### 5.1.2 Implementability

Alternative 1 is technically feasible and readily implementable with existing resources because it involves no change from the current condition. This alternative would not require construction or long-term O&M and is therefore not subject to unavailability of services or materials.

### 5.1.3 Cost

There are no costs associated with Alternative 1 (Table 5-1) the No Action Alternative.

## 5.2 ALTERNATIVE 2 – INSTITUTIONAL CONTROLS/LAND USE RESTRICTIONS

### 5.2.1 Effectiveness

This alternative meets the removal action objectives to maintain the recreational opportunities for people who visit Kiska Island and reasonably protects human health and the environment from MEC. The exposure pathways evaluation, summarized in Section 2.6, indicated that no unacceptable risk to human or ecological receptors is likely present at the sites under current restricted land uses, based on available site information and standard risk screening protocols. Alternative 2 proposes to allow the current land uses to continue, but adds additional protection by educating the public on the issues related to MEC including issuing NM and LNM. The updated NOAA navigational charts including ships equipped with ECDIS is anticipated to be very effective at informing people who enter MEC areas of the risks. This alternative does not include any site work and does not physically prevent disturbance of MEC by people, however intentional disturbance would not be anticipated by educated individuals.

No action- or location-specific ARARs apply to Alternative 2. This alternative would have no short-term impacts to construction workers, the community, or the environment during implementation since no site activities would be performed.

### 5.2.2 Implementability

Alternative 2 is technically feasible, reliable, and readily implementable. Alternative 2 includes the use of administrative mechanisms to inform the public and potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. Notices to Mariners and educational information that would be sent to public facilities and organizations who are likely to visit Kiska are relatively easy to implement. Alternative 2 would not require construction or long-term O&M at the site so is not subject to unavailability of services at this remote location.

### 5.2.3 Cost

Estimated costs for Alternative 2 are summarized in Table 5-2. Capital costs are associated with implementing administrative controls at the site including project management, meetings, and general coordination. Administrative mechanisms include distribution of information in the form of NM and LNM, updating navigational charts, and preparing materials to notify the public of MEC in areas of Kiska Island. In addition, the cost to prepare a LUC Plan for NDSA Kiska Island is included. The total estimated capital costs are $150,000.

O&M costs are associated with information distribution and reporting every 5 years including project management. The present worth cost estimate for O&M is $100,000 and assumes a 30-year lifetime. The total estimated present worth capital and O&M cost for implementing Alternative 2 is $250,000.

## 5.3 ALTERNATIVE 3 – INSTITUTIONAL CONTROLS/LAND USE RESTRICTIONS WITH PHYSICAL CONTROLS

### 5.3.1 Effectiveness

This alternative meets the removal action objectives to maintain the recreational opportunities for people who visit Kiska Island and reasonably protects human health and the environment from MEC. The exposure pathways evaluation, summarized in Section 2.6, indicated that no unacceptable risk to human or ecological receptors is likely present at the sites under current restricted land uses, based on available site information and standard risk screening protocols. Alternative 3 proposes to allow the current land uses to continue, but adds additional protection by educating the public on the issues related to MEC and uses physical controls at the site in the form of signs and buoys. Using signs and buoys adds one additional layer of notification to the public in the unlikely event that administrative controls do not effectively reach a person visiting Kiska Island. This alternative does not physically prevent disturbance of MEC by people, however intentional disturbance would not be anticipated by educated individuals. Since the current land uses do not present unacceptable risk, this alternative meets the objective of long-term protection of human health and the environment from MEC.

The Archaeological and Historical Preservation Act location-specific ARARs shown in Table 5-2 may apply to Alternative 3. This alternative would have minimal short-term impacts to construction workers, the community, and the environment during implementation since construction is limited to digging posts for signs.

### 5.3.2 Implementability

Alternative 3 is technically feasible and readily implementable, but its reliability is questionable. The difficulty in the implementation phases of this alternative are related to the remote location of the site. Alternative 3 involves the use of informational devices to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. Notices to Mariners and educational information that would be sent to public facilities and organizations who are likely to visit Kiska are relatively easy to implement. Installing warning signs on the beaches and floating buoys to notify people at the site that potential danger exists from MEC is difficult and costly to implement because of the remote location. The longevity of signs and buoys in the harsh windy marine environment is unknown and even if they remain in place they may not be legible or their intent could be misunderstood.

Alternative 3 would require construction and long-term O&M and is therefore subject to availability of services at this remote location. Construction would result in negligible environmental impacts from minor disturbance of established vegetation where sign posts are installed. There is also a potential for disturbing MEC on the sea floor when anchors for the buoys are installed. However, given the small foot print of the anchors envisioned, the risk would be minimal and only occur at the time of installation. Alternative 3 would also include conducting periodic inspections and maintenance (e.g. every 5 years) to document and maintain LUC implementation. Because work may involve anchors during periodic inspection and maintenance, there would be some inherent risk to the workers. The frequency of inspection and maintenance may be reduced if signs and buoys last longer than 5 years in the harsh marine environment present in the Aleutian Islands.

### 5.3.3 Cost

Estimated costs for Alternative 3 are summarized in Table 5-3. Capital costs are associated with implementing administrative and physical controls at the site including project management, meetings, and general coordination. Administrative mechanisms include distribution of information in the form of NM and LNM, updating navigational charts, and preparing materials to notify the public of MEC in areas of Kiska Island. In addition, the cost to prepare a LUC Plan for NDSA Kiska Island is included. Capital costs for physical controls include all the travel, materials, and supplies to install signs and buoys at the site as well as preparation of work plans and reporting. The total estimated capital costs are $4.3 million.

O&M costs are associated with information distribution every 5 years, reporting, and the site inspection and maintenance visit to check land use and repair or replace signs and buoys as needed. The present worth cost estimate for O&M is $11.5 million and assumes a 30-year

## Table 5-1
## Cost Estimate for Alternative 1 - No Action

| Item | Unit Cost | Units | Quantity | Cost |
|---|---|---|---|---|
| **TOTAL CAPITAL COSTS** | | | | **$0** |
| **TOTAL O&M COSTS** | | | | **$0** |
| **TOTAL CAPITAL AND O&M COSTS** | | | | **$0** |
| **PRESENT WORTH O&M COSTS** | | | | **$0** |
| **TOTAL PROJECT PRESENT WORTH** | | | | **$0** |

Note:
O&M - operation and maintenance

## Table 5-2
## Cost Estimate for Alternative 2 -
## Institutional Controls/Land Use Restrictions

| Item | Unit Cost | Units | Quantity | Cost |
|---|---|---|---|---|
| CAPITAL DIRECT COSTS | | | | |
| Project Management, Project Meetings, and Coordination | $4,800 | MO | 6 | $28,800 |
| Prepare Notice to Mariners (NM), 3 versions | $125 | HR | 40 | $5,000 |
| Submit NM to NOAA and Local NM to Coast Guard | $1,000 | LS | 2 | $2,000 |
| Develop informational materials | $20,000 | LS | 1 | $20,000 |
| Research and notify likely Kiska visitors (bird, divers, fishing fleet) | $125 | HR | 24 | $3,000 |
| Public notifications to airports, piers, and towns in the Aleutians | $125 | HR | 20 | $2,500 |
| Work Plan Preparation for activities to be performed | $7,500 | LS | 1 | $7,500 |
| Create Land Use Control Implementation Plan | $30,000 | LS | 1 | $30,000 |
| RA Reporting | $125 | HR | 80 | $10,000 |
| SUBTOTAL CAPITAL COSTS | | | | $108,800 |
| Contingency/Unlisted Items | | % | 20 | $21,760 |
| **TOTAL CAPITAL DIRECT COSTS** | | | | **$130,000** |
| | | | | |
| CAPITAL INDIRECT COSTS | | | | |
| Design | DC | % | 0 | $0 |
| Permitting and Regulatory Compliance | DC | % | 10 | $13,000 |
| TOTAL CAPITAL INDIRECT COSTS | | | | $13,000 |
| | | | | |
| TOTAL DIRECT AND INDIRECT CAPITAL COSTS | | | | $143,000 |
| Site Inspection and Overhead Costs | Total Costs | % | 3 | $4,300 |
| **TOTAL CAPITAL COSTS** | | | | **$150,000** |

## Table 5-2 (Continued)
## Cost Estimate for Alternative 2 - Institutional Controls/Land Use Restrictions

| Item | Unit Cost | Units | Quantity | Cost |
|---|---|---|---|---|
| **O&M COSTS** | | | | |
| **Reoccuring Informational Education Event** | | | | |
| Project Management and Coordination | $150 | HR | 80 | $12,000 |
| Research and notify likely Kiska visitors (bird, divers, fishing fleet) | $125 | HR | 24 | $3,000 |
| Public notifications to airports, piers, and towns in the Aleutians | $125 | HR | 20 | $2,500 |
| Event Summary Letter Report | $125 | HR | 16 | $2,000 |
| Agency Report Review | $1,000 | LS | 1 | $1,000 |
| **SUBTOTAL INSPECTION COSTS** | | | | **$20,500** |
| Contingency Allowances | | % | 25 | $5,125 |
| Site Inspection and Overhead Costs | | % | 3 | $769 |
| **TOTAL EVENT COST (YEARS 5, 10, 15, 20, 25, and 30)** | | | | **$26,000** |
| | | | | |
| **TOTAL CAPITAL COSTS** | | | | **$150,000** |
| TOTAL O&M COSTS | | | | |
| **TOTAL O&M COSTS (30 YEARS)** | | | | **$160,000** |
| **TOTAL PRESENT WORTH O&M COSTS[a]** | | | | **$100,000** |
| TOTAL CAPITAL AND O&M COSTS | | | | |
| **TOTAL CAPITAL AND O&M COSTS (30 YEARS)** | | | | **$310,000** |
| **TOTAL PRESENT WORTH PROJECT COST[a]** | | | | **$250,000** |

