FINAL
13 March 2013

Preliminary Assessment Report for Naval Defensive Sea Area

Kiska Island

Alaska

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

FINAL
PRELIMINARY ASSESSMENT REPORT FOR NAVAL DEFENSIVE SEA AREA

KISKA ISLAND
ALASKA

Naval Facilities Engineering Command Northwest
Silverdale, Washington

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ABBREVIATIONS AND ACRONYMS

AA	antiaircraft
AMNWR	Alaska Maritime National Wildlife Refuge
AMTB	antimotor-torpedo-boat
DMM	discarded military munitions
HMX	cyclotetramethylene tetranitramine
km	kilometer
MC	munitions constituent
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MRP	Munitions Response Program
NAAF	Naval Auxiliary Air Facility
NARA	National Archives and Records Administration
NAVFAC	Naval Facilities Engineering Command
NDSA	Naval Defensive Sea Area
PA	preliminary assessment
RDX	cyclotrimethylene trinitramine
TNT	trinitrotoluene
UAA	University of Alaska Anchorage
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance

1.0 INTRODUCTION

Kiska Island and Little Kiska Island were withdrawn from the public domain for naval purposes in 1903. During World War II the Empire of Japan occupied Kiska Island from the June 7, 1942 until the July 28, 1943. The Allied forces bombarded the Japanese positions on and around Kiska from June 7, 1942 to August 15, 1943. After retaking the island in August 1943, the U.S. Army and Navy established defensive operations there for approximately one year. The Department of the Navy was given control of Kiska on May 2, 1949. As part of the defensive operations, in-water ranges with mobile guns were established. The Navy formally returned Kiska and Little Kiska Islands to the Department of the Interior on February 23, 1951.

A Naval Defensive Sea Area (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 was established on February 14, 1941 by Executive Order 8680, included as Appendix A. This NDSA includes the territorial waters between the extreme high-water marks and the 3-mile marine boundaries.

According to 32 CFR Part 761, Subpart A §761.3 (a), there are three NDSAs in Alaska under the control of the Secretary of the Navy: Kiska Island, Kodiak Island, and Unalaska Island. The Navy addresses in-water ranges at the NDSA for Kiska Island in this preliminary assessment (PA) report. The Navy addresses the NDSAs for Unalaska and Kodiak Islands in separate preliminary assessment reports. The Navy is not addressing any other area in Alaska with coastal defense artillery.

The Navy's Munitions Response Program (MRP) addresses the National Defense Authorization Act of 2000 that required the Department of Defense to establish a program that addresses the potential explosives 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. Because there is evidence of practice in-water ranges within the NDSA at Kiska Island, the Navy initiated a PA of this NDSA. 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.

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.

1.1 PURPOSE

The purpose of a PA is 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 this 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 the NDSA at Kiska Island. . The findings in the PA report were used to make recommendations for addressing any action at the NDSA. The presence of MEC within the NDSAs beyond the known limits of in-water ranges resulting from combat activities during World War II are beyond the scope of this investigation.

1.2 PROJECT SCOPE

The scope of this project consists of a records review and preparing the related PA report. The records review includes an extensive search for information regarding historical operations of in-water practice ranges and ordnance handling points located within the NDSA at Kiska Island. The PA report includes 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.

This PA is based on review of records conducted on-site 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 included.

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

- U.S. Army Corp of Engineers (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

2.0 SITE BACKGROUND

2.1 SITE LOCATION AND SETTING

Kiska is an island in the Rat Island group of the Aleutian Island chain in Alaska. It is approximately 22 miles (35 km) long and varies in width from 1.5 to 6 miles (2.4 to 9.7 km). It is located at 51° 57′ 51″ north latitude, 177° 27′ 36″ east longitude. The Rat Islands are a volcanic group of 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 2-1 shows the location of the Rat Island group and the relative positions of the individual islands.

The Rat Islands are situated at a convergent boundary between two tectonic plates that make up the Earth's crust. The more southern or Pacific Plate is being subducted under the more northern North American Plate. This results in an area that is spotted with active and dormant volcanos and very earthquake prone. Earthquakes with magnitudes greater than 6 on the Richter scale are common.