[a] Present worth costs were calculated using a 3% discount rate

Notes:
DC - direct cost
EA - each
HR - hour
LS - lump sum
MO - month
O&M - operation and maintenance

## Table 5-3
## Cost Estimate for Alternative 3 -
## Institutional Controls/Land Use Restrictions with Physical Controls

| Item | Unit Cost | Units | Quantity | Cost |
|---|---|---|---|---|
| CAPITAL DIRECT COSTS | | | | |
| Project Management, Project Meetings, and Coordination | $4,800 | MO | 18 | $86,400 |
| Prepare Notice to Mariners (NM), 3 versions | $125 | HR | 40 | $5,000 |
| Submit NM to NOAA and Local NM to Coast Guard | $1,000 | LS | 2 | $2,000 |
| Develop informational materials | $20,000 | LS | 1 | $20,000 |
| Research and notify likely Kiska visitors (bird, divers, fishing fleet) | $125 | HR | 24 | $3,000 |
| Public notifications to airports, piers, and towns in the Aleutians | $125 | HR | 20 | $2,500 |
| Work Plan Preparation for activities to be performed at the site | $50,000 | LS | 1 | $50,000 |
| Create Land Use Control Implementation Plan | $30,000 | LS | 1 | $30,000 |
| **Sign and Buoy Materials including shipping to Kodiak Island** | | | | |
| Sign Fabrication | $2,500 | EA | 7 | $17,500 |
| Shipping Signs to Kodiak | $1,000 | EA | 7 | $7,000 |
| Buoys (8 feet diameter by 26 feet long) | $27,000 | EA | 9 | $243,000 |
| Buoy Shipping to Kodiak Island (2 per load, 5 loads) | $13,753 | LD | 5 | $68,765 |
| Chain, 1.5 inch, 9 at 100 feet long each | $22 | EA | 900 | $19,800 |
| Sign Posts, Connection Hardware, and Ready Mix Concrete | $1,500 | EA | 7 | $10,500 |
| Misc Tool and supplies | $20,000 | LS | 1 | $20,000 |
| **Air Travel to Kodiak Island (3 people) for Buoy Installation oversight and Sign Installation Crew** | | | | |
| Air Fare for Crew (Seattle to Anchorage) | $800 | EA | 3 | $2,400 |
| Air Fare for Crew (Anchorage to Kodiak) | $600 | EA | 3 | $1,800 |
| Per Diem for 3 people for 2 days in Anchorage | $292 | EA | 6 | $1,752 |
| Per Diem for 3 people for 2 days on Kodiak | $199 | EA | 6 | $1,194 |
| Travel Time (Seattle to Kodiak), 16 hrs round trip for 3 people | $125 | HR | 48 | $6,000 |
| **Buoy Tender Vessel Charter - Transport (includes fuel and crew plus transport for 3 additional people)** | | | | |
| Vessel Round Trip Transit from Kodiak to Kiska | $7,305 | HR | 200 | $1,461,000 |
| Labor for NAVFAC Personnel (3 people, 8 days round trip) | $3,000 | DAY | 8 | $24,000 |
| **Buoy Tender Vessel Charter - Buoy Installation** | | | | |
| Buoy Installation Vessel including crew labor (12 hrs/buoy) | $7,305 | HR | 108 | $788,940 |
| Buoy Installation Oversight (1 person at 12 hrs/buoy) | $125 | HR | 108 | $13,500 |
| **Sign Installation (completed concurrently with buoy installation by 2 people)** | | | | |
| Sign Installation (12 hr days), 7 signs in 5 days by 2 people | $125 | HR | 120 | $15,000 |
| Small Boat Operation to support sign installation | $1,000 | DAY | 5 | $5,000 |
| Travel and Contingency for Weather (8 hr day for 3 people) | $3,000 | DAY | 3 | $9,000 |
| RA Reporting | $125 | HR | 300 | $37,500 |
| SUBTOTAL CAPITAL COSTS | | | | $2,952,551 |
| Contingency/Unlisted Items | | % | 25 | $738,138 |
| **TOTAL CAPITAL DIRECT COSTS** | | | | **$3,690,000** |
| | | | | |
| CAPITAL INDIRECT COSTS | | | | |
| Design | DC | % | 8 | $295,200 |
| Permitting and Regulatory Compliance | DC | % | 5 | $184,500 |
| TOTAL CAPITAL INDIRECT COSTS | | | | $479,700 |
| | | | | |
| TOTAL DIRECT AND INDIRECT CAPITAL COSTS | | | | $4,169,700 |
| Site Inspection and Overhead Costs | Total Costs | % | 3 | $125,100 |
| **TOTAL CAPITAL COSTS** | | | | **$4,290,000** |

## Table 5-3 (Continued)
## Cost Estimate for Alternative 3 -
## Institutional Controls/Land Use Restrictions with Physical Controls

| Item | Unit Cost | Units | Quantity | Cost |
|---|---|---|---|---|
| **O&M COSTS - INFORMATIONAL EDUCATION** | | | | |
| **Reoccuring Informational Education Event** | | | | |
| Project Management and Coordination | $150 | HR | 80 | $12,000 |
| Research and notify likely Kiska visitors (bird, divers, fishing fleet) | $125 | HR | 24 | $3,000 |
| Public notifications to airports, piers, and towns in the Aleutians | $125 | HR | 20 | $2,500 |
| Informational Education Event Summary Letter Report | $125 | HR | 16 | $2,000 |
| Agency Report Review | $1,000 | LS | 1 | $1,000 |
| **SUBTOTAL INSPECTION COSTS** | | | | **$20,500** |
| Contingency Allowances | | % | 25 | $5,125 |
| Site Inspection and Overhead Costs | | % | 3 | $769 |
| **TOTAL EVENT COST (YEARS 5, 10, 15, 20, 25, and 30)** | | | | **$26,000** |
| **O&M COSTS - BUOY & SIGN MAINTENANCE** | | | | |
| **General O&M Tasks** | | | | |
| Project Management and Coordination | $4,800 | MO | 9 | $43,200 |
| Work Plans | $125 | HR | 300 | $37,500 |
| Labor for Travel and Contingency for Weather (8 hr day) | $3,000 | DAY | 2 | $6,000 |
| Site Inspection and O&M Status Report | $30,000 | LS | 1 | $30,000 |
| **Buoy Inspection, Repairs, and Replacement** | | | | |
| Travel to Kodiak (3 people) | $13,146 | LS | 1 | $13,146 |
| Tranportation to Kiska by Buoy Tender Vessel | $1,485,000 | LS | 1 | $1,485,000 |
| Buoy Replacement Materials (buoy with freight) | $33,877 | EA | 2 | $67,753 |
| Buoy Replacement Materials (chain) | $22 | FT | 200 | $4,400 |
| Buoy Replacement Installation (16 hrs/buoy) | $7,305 | HR | 32 | $233,760 |
| Buoy Replacement Installation Oversight (1 person 16 hrs/buoy) | $125 | HR | 32 | $4,000 |
| Buoy Refurbishment | $7,000 | EA | 2 | $14,000 |
| Buoy Inspection and cleaning (5 hrs/buoy) | $7,305 | HR | 45 | $328,725 |
| Buoy Inspection Oversight (1 person at 5 hrs/buoy) | $125 | HR | 45 | $5,625 |
| **Sign Inspection, Repairs, and Replacement** | | | | |
| Sign Replacement | $3,500 | EA | 7 | $24,500 |
| Sign Mounting Hardware (assumes 2 will be completely replaced) | $1,500 | EA | 2 | $3,000 |
| Labor Costs for Repair/Replacement Team (2 people, 12hrs) | $125 | HR | 48 | $6,000 |
| Small Boat Operation to support sign replacement | $1,000 | DAY | 2 | $2,000 |
| **SUBTOTAL INSPECTION COSTS** | | | | **$2,308,609** |
| Contingency Allowances | | % | 30 | $692,583 |
| Site Inspection and Overhead Costs | | % | 3 | $90,036 |
| **TOTAL EVENT COST (YEARS 5, 10, 15, 20, 25, and 30)** | | | | **$3,091,000** |
| | | | | |
| **TOTAL CAPITAL COSTS** | | | | **$4,290,000** |
| TOTAL O&M COSTS | | | | |
| **TOTAL O&M COSTS (30 YEARS)** | | | | **$18,700,000** |
| **TOTAL PRESENT WORTH O&M COSTS[a]** | | | | **$11,510,000** |
| TOTAL CAPITAL AND O&M COSTS | | | | |
| **TOTAL CAPITAL AND O&M COSTS (30 YEARS)** | | | | **$22,990,000** |
| **TOTAL PRESENT WORTH PROJECT COST[a]** | | | | **$15,800,000** |

[a] Present worth costs were calculated using a 3% discount rate

Notes:
DC - direct cost
EA - each
HR - hour
LS - lump sum
MO - month
O&M - operation and maintenance

# Table 5-4
## Summary of Costs by Alternative

| Task | Alternative 1<br>No Action | Alternative 2<br>Institutional Controls/ Land Use Restrictions | Alternative 3<br>Institutional Controls/ Land Use Restrictions with Physical Controls |
|---|---|---|---|
| **Subtotals** | | | |
| Capital Direct Costs | $0 | $130,000 | $3,690,000 |
| Contingency Assumed (%) | -- | 20 | 25 |
| Capital Indirect Costs | $0 | $13,000 | $479,700 |
| Site Inspection and Overhead | $0 | $4,300 | $125,100 |
| **Total Capital Costs** | **$0** | **$150,000** | **$4,290,000** |
| **Totals** | | | |
| Total O&M Costs (30 years) | $0 | $160,000 | $18,700,000 |
| Annualized O&M Costs | $0 | $5,000 | $623,000 |
| Total Capital and O&M Costs | $0 | $310,000 | $22,990,000 |
| **Total Project Present Worth [a]** | **$0** | **$250,000** | **$15,800,000** |

[a] Present worth costs were calculated using a 3% discount rate.