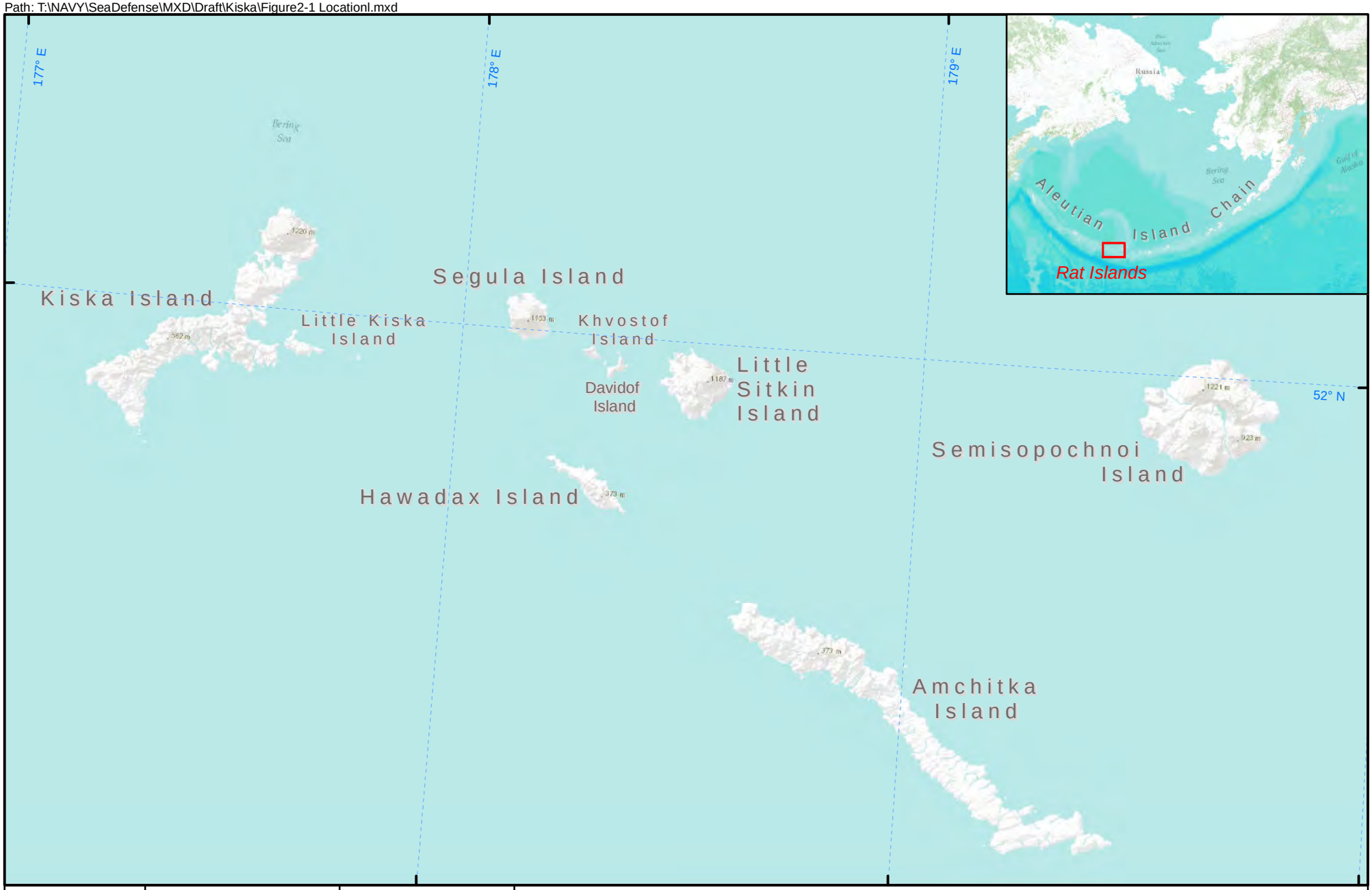
2.2 SITE DESCRIPTION

The study area for this PA consist of the known in-water range areas established for target firing of the costal artillery and AA batteries installed on Kiska Island by Allied forces, known in-water practice bombing targets, and on-water ordnance handling locations within the 3-mile limit of the NDSA. Figure 2-2 shows the extent of the NDSA surrounding Kiska and Little Kiska Islands.

2.3 SITE OWNERSHIP HISTORY

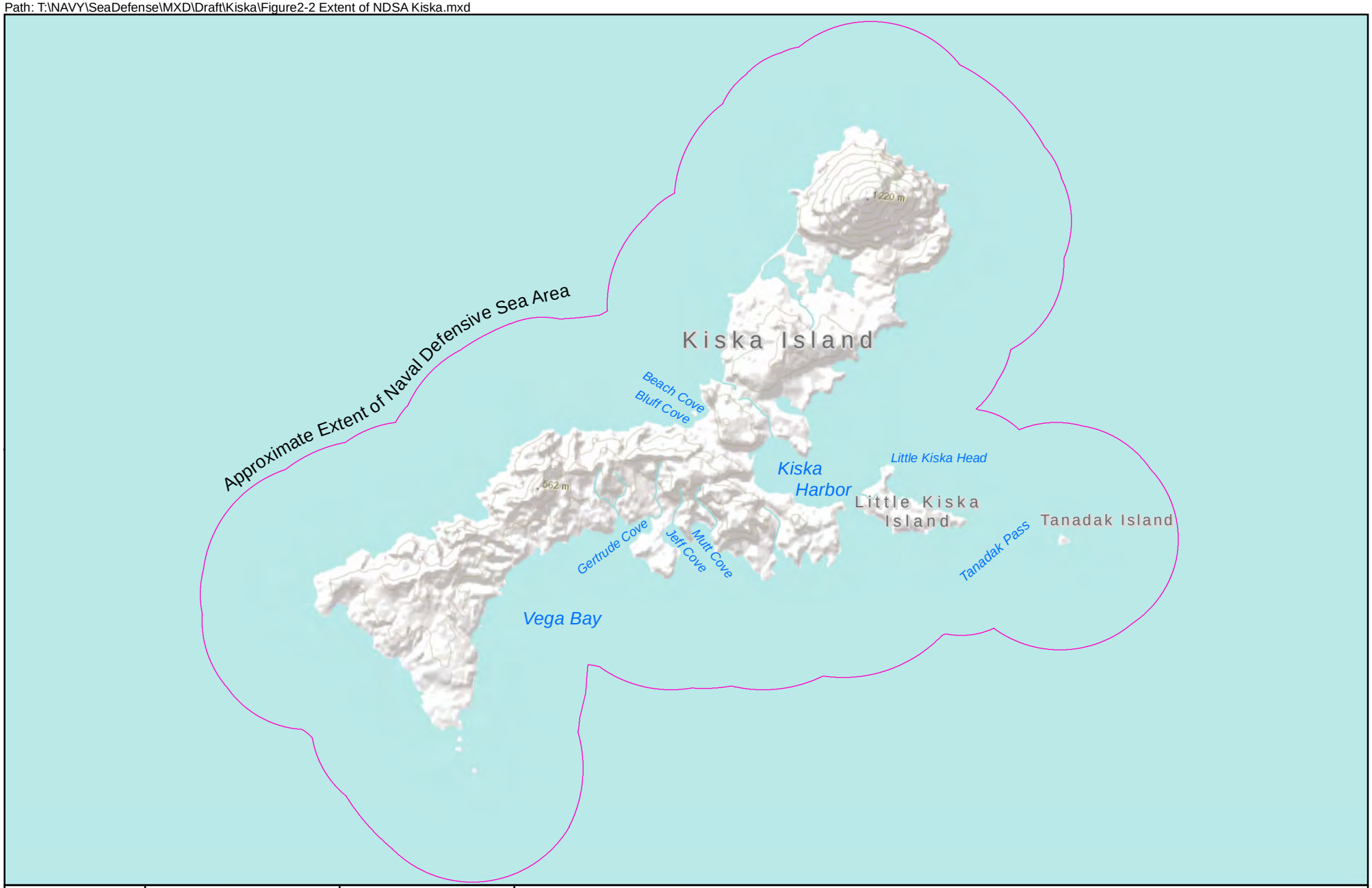
The U.S. purchased Alaska, which includes the Aleutians, from Russia in 1867. Kiska Island and Little Kiska Island were withdrawn from the public domain for naval purposes in 1903 (USACE 2004). A 10-man Navy weather station was the only U.S. military presence on the islands prior to the Japanese occupation in 1942. The islands were invaded and occupied by Japanese forces from June 7, 1942 until July 28, 1943 (Garfield 1969). After the Japanese abandoned the island, 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 (USACE 2004).

Path: T:\NAVY\SeaDefense\MXD\Draft\Kiska\Figure2-1 Locationl.mxd



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 5 10 Scale In Miles	**Figure 2-1** **Location and Relative Position of the Islands in the Rat Island Group** **Aleutian Islands, Alaska**

Path: T:\NAVY\SeaDefense\MXD\Draft\Kiska\Figure2-2 Extent of NDSA Kiska.mxd



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	N 0 2 4 Scale In Miles	**Figure 2-2** **Extent of the Naval Defensive Sea Area Surrounding Kiska and Little Kiska Islands**

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. As the Army had no permanent interest in Kiska Island, 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 (USACE 2004).

Kiska and Little Kiska Islands remain undeveloped and uninhabited since their abandonment after World War II. The former Japanese occupation site on the island (including surrounding waters) was designated a national historic landmark (the highest level of recognition accorded to historic sites in the United States) on February 4, 1985, and is protected under federal law. Collecting artifacts from a national landmark is illegal. These islands are also a part of the Alaska Maritime National Wildlife Refuge (AMNWR) that is managed by the U.S. Fish and Wildlife Service. Activities at or near Kiska and Little Kiska Islands may include historical research, site-seeing, camping, photography, hiking, fishing, and diving. None of these activities are prohibited. However, because of the remoteness of these islands, they are likely not frequently visited. A danger sign posted in Kiska Harbor warns visitors of the presence of MEC and prohibits digging.

2.4 SITE OPERATIONS AND WASTE CHARACTERISTICS

Human activities on Kiska and Little Kiska Islands during World War II consisted of active warfare between Allied forces and the Empire of Japan. In June 1942, the Japanese invaded Kiska and began military development in the area surrounding Kiska Harbor. The Japanese occupation force consisted of approximately 7,800 men from assorted Army, Navy, and air units. The main camp area includes numerous aboveground and underground structures, a seaplane ramp, a submarine base with a marine railway, and docks for unloading supply ships and barges. The Japanese began construction of an airfield located north of Kiska Harbor that was not completed. Harbor defenses included the installation of 16 coastal defense guns and 69 AA batteries (Cohen 1993). Because of the circumstances of the Japanese withdrawal during July 1943, these guns remained on Kiska and Little Kiska Islands. Several of the larger guns remain on the islands today.

The Allied forces bombarded the Japanese positions on and around Kiska from June 7, 1942 to August 15, 1943. An estimated 3,000 tons of bombs were dropped on Kiska by Allied forces during this period (USACE 2004). A World War II veteran who served on a flight combat crew during the bombardment of Kiska said that bombs were dropped on targets in the water, including ships and float planes (Cochran 2012). In addition, surface bombardment by naval units between August 1942 and 1943 resulted in the following number of high-explosive rounds fired on Kiska and Little Kiska Islands (USACE 2004):

- 14-inch: 243 rounds
- 8-inch: 1,686 rounds
- 6-inch: 5,145 rounds
- 5-inch: 9,234 rounds

On August 15, 1943 an invasion force of approximately 34,400 Allied troops came ashore at two beaches located along the northwestern shore of the island. These troops found the island abandoned by the Japanese.

Once reacquired by Allied forces, the 38th Naval Construction Battalion was assigned the initial operations at Kiska (Alaska Geographic Society 1995). They were responsible for establishing all base facilities and waterfront development, including reconstruction of the Japanese barge dock and construction of a ship dock, both extending into Kiska Harbor. The naval installation established at the site of the old Japanese submarine base was authorized as a NAAF (USACE 2004).

The airfield started by the Japanese and completed by the Allies was limited in its usefulness. Unusually strong crosswinds made the strip hazardous, and the limited length made landings by larger planes impossible. Kiska Bay did provide limited protection for the landing and use of seaplanes. The original Allied plan for the island called for the completion of the airfield with a protective garrison cantonment for 15,000 troops. Military construction records dated February 29, 1944 document construction of the airfield and housing for 3,525 troops, with an anticipated completion date of June 1944 (NARA II, RG77:390/1/30/5 Box 118). As the war progressed, military planners recommended that an Army base be developed at Adak and air bases be established there and on Attu (Morison 1951). Kiska was reduced in importance, and by May 1, 1945, 165 troops were garrisoned on island and operated a weather station, a communications center, and an emergency air field (NARA II, RG77:390/1/30/5 Box 126).

Bomb disposal and booby-trap-removal activities were conducted while the Allied forces were on island. These removal activities were restricted to on-land finds. No record has been found to suggest the removal of unexploded ordnance (UXO) from the marine environment of the NDSA surrounding Kiska Island.

On 1948 maps the area around Kiska and Little Kiska Islands is marked as a “prohibited area” and defined as an NDSA and airspace reservation closed to the public. An aeronautical chart from the same period marks the area as a “danger area.” Danger areas usually signified that the area was being used for military purposes involving target practice. This Danger Area was not present on the 1955 aeronautical chart. The islands were most likely used for military exercises during this period (USACE 2004).

2.4.1 Historical Waste Management Practices

The primary waste of concern for this investigation is MEC within the marine environment of the NDSA surrounding Kiska and Little Kiska Islands. MEC includes UXO, discarded military munitions (DMM), and MCs in high enough concentrations as to present an explosive hazard. The nature of ordnance handling and use within an active combat zone, such as Kiska and Little Kiska Islands, results in waste entering the marine NDSA by the following mechanisms:

- Ordnance fired over water from coastal defense guns and AA batteries during target training and gun function testing that did not detonate as intended
- Ordnance lost into the water during transfer from transport ships to the shore, either at a fixed dock or an explosive anchorage situated in the harbor away from shore installations
- Ordnance lost overboard during fleet operations, including the sinking of ships
- Excess ordnance deliberately disposed of (referred to as DMM) into the marine environment at the conclusion of hostilities
- In the case of Kiska and Little Kiska, ordnance deliberately dropped or fired by Allied forces during the Japanese occupation of the islands that did not detonate as intended

Ordnance that was fired or dropped that did not detonate as intended is known as UXO. An unknown quantity of MEC was lost, discarded, deliberately dropped, or fired into the marine environment of the NDSA surrounding Kiska and Little Kiska Islands during World War II. As much as 30 percent of the explosive ordnance that was dropped or fired during World War II did not detonate as intended (Francis and Alama 2011).