Notes:
Discount Rate (3%) = Interest Rate (6%) - Inflation (3%)

CY - cubic yards
NA - Not Applicable
O&M - Operation and Maintenance

# 6.0 COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section evaluates the relative performance of each alternative in relation to each criterion: effectiveness, implementability, and cost. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that key tradeoffs can be identified that would affect the remedy selection. Each criterion and subcriterion was rated from low to high using a ranking of either poor, fair, good, excellent, or superior. The individual subcriterion rankings were averaged to determine the overall criterion rank. A summary of the comparative evaluation is provided in Table 6-1.

## 6.1 EFFECTIVENESS

Alternatives 1, 2, and 3 meet the removal action objective to maintain the recreational opportunities for people who visit Kiska. Neither alternative limits direct access to the site, but Alternative 2 and 3 informs the public with Notices to Mariners and education materials about the MEC at the site. Alternative 3 places warning signs and buoys at the site which potentially increases its effectiveness to people who visit the site.

All alternatives meet the objective of long-term protection of human health and the environment from MEC and comply with ARARs, so the subcriterion protect human health, protect environment, and ARAR compliance were ranked equally as good. However, Alternative 2 and 3 meet effectiveness objectives with increasing degrees of certainty than Alternative 1. The exposure pathways evaluation, summarized in Section 2.6, indicated that no unacceptable risk to human or ecological receptors is likely present at the sites under current land uses, based on our understanding of site conditions. All of the alternatives are immediately protective of human health and the environment. Unlike Alternative 1, Alternative 2 and 3 would increase awareness of the potential presence of MEC and would thereby reduce the potential for visitors to touch or remove MEC from the site. Alternative 2 and 3 would increase the level of protection for human health and the environment in the long-term compared to Alternative 1. Therefore, Alternative 2 and 3 were rated higher for long-term effectiveness then Alternative 1. Furthermore, Alternative 3 would have an increased level of protection compared to Alternative 2 because warning signs and buoys would be installed at the site. It is difficult to determine how much more effective Alternative 3 would be. It is anticipated that the majority of people who travel to Kiska would have been informed by the administrative methods, such as the NM and LNM prior to arriving at the island so the physical controls would not add any additional protection to informed visitors.

Alternative 1 and 2 have no action- or location-specific ARARs and would have no short-term impacts to construction workers, the community, or the environment during implementation so were rated as excellent for short-term effectiveness. Alternative 3 would need to comply with location-specific

ARARs and would have short-term impacts to construction workers and the environment during construction so was rated slightly lower at good for short-term effectiveness. Short-term impacts would include potential construction worker exposure to site-related MEC and the hazards of traveling to the remote location, and environmental impacts from minor vegetation clearing and digging to install fence posts. Alternative 3 would also have significantly higher greenhouse gas emissions associated with air travel and vessel transit to install the signs and buoys so was rated as fair for sustainability.

Alternative 2 and 3 have an increased level of safety to the general public compared to Alternative 1 and include future education to potential users. Alternative 3 adds an even higher but unknown level of safety than Alternative 2 because it includes physical controls at the site and site inspections to check site conditions and perform sign and buoy maintenance if needed. Alternative 1 maintains that there are complete exposure pathways to human and eco receptors; however, based on current recreational opportunities, current land uses, and the remoteness of the site, it is unlikely that there is an unacceptable human health risk present at the site. However, Alternative 1 has a decreased level of safety for site visitors not informed about the dangers of MEC present at the site. Alternative 2 is an effective and reliable alternative that maintains the current recreational opportunities at the site with an increased level of safety. Alternative 3 is the most effective alternative that maintains the current recreational opportunities at the site with the highest level of safety but ranks the same (good) as Alternative 2 when all the subcriterion are averaged.

The combined ranking of effectiveness in decreasing order is as follows.

- Alternative 2 and 3 – Good
- Alternative 1 - Poor

## 6.2 IMPLEMENTABILITY

All of the alternatives are technically feasible and implementable. Alternative 1 and 2 are the most readily implementable, because they do not require construction and are therefore not subject to logistical issues of performing work at a remote site. Alternative 1 involves no change from the current condition and is the only alternative that does not require O&M so is rated superior. Alternative 2 and 3 involves use of administrative methods to increase awareness to potential visitors that Kiska Harbor and the former NDSA in-water ranges have MEC. Notices to Mariners and educational information that would be sent to public facilities and organizations who are likely to visit Kiska are relatively simple to implement. These two alternatives include periodic (every 5 years) informational updates to the public for 30 years which are relatively easy to implement. Therefore

Alternative 2 is rated excellent, but Alternative 3 was rated slightly lower at good because of the difficulty of installing and maintaining physical controls as described below.

Alternative 3 adds physical controls at the site in addition to the administrative methods used in Alternative 2 and 3. The physical controls would include installing warning signs on the beaches and floating buoys to notify people at the site that potential danger exists from MEC. The sign and buoy installations are difficult to implement solely because how remote the site is. In addition, Alternative 3 includes six O&M site visit to inspect and repair signs and buoys every 5 years which would also be challenging to implement. Alternative 3 would require construction and long-term O&M and is therefore subject to availability of services at this remote location. Construction would result in very minor environmental impacts from minor disturbance of established vegetation where sign posts are installed. Alternative 3 also includes conducting inspections and maintenance during each site visit to document and maintain LUC implementation.

The combined ranking of implementability in decreasing order is as follows.

- Alternative 1– Superior
- Alternative 2 - Excellent
- Alternative 3 - Good

## 6.3 COST

The total estimated present worth capital and O&M costs for Alternatives 1, 2, and 3 at NDSA Kiska are $0, $0.25 million, and $15.8 million respectively (see Table 5-4). Alternative 1 has zero cost so is rated superior. Alternative 2 is the most cost effective alternative that best meets the removal action objectives for the site so was rated excellent. Alternative 3 meets the removal action objectives for the site, but at a disproportionately highest cost. The cost for Alternative 3 is so high compared to the alternative it was rated as poor. It is not clear if the additional physical controls included in Alternative 3 add any significant level of protection.

The ranking of costs in decreasing order is as follows.

- Alternative 1 - Superior
- Alternative 2 – Excellent
- Alternative 3 - Poor

## Table 6-1
## Comparative Evaluation of Criteria

| Criterion | Ratings | | |
|---|---|---|---|
| | **Alternative 1 No Action** | **Alternative 2 Institutional Controls/Land Use Restrictions** | **Alternative 3 Institutional Controls/Land Use Restrictions with Physical Controls** |
| **Effectiveness[a]** | **Poor** | **Good** | **Good** |
| Protect Human Health | Good | Good | Good |
| Protect Environment | Good | Good | Good |
| ARAR Compliance | Good | Good | Good |
| Long-Term Effectiveness | Poor | Good | Excellent |
| Short-Term Effectiveness | Excellent | Excellent | Good |
| Reliability | Poor | Good | Good |
| Sustainability | Good | Good | Fair |
| **Implementability[a]** | **Superior** | **Excellent** | **Good** |
| Administrative | Superior | Good | Good |
| Technical | Superior | Excellent | Good |
| **Cost (Present Worth)[b]** | **Superior - $0** | **Excellent - $0.25M** | **Poor - $15.8M** |
| **Summary** | | | |
| Overall | Good | Excellent | Fair |

[a] The overall rating for this Criterion is the average of the individual rating determined for its subcriterion.
[b] Costs presented are FS-level for comparison purposes. Actual costs to complete the work may be higher or lower.

# 7.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

Based on the evaluation of effectiveness, implementability, and cost, Alternative 2 is the recommended alternative. Alternative 2 is a readily implementable, reliable, and cost-effective alternative that meets both the removal action objectives to maintain the recreational opportunities for visitors to Kiska, and is protective of human health and the environment from MEC in the long-term. Alternative 2 is readily implementable, has no short-term impacts to construction workers, the community, and the environment during implementation. Alternative 2 maintains the current recreational opportunities at the site and, based on exposure pathways evaluation, is protective of human health and the environment under current restricted and reasonably foreseeable future land uses. Comments on the Final EE/CA made during public review will be considered in the final selection of the alternative in the Action Memorandum, and comment responses will be included in the administrative record file.