The USACE evaluated Kiska and Little Kiska Islands under the Formerly Used Defense Sites program and presented the findings in an archive search report (USACE 2004). The evaluation applied to the on-land hazards of potential ordnance explosive and chemical warfare material. The USACE performed a Military Munitions Response Program (MMRP) Site Inspection in 2011 and is preparing a final report as of early 2013, which identifies in-water ranges.

2.4.2 Regulatory Compliance

The National Defense Authorization Act of 2000 required the Department of Defense 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 the potential explosives 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 is 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 result of combat operations
> - A maritime wreck
> - An artificial reef

2.5 SOURCE CHARACTERIZATION

The sources of MEC released into the marine environment at Kiska and Little Kiska Islands by Allied forces consist of coastal defense and AA gun batteries, supply transfer points, air combat units of the Army Air Corps 11th Air Force, and air units and ships attached to the 17th Naval District. Other sources of MEC may include the Japanese or Allied troops that may have disposed of or lost ordnance items overboard in the water, particularly in the Kiska Harbor, while they were present on the island.

According to a reference librarian at the Navy Department Library, detailed records of training exercises, which are part of the operational records, were not required to be retained for the historical archives. Therefore, details of training exercises typically do not exist in the archived records. In rare instances, training exercise records may exist in the archive record if they were provided by a private individual (Knechtmann 2012). A limited amount of training records for Kiska Island was discovered during the archive records review. Information obtained from these training records is summarized in Section 2.5.3.

2.5.1 Source Descriptions

Information reviewed for this PA report identified the following Allied coastal and AA gun batteries on Kiska and Little Kiska Islands (USACE 2004, NARA II, NARA Anchorage, and NARA Seattle):

- One 90-mm antimotor-torpedo-boat (AMTB) gun, 65th AA Artillery Group
- One 37-mm AMTB gun, 65th AA Artillery Group
- Four guns of unknown size, K Battery 203rd Coastal Artillery
- Four 40-mm M-1 AA guns, Navy AA Battery 411
- Six 20-mm Mk-4 AA guns, Navy AA Battery 411
- Ten .50-caliber, water-cooled machine guns, Navy AA Battery 411

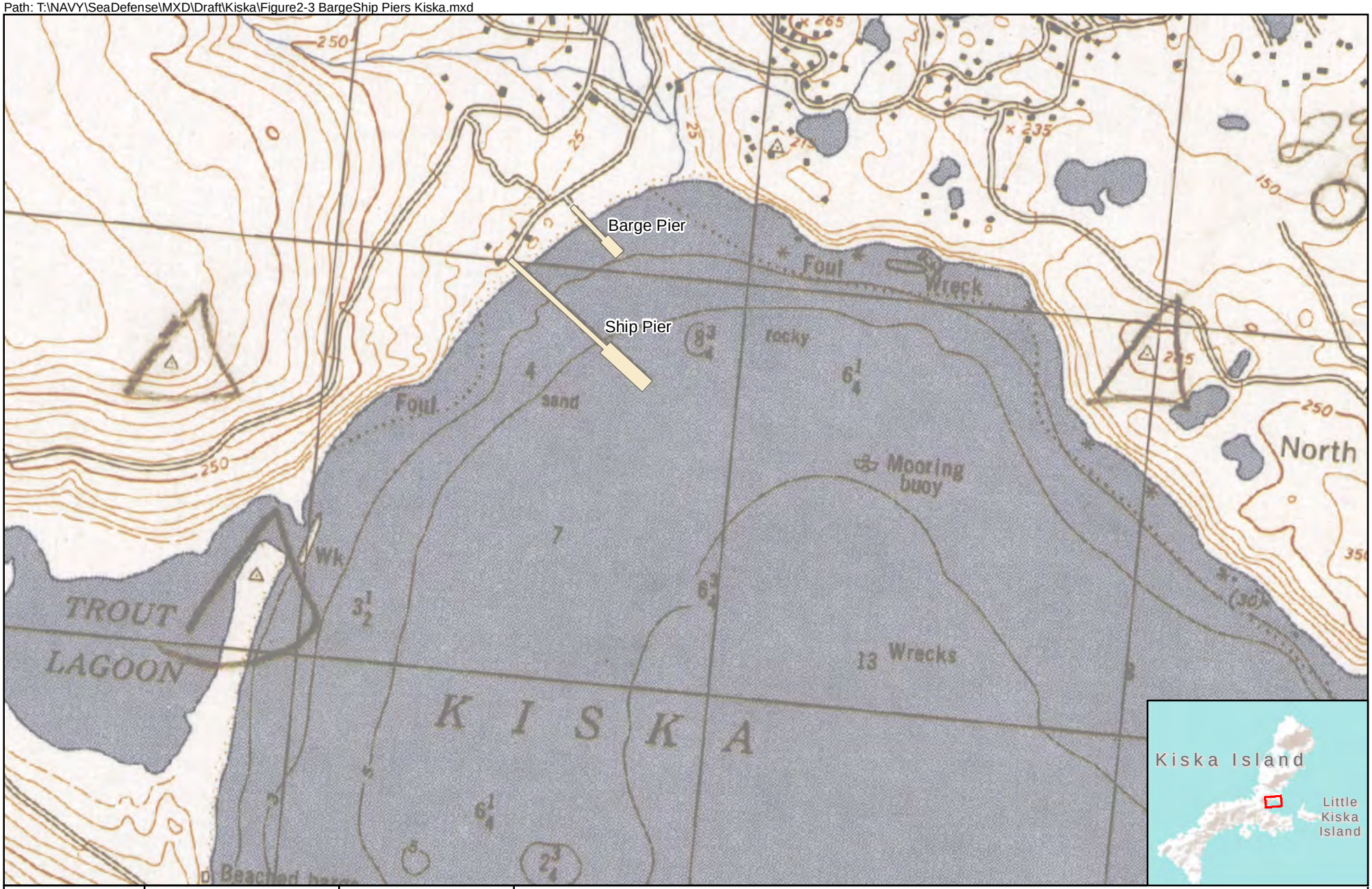
Information obtained indicates that defensive guns were installed in the vicinity of Kiska Harbor, Mutt Cove, Jeff Cove, Gertrude Cove, Beach Cove, Bluff Cove, and Little Kiska Head (Figure 2-2). However, the exact locations of the Allied gun batteries were not determined during this investigation. No map identifying the locations of the Allied guns was discovered. Available information suggests that the Allied guns were mobile and were removed from the island as the troops withdrew. Lastly, there is no information suggesting that Allied troops used the abandoned Japanese guns for defensive purposes.

Two piers (a small barge dock and a long ship dock) were constructed into the northwest portion of Kiska Harbor between North Head and Trout Lagoon. Figure 2-3 shows the locations of these former structures. The Allied forces used the piers during their operations on the island to offload supplies, including ordnance. Remnants of the ship pier are still visible in Kiska Harbor today.

From June 11, 1942 until August 15, 1943, the 11th Air Force and air units of the 17th Naval District dropped every type of conventional bomb in the U.S. arsenal on Kiska and Little Kiska Islands. As previously stated, an estimated 3,000 tons of bombs were dropped on Kiska during this period (USACE 2004). Because of the ever-changing weather conditions in the Aleutian Islands, these bombs were frequently dropped through heavy overcast without visual contact with the ground surface. In addition, ships attached to the 17th Naval District bombarded the Japanese positions multiple times.

During the pre-invasion period from May 24 to August 15, 1943, the bombardment reached its maximum intensity. Allied forces bombarded Kiska with 600 tons of explosives fired from naval ships and an additional 1,310 tons dropped by air combat groups during this period (Naval Historical Center 1993).

Path: T:\NAVY\SeaDefense\MXD\Draft\Kiska\Figure2-3 BargeShip Piers Kiska.mxd



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	N 0 0.075 0.15 Scale In Miles	**Figure 2-3** **Locations of Former Barge and Ship Piers** **February 1944, Kiska Island**

From May 26 to 29, 1950, 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 from its base at Naval Air Station Kodiak. The results of rocket firing and bombing were not officially observed. The purpose of the exercise was to compile cruise-control data, increase confidence of pilots, train in coordinating bombing and rocket attacks at long range, and fly in potentially harsh weather conditions. Ammunition payloads included a full load of gun ammunition, six water/sand filled bombs, six 5-inch rockets, and eight 3.5-inch rockets (USACE 2004). The targets for this exercise are shown as triangular symbols A, B, and C on Figure 2-4.

2.5.2 Historical Aerial Photography Evaluation

Aero-Data Corporation in Baton Rouge, Louisiana, performed an interpretation of available aerial photography of Kiska Harbor within the Kiska Island Naval Defensive Sea Area to assist in the evaluation of the in-water ranges during and after World War II. Their report is included as Appendix B. Aero-Data acquired aerial imagery, satellite imagery, maps, oblique photographs, and ground photographs were acquired from both public and private sources. The imagery and maps were registered to a common coordinate system and interpreted. Oblique photographs and ground photographs were also obtained, which showed locations where munitions were probably offloaded from ships.

Vertical aerial photography obtained for this study was geo-registered. In addition, maps showing the boundary of the Site and maps of other features were geo-registered to the aerial photography. Although no stereoscopic aerial photography from World War II was found, available images were used to identify areas where ships and landing crafts were visible in the aerial photography. Ground photographs revealed that the beach was crowded with supplies and probably munitions. No features, such as targets, were detected in the water offshore although a few ships were anchored in deeper water.

2.5.3 Evidence of Munitions and Explosives of Concern or Related Hazardous Substances in the Marine Environment

Quarterly training reports of AA firings at Kiska show Battery 411 firing four 40-mm guns, four 20-mm guns, and ten .50-caliber machine guns. During a typical training exercise, up to 190 40-mm rounds, 700 20-mm rounds, and 1,630 .50-caliber rounds were expended (USACE 2004). A hydrogen-filled balloon was used as a target for AA. No record was found to indicate that AA guns were stationary. It is believed that the guns were mobile, and the exact positions from where they were fired were not identified during the archive review.

Test firings with 37-mm, 40-mm, and .50-caliber weapons took place on October 2, 1943 in the following areas:

Path: T:\NAVY\SeaDefense\MXD\Draft\Kiska\Figure2-4 Target Rocket Bombing Kiska.mxd

U.S. NAVY

Delivery Order 0040
Naval Defensive
Sea Area
Kiska Island, Alaska

Figure 2-4
Target Locations for a Rocket and Bombing Exercise Conducted by Patrol Squadron Two, May 1950, Kiska Island

- Area 1 – Kiska Harbor: The installations on the shoreline of Kiska Harbor from Trout Lagoon to South Head would fire into an area creating a danger zone from a line running between North Head and Kano Bight to 3,500 yards off shore from this line.

- Area 2 – off Little Kiska Head on azimuth of 40° out over Tiger Cove: The danger zone extended 5,000 yards off shore in this section.

- Area 3 – off Little Kiska Head on azimuth of 140°: The danger zone extended 5,000 yards down South Pass.

- Area 4 – off Mutt and Jeff Coves: The danger zone included all the area within a line drawn from Bukhti Point and Hatchet Point.

- Area 5 – off Gertrude Cove: The danger area included Gertrude Cove and the area 5,000 yards offshore from a line extending between Hamburger Point and Ethel Cove.