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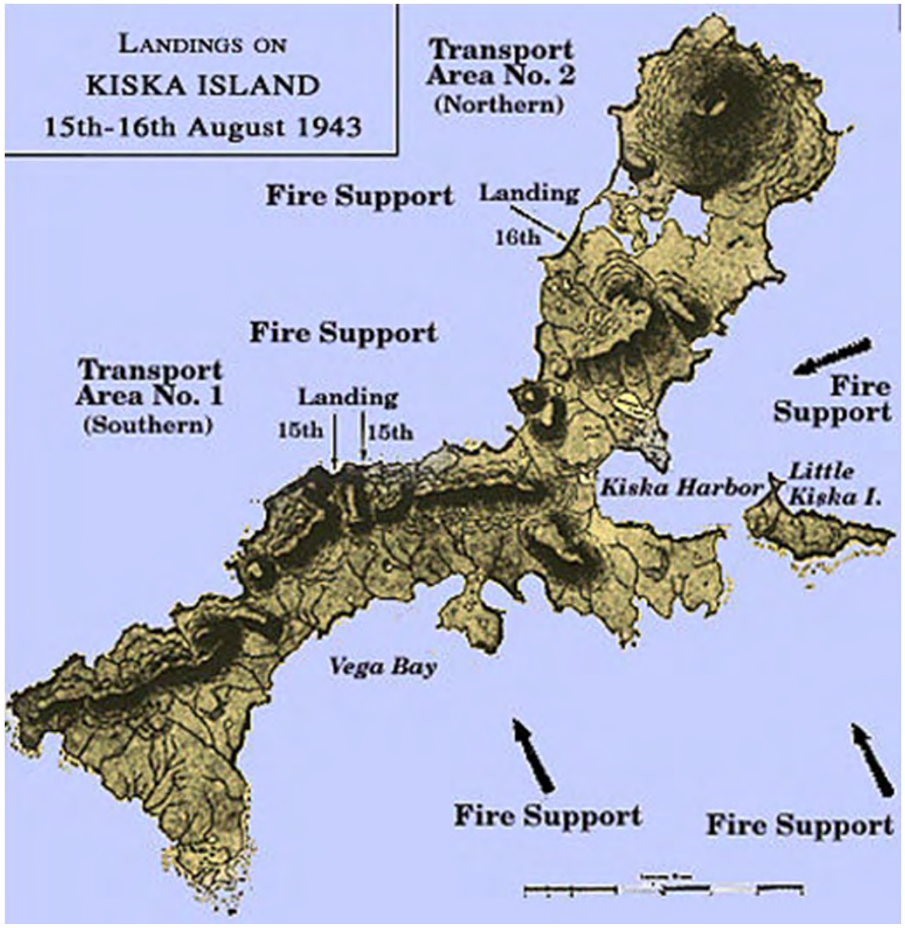
# Appendix A

## Site Photographs

Appendix A
Select Photographs
Kiska Island, Alaska

## World War II Era

(1942 - 1943)




Landing Fire Support Plan


Allied Landing Plan

Appendix A
Select Photographs
Kiska Island, Alaska

## World War II Era

(1942 - 1943)


Japanese Defensive Positions


Burning Japanese Transport in Kiska Harbor

Sinking Japanese Ship off Kiska

Appendix A
Select Photographs
Kiska Island, Alaska

## World War II Era

(1942 - 1943)


Casings from Shells Fired on Kiska by US Ships


Supply HQ in Gertrude Cove, August 21, 1943


U.S. Landing Craft in Kiska Harbor

Appendix A
Select Photographs
Kiska Island, Alaska

## Modern Day Site Photos

(2000 - 2010)

Ship Pier Looking Southwest

Ship Pier Looking East

Ship Pier Looking Southeast

Appendix A
Select Photographs
Kiska Island, Alaska

## Modern Day Site Photos

(2000 - 2010)

Gun Emplacement

Anti-Aircraft Gun

Ammo present on Kiska

Appendix A
Select Photographs
Kiska Island, Alaska

**Modern Day Site Photos**

(2000 - 2010)

Shipwreck


Shipwreck

Appendix A
Select Photographs
Kiska Island, Alaska

## Modern Day Site Photos

(2000 - 2010)

Shipwreck

Same Shipwreck (different angle)

# Appendix B

# MEC Safety Information – Follow the 3Rs

3Rs Explosives Safety Guide

# Maritime Industry

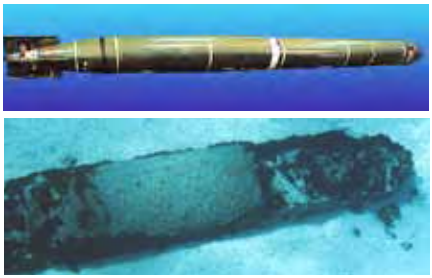
ORecognize
ORetreat
OReport

**DURING COMMERCIAL OPERATIONS SUCH AS FISHING, CLAMMING OR DREDGING; NETS; BOTTOM TENDING GEAR; AND DREDGES MAY CATCH OR DREDGE UP MUNITIONS FROM THE OCEAN. THESE MUNITIONS SHOULD BE CONSIDERED A SERIOUS DANGER TO A VESSEL AND ITS CREW.**

Many vessel crews tell sea stories about catching suspicious items in their nets or dredging gear. The lucky crews live to spin their own tales, while others become the subject of tragic sea stories.

*Unexploded Ordnance Recovered During Dredging*

In July 1965, such a tragedy took place aboard the fishing vessel *(FV) Snoopy*. The *FV Snoopy* was trawling for scallops off the coast of North Carolina when it caught a large cylinder in its net. A witness said he could clearly see a long round object swaying in the net amidships, over the deck.



*A Clean Torpedo (top) and a Heavily Corroded Torpedo on the Seafloor (bottom)*

What happened next is unclear; but an explosion caused the loss of the *FV Snoopy* and eight members of her crew.

What went wrong? Was it preventable? Could something have been done to save the crew? While all these questions were asked, no one but the *FV Snoopy's* crew knows what actually happened that day. However, the tale of the *FV Snoopy* is meaningful if others learn from this tragedy.

(Note: Both commercial and sport divers should also be aware of the hazards munitions present).

To protect your crew and vessel if you encounter or suspect you have encountered a munition at sea, follow the 3Rs of explosives safety: Recognize, Retreat, Report.

ORecognize
ORetreat
OReport

# Recognize

The military has conducted training and combat operations at sea for centuries. Prior to 1970, the U.S. military as well as the militaries of other nations also sea-disposed of excess, obsolete and unserviceable munitions either en route to port or as part of planned disposals. In the 1970s, the U.S. military stopped the practice, now only allowing it in an emergency. Mariners are cautioned they could encounter munitions during commercial operations, such as fishing or dredging. Using common sense and basic knowledge, Mariners can spin their own story rather than becoming a character in a tragic sea tale.

*Various Recovered Projectiles*

Munitions can be encountered anywhere at sea, not just in charted hazard areas. Munitions that may be encountered include mines, torpedoes, depth charges, artillery shells, bombs and missiles. These munitions, which can contain high explosives or chemical agents, can present a serious danger to a vessel and its crew.

*Projectile and Cartridge Case on Seafloor*

- Munitions, to include those that have been lying dormant in sea or fresh water for many years, should be considered extremely dangerous.
- In some cases, munitions that have been in water for a long period may become more sensitive.
- Regardless of whether encountered on land or recovered from the sea, munitions can explode when handled.
- Munitions submerged in sea or fresh water for any length of time may be:
  - Like new and easy to identify;
  - Heavily encrusted with sea growth and difficult to identify.

This guide includes drawings representative of munitions that may be encountered at sea. Drawings may help in recognizing suspect munitions.

## MUNITIONS ARE DESIGNED TO BE DANGEROUS

Munitions are designed to injure, maim, or kill people, or to destroy equipment (e.g., vessels). The best protection from the potential hazards associated with munitions is to heed the warnings on nautical charts, avoid known disposal areas, and follow the 3Rs (Recognize, Retreat, Report).

## CHEMICAL MUNITIONS AND CHEMICAL AGENTS

Beginning in World War I, the Department of Defense (then, the Department of War) designed toxic chemical agents to kill, seriously injure, or incapacitate an enemy. In the past, the United States and other countries sea-disposed chemical munitions and chemical agents in bulk containers, such as 55-gallon drums. As a result, some munitions or containers recovered from the sea may contain toxic chemical agents.

*Recovered Chemical Filled Projectile*

Vessel crews should be alert for conditions or signs that could indicate the presence of toxic chemical agents:

- Unusual odor from equipment or fish;
- A stinging sensation in the eyes, or burning or irritated skin;
- Corroded containers or suspicious clay-like lumps.

*Chemical Filled Projectile Recovered from Clam Bed*

## IF CHEMICAL AGENTS ARE SUSPECTED, IMMEDIATE ACTION IS NECESSARY TO PROTECT THE CREW AND VESSEL.

**If You Suspect You Have Encountered a Chemical Munition:**

- Move all crew members up wind;
- Close all doors and hatches;
- Shut down all ventilation systems;
- Steam into the wind to carry contaminants away from the crew;
- Contact the U.S. Coast Guard for assistance

*Munitions on the Seafloor*

In case of physical contact with toxic chemical agents, immediately rinse the contaminated area with large amounts of water (if possible, use warm soapy water), even if no effects are felt.

Crewmembers should not work in a contaminated area and every effort should be made to prevent the spread of contaminants. Fishing vessels that have come into contact with toxic chemical agents must not bring their catch ashore until it has been checked and released by the appropriate state's Department of Environmental Health. Sea life contaminated by chemical agents is unsuitable for human or animal consumption.

*A Clean Aerial Bomb Prepared for Shipping (above) and an Aerial Bomb on the Seafloor (below).*

## ORetreat

Because munitions present a potential explosive hazard, they should never be touched, moved or disturbed (handled); however, at sea, the specific action required will depend on the circumstances.

A Clean 5-inch Caliber Projectile (above) and Recovered 5-inch 38 Caliber Projectiles (below)

- If possible, crews should avoid bringing munitions (or suspect munitions) onboard. If a munition is ensnared or fouled in gear, retreat by carefully jettisoning the munition, or by cutting away the gear. If this is not possible, carefully secure the munition onboard and move and keep the crew as far away from the munition as possible.
- Great care should be taken to avoid bumping the munition; each action carries risk.