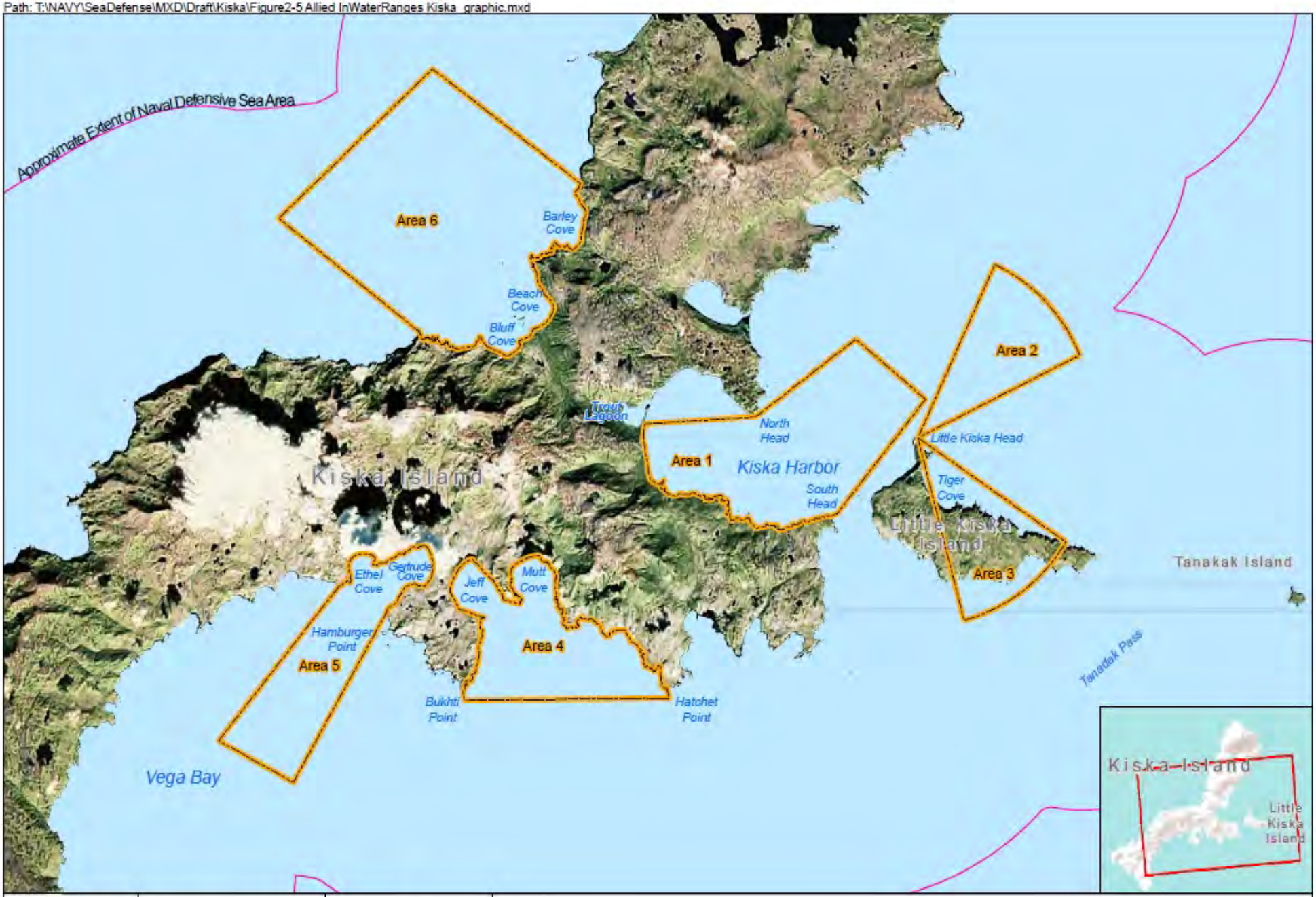
- Area 6 – off Beach and Bluff Coves: The danger area extended offshore 5,000 yards. (The source figure shows the danger area extending to the north beyond Beach Cove to the north end of Barley Cove.)

The extent of each of these in-water firing range danger areas is shown on Figure 2-5.

Additional information discovered during the records search indicated that at the beginning of 1944, test firing of 40-mm, 20-mm, and .50-caliber guns on Kiska Island was conducted once each month (OIC 1944a). Two documented training exercises were discovered. On February 8, 1944 all 40-mm, 20-mm and .50 caliber gun crews participated in AA balloon target practice. The number of rounds fired was not reported (OIC 1944b). On March 8, 1944, Battery 411 conducted AA balloon target practice for all 40-mm and .50-caliber gun crews and 20-mm gun crews #3 and #4. During this practice, 112 40-mm rounds, 540 20-mm rounds, and 530 .50-caliber rounds were fired (OIC 1944c). Effective April 1944, the frequency of these AA training sessions become weekly (OIC 1944d).

Much research has been conducted on Kiska and Little Kiska Islands regarding the Japanese occupation during World War II. This includes an underwater survey of Kiska Harbor conducted in 1989 by the National Park Service with the cooperation of the U.S. Third Fleet. During this survey, divers photographed MEC on the bottom of Kiska Harbor (Cohen 1993). Examples of these photographs are reproduced as Figure 2-6. These particular ordnance items were determined to be of Japanese origin. Documentation of recovery for these MEC items was not found. More recently in 2007, a diver retrieved an unexploded Japanese grenade on the

Path: T:\NAVY\SeaDefense\MXD\Draft\Kiska\Figure2-5 Allied InWaterRanges Kiska_graphic.mxd



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	N 0 0.75 1.5 Scale In Miles	**Figure 2-5** **Locations of Known Allied In-Water Ranges** **October 1943, Kiska Island**

33762079_01.ai

Source: Cohen 1993

U.S.NAVY

Figure 2-6
Photographs of Japanese Ordnance on the Bottom of Kiska Harbor, 1989

Delivery Order 0040
Naval Defensive
Sea Area
Kiska Island, Alaska

seafloor in Kiska Harbor, but then dropped it overboard when he realized the danger it posed (Morrisett 2012).

A World War II veteran who served on a flight combat crew in the Aleutian Islands indicated during an interview that "at the end of the war, unused ordnance items were disposed of at the end of docks" (Cochran 2012). In 2007, during a dive off the Kiska ship dock, a diver reported seeing "just thousands of small arms shells on the seafloor" (Deffendall 2012).

During research for this investigation, records from the 11th Air Force from 1940 to 1945 were reviewed. This review identified documentation that on at least one occasion Allied forces dropped eight 500-pound and eight 1,100-pound bombs with long-delay fuses into Kiska Harbor to prevent submarines from entering the harbor (673rd Air Base Wing 2012). The final disposition of these bombs was not reported.

2.5.4 Estimated Quantity of Munitions and Explosives of Concern

No reasonable estimate of the quantity of MEC in the marine waters of the NDSA surrounding Kiska and Little Kiska Islands can be determined from the information reviewed for this PA.

During a typical training exercise, up to 190 40-mm rounds, 700 20-mm rounds, and 1,630 .50-caliber rounds were expended (USACE 2004).

However, given the extensive Allied bombardment of Kiska and Little Kiska Islands during the Japanese occupation, the existence of photographed Japanese MEC in Kiska Harbor, the documented use of Kiska Harbor as a training target in 1950, and the reported fact that up to 30 percent of ordnance may not have detonated as intended, there is ample possibility that MEC exist in the marine waters of the NDSA surrounding these islands.