### NEVER BRING A MUNITION OR SUSPECT MUNITION INTO PORT

**Munitions Not On Board**

If an actual or suspect munition is recovered:

- Immediately stop all operations;
- Do not bring the munition or gear containing it onboard, if possible;
- Do not allow the munition to come or remain along side the vessel where wave action may cause contact with the hull;

- If a munition is in the gear and has not been brought onboard, try to safely lower it back into the water and, as indicated below, note the position and report it to the U.S. Coast Guard.
- If in shallow water (less than 130 feet), lower the munition to the bottom, buoy off the net or dredge recovery lines (remain in the immediate area).
- If in deep water, stream the munition as far aft as possible and maintain steerageway as necessary.
- Remain in the area while awaiting assistance.

A Clean Rifle Grenade (above) and a Recovered Grenade. Item is about four inches long.

**Munitions Onboard**

- If the gear is brought over the deck with an actual or suspected munition, but remains suspended and can continue to be safely suspended in place or nearby, immediately:
- Secure the munition with guy lines to prevent further movement;
- Keep the crew away from that area.

If a suspect munition is brought onboard:

- Keep unneeded crew members as far away as possible.
- Decide whether to do one of the following:
  - Carefully jettison it, or
  - Retain it onboard.
- If jettisoned, note and report position.
- If retained onboard:
  - Limit handling and avoid hitting or bending any part of the munition;
  - Stow the munition on deck as far away as possible from heat sources, vibration and the crew, but limit handling;
  - Firmly chock and lash the munition to prevent movement;
  - Cover and/or wet to minimize the potential for:
    - Deterioration of metal parts and release of any fill;
    - Explosives to dry out and become sensitive to shock.
  - Keep crew away from item.
  - Request assistance (Channel 16--156.800 MHz).
- If within 2 or 3 hours of land, the safest measure is to notify the U.S. Coast Guard and move to a rendezvous area offshore.

# Report

Careful observation is necessary prior to reporting, so that proper instructions and assistance can be provided. The information you provide may be combined with other reports to produce new warnings to mariners and update nautical charts.

Floating Mine Washed Up on Beach

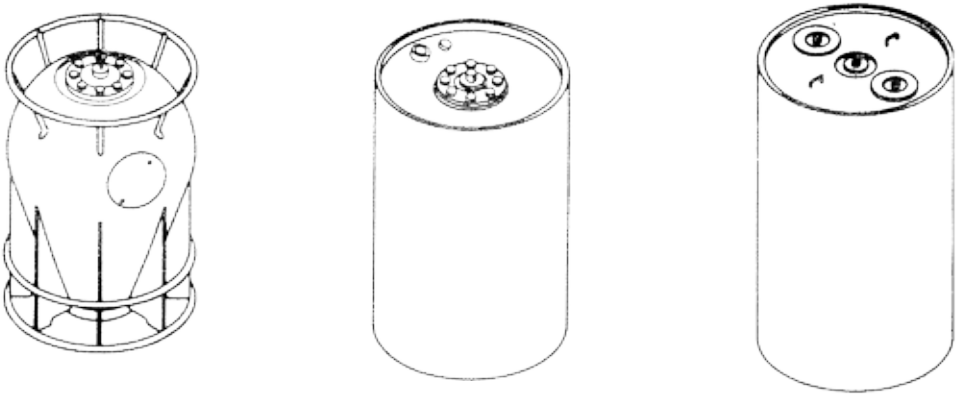
When actual or suspect munitions are encountered at sea, the vessel's captain should notify the U.S. Coast Guard and provide the below information, as soon as possible. (Note: If a munition is encountered while in port [e.g., during off loading or processing] call 911.)

- The vessel's position (use World Geodetic System 1984 [WGS-84] for reporting).
- If the exact position is unknown, give approximate coordinates, or a range and bearing from a charted feature.
- The activity being conducted when the munition was encountered (e.g., fishing, dredging).
- A general description of the munition's key features (size, shape, fins, props, markings) and condition. (Never attempt to clean, open, or tamper with a munition in any way).
- The action taken (e.g. stowed or jettisoned).
- If jettisoned, also provide:
  - The position of the release, water depth, and buoys or markings used;
  - A description of any entanglement (e.g., net, dredge) or other details.
- Any unusual odors, if noticed.
- Whether the munition was jettisoned:
  - In or near a charted munitions dump;
  - Near (within 1,000 yards of) any surface or sub-surface structures.

**THE US COAST GUARD WILL NOTIFY THE APPROPRIATE MILITARY EXPLOSIVE ORDNANCE DISPOSAL UNIT TO ARRANGE FOR REQUIRED SUPPORT.**

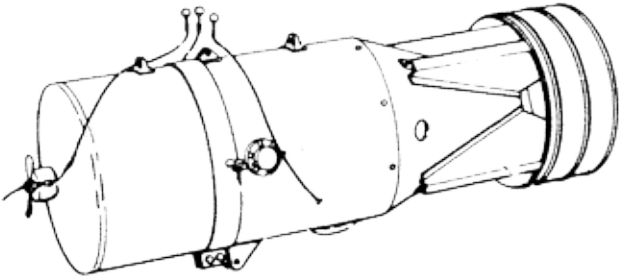
## DEPTH CHARGES

Length 28" / Diameter 18" to 25"

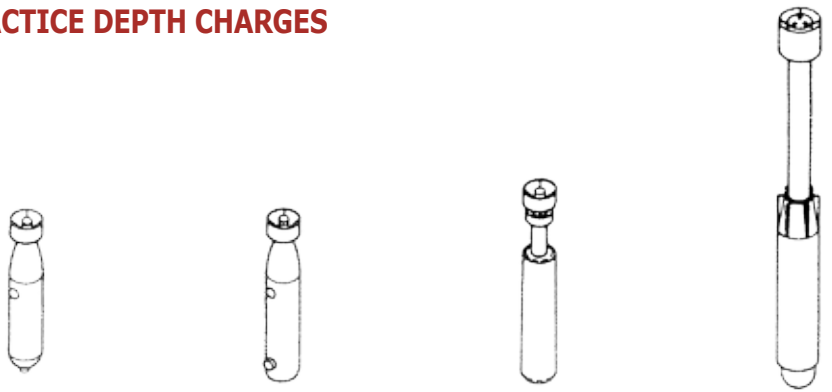


## DEPTH BOMB

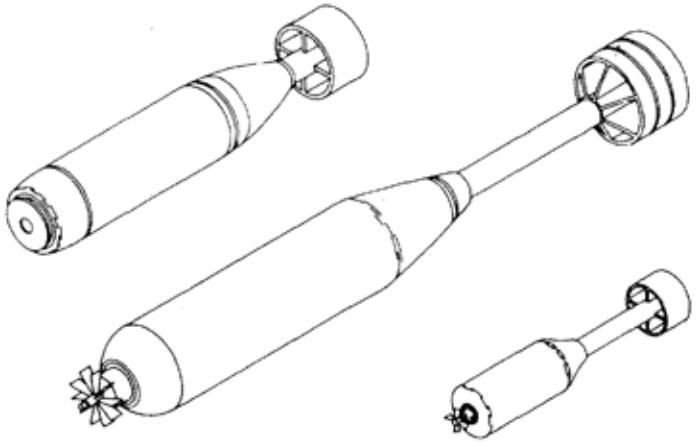
Length 50" to 59" / Diameter 15" to 18"



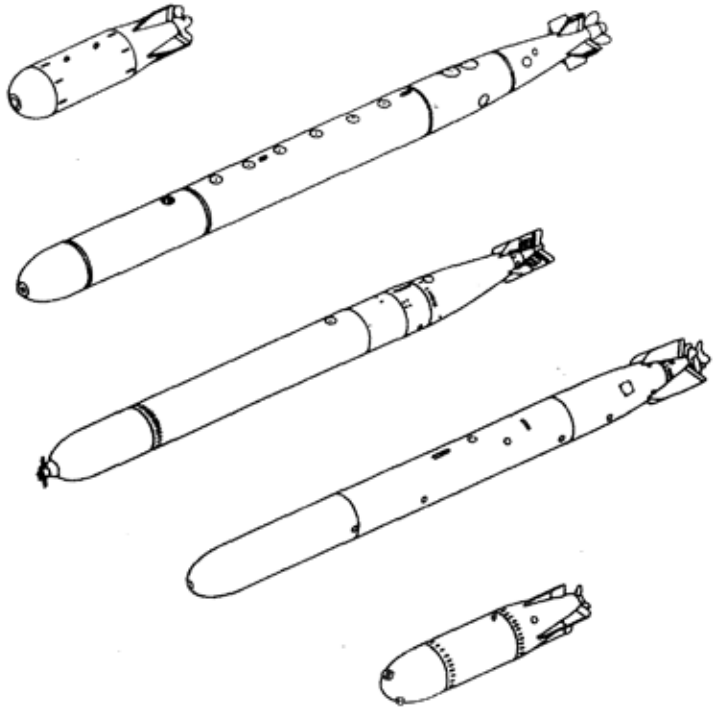
## PRACTICE DEPTH CHARGES



## PROJECTED ANTI-SUBMARINE-WARFARE WEAPONS



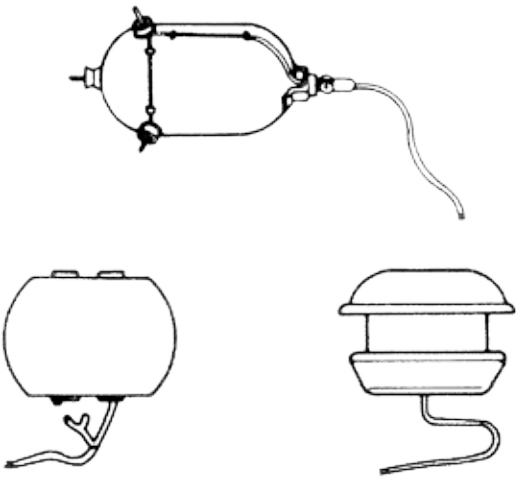
## REPRESENTATIVE TORPEDOES



## MISCELLANEOUS MINE FLOATS

Length 10" to 24"

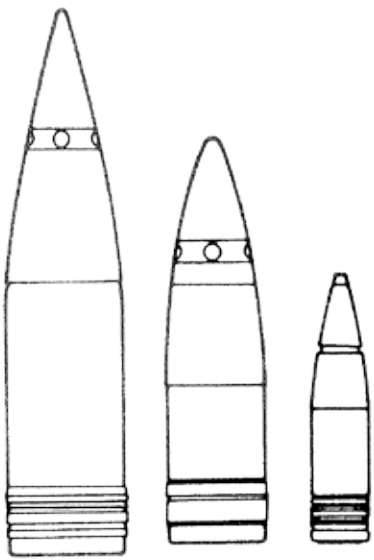
Diameter 12" to 18"



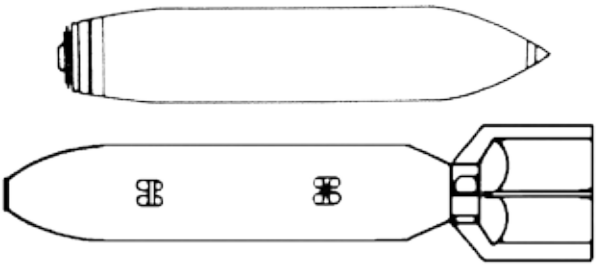
## PROJECTILES

Lengths 20 mm to 16"

3" to 5" in Diameter (Typically)

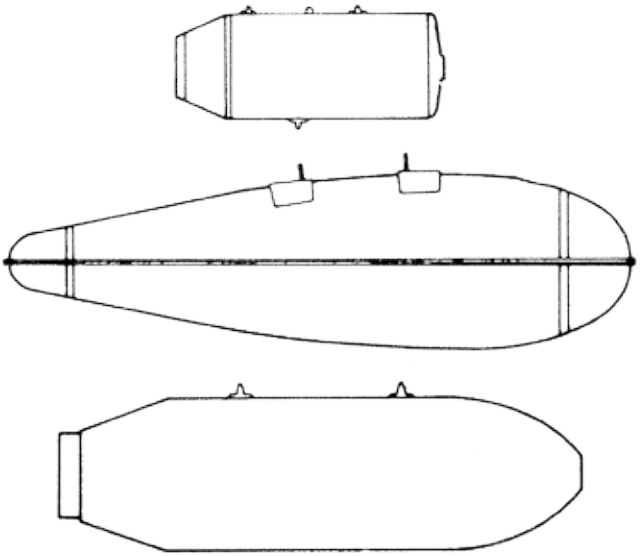


## AERIAL BOMBS



Bomb Body Lengths 39" to 97"

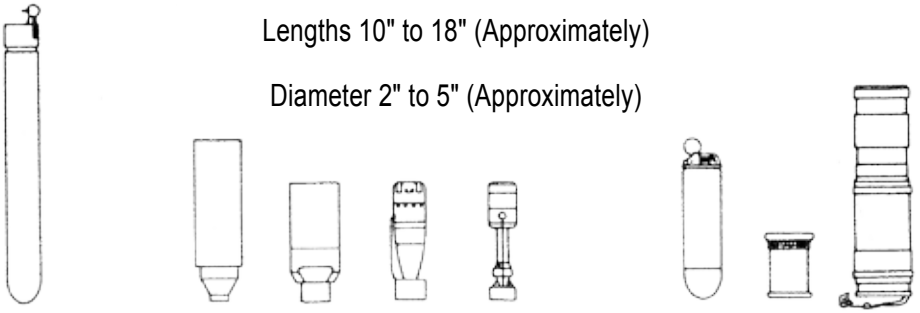
Diameter 7" to 19"



## MARKERS AND SIGNALS

Lengths 10" to 18" (Approximately)

Diameter 2" to 5" (Approximately)



# Don't Forget

- Munitions are dangerous and may not be easily recognizable!
- Avoid military and former military ranges and disposal areas!
- Do not bring munitions on-board!
- Never bring a munition into port, unless directed to do so by USCG!

# Follow the 3Rs

**Recognize**

When you may have encountered a munition.

**Retreat**

If you know or suspect you have encountered a munition, jettison it or secure it and keep the crew from the immediate area.

**Report**

Immediately notify the US Coast Guard of the vessel's or munitions' location and provide a description of the munition.

**Emergency contacts:**

- In Port: Call 911
- At sea: Use Channel 16 (156.800 MHz)


**For additional information call**
**U.S. Army Technical Center for Explosives Safety**
**at (918) 420-8919**
**or see**

**the US Army's UXO Safety Education website**
**https://www.denix.osd.mil/uxosafety**

FEBRUARY 2010

# Appendix C

## Example Signs and Vendor Information

# Appendix C
# Example Danger Explosive Hazard Signs


Example Danger Sign


Example Danger Signs


Example Danger Sign in English and Spanish

# Appendix C
# Example Danger Signs


Example UXO Sign


Example UXO Sign

# Appendix C
# Example Explosive Symbols

Explosive Symbol from UXO



Explosive Symbol

# Appendix C
# Example “Do Not Touch” Signs

Do Not Touch Symbol




Do Not Touch Symbol

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-No Hidden Setup Fees or Up-charges

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Seattle WA 98108

Hours 9:00AM - 6:00PM
Monday through Friday



## Aluminum Sign

Take a drab old building and make it come to life with sizzling *Aluminum Sign* from the designers at *Seattle Signs*. This custom *Aluminum Sign* is a simple sheet of *Aluminum* Dibond. The digitally printed graphics on this *Aluminum Sign* are made with long lasting outdoor UV Ink for a fantastic result. *Aluminum Signs* have a magnetic effect on passers by.


*Aluminum Sign*


Offset


*Aluminum* Dibond *Sign*


Seattle *Aluminum Sign*


*Aluminum* building *Sign*

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**Your E-mail:**

**Phone Number:**

**Subject:**

**Mail Message:**

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## Metal Signs

Take care of business with a *metal sign*. These *metal signs* can be made in traditional parking sign style or with elegant graphic designs. For a great price, a *metal sign* effectively gets the message across.

Parking *Metal Signs*

*Metal* Warning *Sign*

*Metal* Parking *Signs*


*Metal* Property *Signs*


*Metal* Parking *Signs*

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**Subject:**

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## Brushed Metal Face Monument Sign

The face is made of a composite aluminum material called Dibond. The logo is reverse cut out to reveal the green backing color.



Brushed Metal Face Monument Sign

Monument Sign with Brushed Metal Face

---

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**Your E-mail:**

**Phone Number:**

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**Mail Message:**

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Please fill in all fields to send an e-mail to Signs of Seattle





**Brushed Metal Face With Reverse Cut Logo**

# Appendix D

# Cost Estimate Backup Materials

McMASTER-CARR® OVER 555,000 PRODUCTS
(562) 692-5911
(562) 695-2323 (fax)
la.sales@mcmaster.com
Text 75930

## Super-Corrosion-Resistant 316 Stainless Steel

Molybdenum gives 316 excellent corrosion resistance for use in a variety of marine and chemical-processing applications. This material maintains its corrosion resistance up to 1500° F. It is not heat treatable and may become slightly magnetic when worked.

View detailed performance properties and composition for stainless steel.

**Warning!** Yield strength and hardness are not guaranteed and are intended only as a basis for comparison.

### Rectangular Tubes—Unpolished

- Yield Strength: Not Rated
- Hardness: Medium (Rockwell B88)
- Meet ASTM A554

This 316/316L stainless steel contains less carbon than standard 316 for better weldability. Also known as hollow bar, these tubes are cold formed and welded. Outside and inside corners are rounded. Straightness tolerance is 0.075" per 3 feet. Length tolerance is ±1" per foot.

| Outside Ht. | Outside Wd. | Ht./Wd. Tolerance | | 1/2 ft. | 1 ft. | 3 ft. | 6 ft. |
|---|---|---|---|---|---|---|---|
| **0.062" Wall Thick. (±0.006")** | | | | | | | |
| 3/4" | 3/4" | ±0.015" | 2937K12 | $7.88 | $14.11 | $35.28 | $58.80 |
| 1 1/2" | 1 1/2" | ±0.020" | 2937K31 | 11.15 | 19.98 | 49.94 | 83.23 |
| **0.065" Wall Thick. (±0.007")** | | | | | | | |
| 1" | 1" | ±0.015" | 2937K11 | 9.40 | 16.84 | 42.10 | 70.17 |
| **0.120" Wall Thick. (±0.012")** | | | | | | | |
| 1" | 1" | ±0.015" | 2937K13 | 10.30 | 18.44 | 46.10 | 76.83 |
| 1" | 1 1/2" | ±0.020" | 2937K32 | 12.23 | 21.91 | 54.77 | 91.29 |
| 1" | 2" | ±0.020" | 2937K33 | 14.59 | 26.14 | 65.35 | 108.91 |
| 1 1/2" | 1 1/2" | ±0.020" | 2937K15 | 15.38 | 27.55 | 68.89 | 114.81 |
| 2" | 2" | ±0.020" | 2937K17 | 18.30 | 32.77 | 81.94 | 136.56 |
| 3" | 3" | ±0.030" | 2937K19 | 21.69 | 38.84 | 97.10 | 161.83 |
| **0.180" Wall Thick. (±0.018")** | | | | | | | |
| 2" | 4" | ±0.030" | 2937K21 | 39.44 | 70.64 | 176.60 | 294.34 |
| 3" | 3" | ±0.030" | 2937K23 | 41.12 | 73.64 | 184.11 | 306.85 |
| **0.250" Wall Thick. (±0.025")** | | | | | | | |
| 2" | 2" | ±0.020" | 2937K24 | 32.18 | 57.63 | 144.07 | 240.12 |
| 2" | 4" | ±0.030" | 2937K25 | 44.64 | 79.95 | 199.87 | 333.11 |
| 3" | 3" | ±0.030" | 2937K27 | 46.35 | 83.02 | 207.55 | 345.91 |
| 4" | 4" | ±0.030" | 2937K29 | 60.03 | 107.51 | 268.78 | 447.97 |