3.0 EXPOSURE PATHWAYS AND TARGETS

This section of the PA report discusses the release mechanisms and associated exposure pathways for MEC residing in the marine environment. This includes evaluation of the surface water migration pathway, the sediment exposure pathway, and target organisms that are potentially exposed to the hazards. When evaluating the fate and transport of the MCs and the actual potential impact of releases of these MCs on both humans and aquatic life, a variety of complex interactions between the physical and chemical properties of these chemicals must be understood (USEPA 2003).

3.1 MARINE SETTING

As described in Executive Order 8680, the Kiska Island NDSA includes the territorial waters between the extreme high-water marks and the 3-mile marine boundaries (Appendix A). Typical maximum water depths in this area reach approximately 40 to 60 fathoms (240 to 360 feet), but exceed 300 fathoms (1,800 feet) off Cape Saint Stephen at the southern end and Sirius Point at the northern end of Kiska Island.

These waters are adjacent to the AMNWR, established on December 2, 1980 when the Alaska National Interest Lands Conservation Act was signed into law by President Jimmy Carter. This act combined 11 previously established refuges totaling about 3 million acres, dating back to the early 1900s with 1.9 million additional acres. The AMNWR includes the islands of the Aleutian chain, including Kiska and Little Kiska Islands. The purpose of the AMNWR is “to conserve fish and wildlife populations and the marine resources upon which they rely” and provide “the opportunity for continued subsistence uses by local residents.”

3.2 PHYSICAL RELEASE PATHWAY

As stated previously, releases of MEC into marine surface water results from the following activities:

- Ordnance fired over water from coastal defense guns and AA batteries during target training and gun function testing that did not detonate as intended
- Ordnance lost into the water during transfer from transport ships to the shore, either at a fixed dock or an explosive anchorage situated in the harbor away from shore installations

- Ordnance lost overboard during fleet operations, including the sinking of ships
- DMM deliberately disposed of into the marine environment at the conclusion of hostilities
- In the case of Kiska and Little Kiska, ordnance deliberately dropped or fired by Allied forces during the Japanese occupation of the islands that did not detonate as intended

Reviewed records and interviews suggest that the activities listed above may have released DMM or UXO into the marine surface waters of the Kiska Island NDSA.

A number of complex factors affect the fate and transport of MCs released in the underwater environment. These factors include the nature of the delivery of the ordnance item to the underwater environment, its potential for corrosion, and associated release of MCs.

Underwater releases of MCs can occur when casings deteriorate (most notably from corrosion), rupture upon impact, or undergo a low-order detonation. MCs may be released immediately after impact or only partially contained within the remains of the delivery system. When ordnance undergoes a low-order detonation or breaks apart upon impact, the MCs, such as bulk explosives, can be scattered over the impact area (USEPA 2003).

3.3 CHEMICAL RELEASE PATHWAY

Because MEC can remain relatively intact in the marine environment, MCs can be released through pinhole cracks that develop over time as a result of corrosion, or through the screw threads linking the fuse assembly to the main charge.

Corrosion of the iron and steel in casings is a complex process that occurs in the presence of water and oxygen. The potential corrosiveness of the local environment could vary greatly. The effects of immersion and corrosion on the release of MCs in various underwater environments depend on site conditions. Even though salt water is potentially more corrosive the higher the salt saturation, exposure to oxygen is a key requirement for corrosive effects. In environments where wave action and tides cause mixing with the atmosphere (typical of the Aleutian Islands), the oxygen content of the water, especially shallow water, can create a high potential for oxidation (USEPA 2003).

A variety of factors in the underwater environment may either reduce the potential for corrosion, or affect the nature of the release from an ordnance item releasing MCs. At higher pH levels, if the right conditions are present (e.g., carbon dioxide saturation or temperature), submerged or

buried metal may develop a coating of calcium carbonate, with a corresponding increase in corrosion resistance. In the absence of oxygen, such as the anaerobic conditions that can exist where there are large concentrations of unoxidized metals or high content of organic matter, or in deeper, cold waters, corrosion in the underwater environment can be virtually stopped. It is also possible that submerged MEC can develop a coating consisting of biological materials (e.g., coral, barnacles, and plants) that can seal the item off from the environment, as well as make it more difficult to locate (USEPA 2003).

Although no empirical evidence exists regarding the rate of corrosion or encrustation acting on MEC in the marine environment at Kiska Island, photographs were taken of Japanese UXO on the bottom of Kiska Harbor during a 1989 underwater survey conducted by the National Park Service in cooperation with the U.S. Third Fleet (Cohen 1993). These photographs indicate varying degrees of corrosion or encrustation of the ordnance items after approximately 46 years in the marine environment. However, even after this length of time, these items are easily identified as MEC in the photographs (Figure 2-6).

3.4 HUMAN EXPOSURE TARGETS

Although Kiska Island is part of the AMNWR, commercial fishing does occur in the surrounding waters, including the associated NDSA. Therefore, human exposure to MEC could occur through accidental direct contact resulting from commercial fishing, anchoring in the area, or direct contact as a result of recreational or research dives into the marine environment of the NDSA.

The risks from MEC in the underwater environment are driven by two different effects: the physical explosive hazard associated with direct encounter with DMM or UXO and the environmental health hazard associated with the release of the MCs contained in MEC. As mentioned in Section 2.4.2, Regulatory Compliance, current Navy policy is to include sites in the Navy MRP where munitions releases of shallow water areas are known or suspected and for only those sites covered by water no deeper than 20 fathoms (120 feet) (U.S. Navy 2007), which is the approximate depth limit of recreational diving. Although MEC items may be located at depths greater than 20 fathoms (120 feet), human and marine exposures at 20 fathoms (120 feet) or less are the primary exposures of concern in this report, based on the Navy MRP policy.

During fishing operations, MEC have been pulled up in fishing equipment from depths greater than 20 fathoms (120 feet). The skipper of the *Aleutian Sable* (Jay Hebert 2012) said that he has pulled up ordnance on several occasions, as recent as June 2012, near the Chelan Bank where he fishes. The *Aleutian Sable* typically fishes for sablefish in water that is 250 to 450 fathoms (1,500 to 2,700 feet) but has fished as deep as 650 fathoms (3,900 feet). Therefore, human

exposure to MEC exists at depths greater than the 20-fathom (120-foot) limit specified in the Navy MRP.