### Round Tubes—Unpolished

- Yield Strength: 30,000 psi
- Hardness: Medium (Rockwell B79)
- 0.035" to 0.120" wall thickness: Meet ASTM A213 and A269;
  0.188" to 0.500" wall thickness: Meet ASTM A511

Material is 316 stainless steel. All sizes are annealed. 0.035" to 0.120" wall thicknesses are cold drawn. 0.188" to 0.500" wall thicknesses are hot rolled. Straightness tolerance is 0.045" per 3 feet. Length tolerance is ±1".

| OD | ID | OD Tolerance | | 1/2 ft. | 1 ft. | 2 ft. | 4 ft. |
|---|---|---|---|---|---|---|---|
| **0.035" Wall Thick. (±0.005")** | | | | | | | |
| 1/4" | 0.180" | ±0.010" | 89495K275 | $2.48 | $4.14 | $6.90 | $11.50 |
| 5/16" | 0.243" | ±0.010" | 89495K295 | 2.80 | 4.67 | 7.78 | 12.97 |
| 3/8" | 0.305" | ±0.010" | 89495K345 | 3.10 | 5.17 | 8.62 | 14.37 |
| 1/2" | 0.430" | ±0.010" | 89495K355 | 3.86 | 6.44 | 10.73 | 17.89 |
| 5/8" | 0.555" | ±0.010" | 89495K365 | 4.83 | 8.06 | 13.43 | 22.38 |
| 3/4" | 0.680" | ±0.010" | 89495K375 | 5.49 | 9.15 | 15.25 | 25.42 |
| 1" | 0.930" | ±0.010" | 89495K385 | 8.15 | 13.59 | 22.65 | 37.75 |
| **0.065" Wall Thick. (±0.010")** | | | | | | | |
| 1/4" | 0.120" | ±0.010" | 89495K395 | 3.45 | 5.75 | 9.58 | 15.97 |
| 5/16" | 0.183" | ±0.010" | 89495K405 | 4.03 | 6.72 | 11.21 | 18.68 |
| 3/8" | 0.245" | ±0.010" | 89495K415 | 4.82 | 8.04 | 13.39 | 22.32 |
| 1/2" | 0.370" | ±0.010" | 89495K425 | 5.71 | 9.51 | 15.86 | 26.43 |
| 5/8" | 0.495" | ±0.010" | 89495K435 | 11.05 | 18.41 | 30.69 | 51.15 |
| 3/4" | 0.620" | ±0.010" | 89495K445 | 12.73 | 21.22 | 35.36 | 58.94 |
| 1" | 0.870" | ±0.010" | 89495K455 | 15.07 | 25.12 | 41.87 | 69.78 |
| 1 1/4" | 1.120" | ±0.023" | 89495K465 | 17.97 | 29.96 | 49.93 | 83.21 |
| **0.120" Wall Thick. (±0.180")** | | | | | | | |
| 3/8" | 0.135" | ±0.010" | 89495K475 | 7.97 | 13.29 | 22.15 | 36.92 |
| 1/2" | 0.260" | ±0.010" | 89495K485 | 9.52 | 15.87 | 26.44 | 44.07 |
| 3/4" | 0.510" | ±0.010" | 89495K495 | 11.10 | 18.50 | 30.83 | 51.39 |
| 7/8" | 0.635" | ±0.010" | 89495K505 | 13.85 | 23.08 | 38.47 | 64.11 |
| 1" | 0.760" | ±0.010" | 89495K515 | 16.91 | 28.18 | 46.96 | 78.27 |
| 1 1/4" | 1.010" | ±0.023" | 89495K525 | 13.48 | 33.69 | 56.15 | 93.59 |
| 1 1/2" | 1.260" | ±0.023" | 89495K535 | 16.14 | 40.36 | 67.27 | 112.11 |
| 2" | 1.760" | ±0.023" | 89495K545 | 26.26 | 65.65 | 109.41 | 182.35 |
| **0.188" Wall Thick. (±0.026")** | | | | | | | |
| 1 1/4" | 0.875" | ±0.023" | 89495K18 | 44.18 | 73.63 | 122.72 | 204.54 |
| 1 1/2" | 1.125" | ±0.023" | 89495K48 | 51.24 | 85.39 | 142.32 | 237.20 |
| 2" | 1.625" | ±0.023" | 89495K54 | 62.68 | 104.46 | 174.11 | 290.18 |
| 2 1/2" | 2.125" | ±0.023" | 89495K56 | 73.27 | 122.12 | 203.53 | 339.22 |
| 3" | 2.625" | ±0.031" | 89495K58 | 86.23 | 143.72 | 239.54 | 399.23 |
| 3 1/2" | 3.125" | ±0.031" | 89495K59 | 89.02 | 148.36 | 247.27 | 412.11 |
| **0.250" Wall Thick. (±0.031")** | | | | | | | |
| 1 1/4" | 0.750" | ±0.023" | 89495K19 | 51.94 | 86.57 | 144.28 | 240.47 |
| 1 1/2" | 1.000" | ±0.023" | 89495K49 | 54.60 | 91.01 | 151.68 | 252.80 |
| 2" | 1.500" | ±0.023" | 89495K71 | 58.40 | 97.34 | 162.23 | 270.38 |
| 2 1/2" | 2.000" | ±0.023" | 89495K72 | 63.39 | 105.64 | 176.07 | 293.45 |
| 3" | 2.500" | ±0.031" | 89495K73 | 68.00 | 113.33 | 188.88 | 314.80 |
| 3 1/2" | 3.000" | ±0.031" | 89495K1 | 90.80 | 151.33 | 252.22 | 420.36 |
| 3 3/4" | 3.250" | ±0.031" | 89495K5 | 92.01 | 153.34 | 255.57 | 425.95 |
| 4" | 3.500" | ±0.031" | 89495K74 | 96.81 | 161.36 | 268.93 | 448.21 |
| 5" | 4.500" | ±0.031" | 89495K6 | 129.38 | 215.64 | 359.40 | 599.00 |
| **0.375" Wall Thick. (±0.047")** | | | | | | | |
| 1 1/4" | 0.500" | ±0.023" | 89495K39 | 46.41 | 77.34 | 128.90 | 214.84 |
| 1 1/2" | 0.750" | ±0.023" | 89495K53 | 67.02 | 111.71 | 186.18 | 310.30 |
| 2" | 1.250" | ±0.023" | 89495K81 | 69.22 | 115.37 | 192.28 | 320.47 |
| 2 1/2" | 1.750" | ±0.023" | 89495K82 | 74.99 | 124.98 | 208.30 | 347.16 |
| 3" | 2.250" | ±0.031" | 89495K83 | 88.69 | 147.81 | 246.35 | 410.58 |
| 3 1/2" | 2.750" | ±0.031" | 89495K4 | 135.57 | 225.96 | 376.60 | 627.66 |

| OD | ID | OD Tolerance | | 1/2 ft. | 1 ft. | 2 ft. | 4 ft. |
|---|---|---|---|---|---|---|---|
| 4" | 3.250" | ±0.031" | 89495K84 | 139.63 | 232.72 | 387.86 | 646.44 |
| 5" | 4.250" | ±0.031" | 89495K7 | 193.73 | 322.88 | 538.13 | 896.88 |
| **0.500" Wall Thick. (±0.063")** | | | | | | | |
| 2" | 1.000" | ±0.023" | 89495K55 | 127.36 | 212.26 | 353.77 | 589.62 |
| 2 1/2" | 1.500" | ±0.023" | 89495K57 | 136.70 | 227.83 | 379.72 | 632.86 |
| 3" | 2.000" | ±0.031" | 89495K91 | 137.38 | 228.97 | 381.62 | 636.03 |
| 3 1/2" | 2.500" | ±0.031" | 89495K92 | 143.12 | 238.54 | 397.56 | 662.60 |
| 3 3/4" | 2.750" | ±0.031" | 89495K93 | 145.77 | 242.95 | 404.92 | 674.86 |
| 4" | 3.000" | ±0.031" | 89495K94 | 164.54 | 274.23 | 457.06 | 761.76 |
| 5" | 4.000" | ±0.031" | 89495K8 | 341.84 | 569.74 | 949.57 | 1,582.61 |

# Showing Results for *"rapid set concrete"* (15 Products)

Related

## Rapid Set60 lb. Concrete Mix

Model # 03010060 Store SKU # 383937


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**$12.35** / each

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**Product Sold :** In Store Only

**Description:**
The Rapid Set 60 lb. Concrete Mix is ideal for a high-performance project requiring a very fast setting time. The professional-grade mix is used on highways and airports nationwide.

Quantity: 1

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|  |  |  |  |
| $13.69 | $14.77 | $13.27 | $10.29 |

Rapid Set 25 lb. Stucco Patch

**Model #** 71020025

★★★★☆ **(1)**

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**Model #** SDS25

★★★★☆ **(23)**

• Ship to Home
**Free with $45 Order**

• Pick Up In Store TODAY
**Free**

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Rapid Set 25 lb. Cement All Multi-Purpose Construction Material

**Model #** 02020025

★★★★★ **(2)**

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Rapid Set 10 lb. Cement All Multi-Purpose Construction Material

**Model #** 02020010

★★★★★ **(3)**

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**$2.25**

Rapid Set 2.12 oz. Concrete Pharmacy Flow Control

**Model #** 81100000

★★★★★ **(1)**

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Rapid Set 25 lb. Mortar Mix

**Model #** 04020025

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**$2.19**

Rapid Set 0.88 oz. Concrete Pharmacy Set Control

**Model #** 80100000

★★★½☆ **(2)**

• In Store Only

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**$29.85**

Rapid Set 1-Gal. Concrete Leveler Primer

**Model #** 191040000

NOT YET RATED

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**$8.85**

Rapid Set 1 qt. Concrete Leveler Primer

**Model #** 192040000

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(1)

• In Store Only

• Pick Up In Store TODAY
Free

+ ADD TO CART

CHECK STORE INVENTORY

Page 1

## Search Feedback

Did you find what you were looking for?

## RECOMMENDATIONS BASED ON YOUR BROWSING HISTORY

**$24.97**

DEWALT Rapid Load 30-Piece Quick Change...

(10)

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**$699.00**
~~WAS $899.00~~

Smarter Tools GP9500EB, 7,500 Continuous Watt...

(97)

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**$99.99**

DEK Universal 25 ft. 10/4 Universal Generator...

(20)

+ ADD TO CART

**$149.00**

DEK Universal Generator Accessory Kit

(23)

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## RECENTLY VIEWED ITEMS

1 of 2

RIDGID 6,800-Watt 357 cc Electric Start Idle...


80 lb. 5000 Plus Concrete

Amerock 3 in. Stainless-Steel Bar Pull

46,000 BTU Mocha Square Propane Gas Patio Heater-

# RIDGID 6,800-Watt 357 cc Electri Idle Down Gasoline Powered Po Generator with Yamaha Engine

Model # RD906812B Internet # 203183985
Store SKU # 1000026154

★★★★☆ (185) | Write a Review | Ask & Ans

**$999.00** / each

**Item Not Sold at W Milpitas #1041**

Check nearby stores to confirm availability and pic

**PRODUCT SOLD :** Online & In Store
Item cannot be shipped to the following state(s): AK,CA

## PRODUCT OVERVIEW

RIDGID Power Tools offers reliable, clean power with the RIDGID Portable Generator Line. This 6800 Watt Electric-Start Ge toughest power needs on the jobsite or at home. The Idle-Down function automatically idles the engine when power is not re and alternator, increasing overall runtime, and reducing noise. With a heavy-duty 357cc OHV Commercial-Grade Yamaha E (8500 Surge/Starting Watts) and features a large 8 gallon fuel tank for up to 11 hours of runtime at 50% load. Featuring the A 6800 Watts of Clean Power- so you can power everything from a laptop to a table saw. This generator features a one-of-a-ki and mount essential controls and outlets anywhere you need them- all while the GenSmart monitoring system displays esse Hours of use and even reminds you when its time for maintenance. The heavy-duty Zero-Gravity hand-truck frame design ar making it easy to transport even in the toughest conditions. The outlet panel features (4) 20 Amp (GFCI Protected) standard meet all your power needs. Backed by a 3 year commercial warranty, you can trust RIDGID to work as hard as you do.

California residents: seeProposition 65 information

- 6800 Running Watts (8500 Surge/Starting Watts)
- 357 cc OHV Yamaha Commercial-Grade Engine with Electric Starting
- Clean Power, Ideal for sensitive electronics - less than 6% THD
- IDLE-DOWN for improved efficiency and quieter operation
- (4) 120V 20 Amp (GFCI Protected), and (1) 240V 30 Amp Twist Lock Outlet
- GenSmart Display for monitoring essential functions including Wattage
- 8 gal. fuel tank for up to 11 hour runtime at 50% load
- Zero Gravity Hand-Truck Frame design
- 3 year warranty
- 3 year warranty
- Click on the “More Info” tab to download the specifications pdf to view the wattage requirement guide

## SPECIFICATIONS

| | | |
|---|---|---|
| Assembled Depth (in.) | 25.625 in | Assembled Height (in.) |
| Assembled Width (in.) | 22.5 in | Auto idle control |
| Automatic Voltage Regulation | Yes | Built-in inverter |
| Certifications and Listings | No Certifications or Listings | Continuous Wattage |
| Engine Displacement (cc) | 357 | Engine manufacturer |
| Fuel Gauge | No | Fuel tank capacity (gallons) |
| Fuel type | Gasoline | Full load fuel consumption (gallons/hour) |
| Horsepower (hp) | 12 | Low oil shutdown |
| Manufacturer Warranty | 3 Year Limited | Muffler |
| Number of circuits/outlets | 5 | Operational volume (dB) |
| Osha Required GFCI Outlets | Yes | Peak Wattage |
| Product Height (in.) | 26 | Product Length (in.) |
| Product Weight (lb.) | 245 | Product Width (in.) |
| Returnable | 30-Day | Run time at 50% load (hours/tar |
| Voltage (volts) | 240 | |

## SHIPPING OPTIONS

Most orders process within 1 business days.

Please allow an additional 2-6 business days for **Curbside Truck Delivery** in the Continental U.S. Deliveries are made to re area/dock for Businesses or curbside for Residential orders. Delivery appointments are required.

Orders for this item may be upgraded to a more specialized service for an additional fee.

Other Delivery Options:

**Basic Home Shipping (No Appointment):** Delivery in the Continental U.S. within 5-10 business days, plus order processin Home Shipping includes delivery to your doorstep or first dry area outside with no signature or appointment required.

**Threshold Home Shipping (By Appointment):** Delivery in the Continental U.S. within 5-10 business days, plus order proce Threshold Home Shipping includes delivery across your first doorway or threshold (i.e. into garage, backyard, or first room o The carrier will contact you to make a delivery appointment with a 4 hour window once the items have arrived at the local hu Delivery appointments are required.

**White Glove Home Shipping (By Appointment):** Delivery in the Continental U.S. within 5-10 business days, plus order pro White Glove Home Shipping includes delivery to the room of your choice, unpacking and debris removal. Assembly is not in

carrier will contact you to make a delivery appointment with a 4 hour window once the items have arrived at the local hub in y
Delivery appointments are required.

If product is eligible for shipping to AK, HI and US Territories additional transit time and remote surcharges may apply.

-----Original Message-----
From: Seris, David M CIV [mailto:David.M.Seris@uscg.mil]
Sent: Monday, August 31, 2015 1:37 PM
To: Corry, Michael C CIV NAVFAC NW, EV32
Subject: RE: Kiska Island NDSA EE/CA Meeting Minutes

Mike:

Thanks for forwarding a copy of the meeting notes.

The USCG position is still that COA 2 makes the most sense.

I can try to help you flesh out some of the possible cost associated with COA 3.

First, for AIS or other "transmit" system, you would have to solve some terrain blockage challenges because those are line of sight. That means you either need to install one site at the top of a mountain (weather, power are challenges, as are access which would likely require a helicopter). Or you would have to install probably a minimum of 3 transmitters at lower elevations.

Using buoys would be pretty expensive. I can speak to that pretty easily since this is what we do.

The appropriate way to mark these locations where you have Munitions and Explosives of concern would be to place buoys on the corners of the "pie shaped" sectors or along the line where you have straight lines drawn in front of a cove.

The issues you will have here have to do with exposure to weather and depth. The buoys we normally use in locations like this are 8' in diameter and 26' long. Even then you're going to likely have issues with these buoys not surviving, parting their moorings, or if lit you will run into situations where the lighting equipment can be damaged. From experience in other areas like Adak and Dutch Harbor, you could probably expect about a 90 percent reliability rate. These large buoys, when coupled with 1 1/2" chain, have a maximum mooring depth of 175 feet. You can set the mooring deeper if you use lighter chain (no less than 1 1/4") but when you do that the chain will wear out quicker and be more prone to parting in a storm. These buoy moorings work just like an anchor does. You need both the sinker and some length of chain actually on the bottom to hold the buoy in place.

So the bottom line is that there is a technical solution for only some of these areas. It would work off of Mutt/Jeff Coves, around Little Kiska Island, and Gertrude Cove might work but it would be pretty marginal. The other locations are just too deep. There is a work-around for that where you use a "composite mooring" of both chain and line.

So what would it all cost? A lot.

I figure you would need 12 8X26 buoys @ $27,000 each. Totals out to about $325K. Shipping to Alaska (Kodiak) is $13,753 per truck load of 2 of these buoys so there's another $82,500.

1 1/2" chain runs $1,922 per 90' length.

"Composite moorings" would add about $10K per mooring for those locations (about 6) where you would need to use them.

If the USCG were doing this on a "reimbursable" basis, we would bill at an "inside the government" rate of $7,305/hour for one of our 225' buoytenders.

The ship would need to make at least two trips from Kodiak to Kiska to set the buoys initially. That's 1,177 miles each way; with the ship transiting at 12 kts, works out to be about 100 hours each way.

So 4 trips @ 100 hours @ 7,305 per hour adds up to $2.922M and that's just for transit. Add another 100-150 hours to set the buoys.

Follow-on years would require one visit for servicing each year; another 300 hours/year. The buoys should be able to stay on station for a period of 6-7 years at which point they would need to be refurbished (figure $7K/buoy) and then replaced on station. In the out-years you could set it up where you rotated out half of the buoys each year when they were due to be refurbished, and continue to maintain the system with the ship only visiting once each year.

Hope this helps.

Dave Seris
17th Coast Guard District
Waterways Management Branch
(907) 463-2267