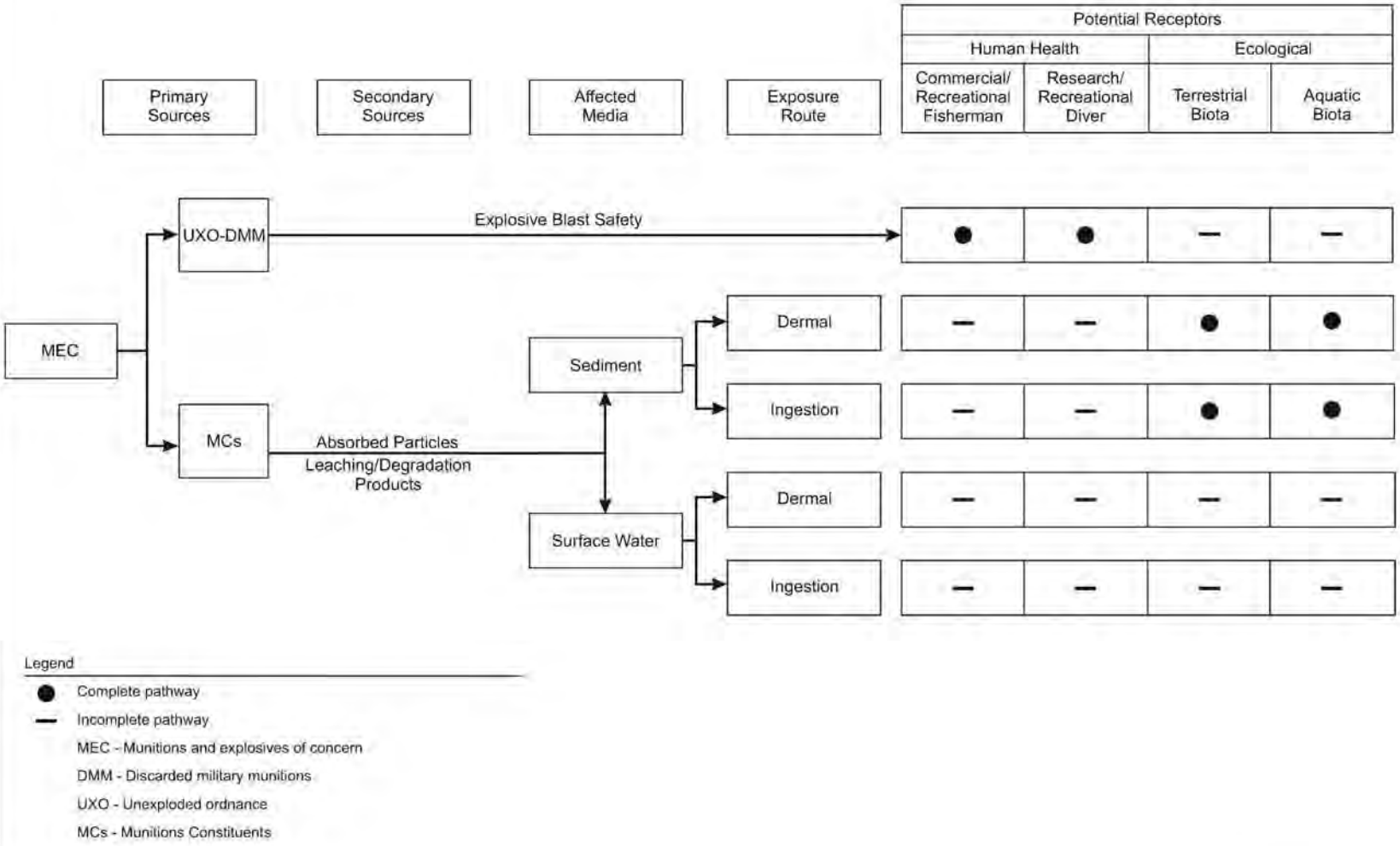
The conceptual site model of the Kiska Island NDSA is presented on Figure 3-1. Because Kiska Island is uninhabited and remote, the only two populations of potential exposure to MEC are commercial fishers and recreational or research divers. These populations are discussed in the following paragraphs.

Recreational or Commercial Fishers: The physical explosive hazard is a completed pathway for fishers (recreational or commercial), who may accidently detonate MEC. Commercial fishers could potentially bring up MEC in their fishing nets, as reported in two articles of such an event in the Bering Sea near Dutch Harbor (Paulin 2012 and Rosenthal 2012a). In addition, a commercial vessel's anchor could potentially detonate or get caught on MEC on the seafloor. Therefore, potential physical explosive hazards for recreational and commercial fishers are considered complete and could be significant.

In addition to the physical explosive hazards associated with MEC, potential health hazards are also associated with exposure to the MCs released from ordnance items. However, because any release would be occurring into such an enormous volume of water that is subject to significant mixing by tidal movements and storms, the probability of fishers coming in direct contact with dangerous concentrations of MCs in the environment is remote. Therefore, this pathway is considered incomplete for recreational and commercial fishers.

Recreational or Research Divers: Recreational or research divers could come into direct contact with MEC during an underwater dive. Recreational or research divers will not typically dive deeper than 20 fathoms (120 feet). Divers could encounter MEC in these shallow waters, 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 of the area. Divers may be drawn to known wrecked ships in Kiska Harbor and Gertrude Cove, although the waters of Kiska Island are not an area of popular diving as they are extremely remote. There were conversations posted on www.scubaboard.com of divers wanting to explore the areas containing shipwrecks at Kiska Island.

It is also known that the wrecked ships in Kiska Harbor were used as targets in training exercises during the 1950s. These shipwrecks are located close to the shoreline (approximately 20 to 50 feet) in water depths ranging from 2 to 8 fathoms (12 to 48 feet) (Figure 2-4). 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 considered complete in these areas. However, the likelihood of a diver coming into physical contact with UXO from these gun-training activities is considered low. There is a



U.S.NAVY

Figure 3-1
Conceptual Site Model

Delivery Order 0040
Naval Defensive Sea Area
Kiska Island, Alaska

higher likelihood of a diver coming into physical contact with MEC (either Japanese or Allied) resulting from combat operations conducted during World War II.

As discussed above for fishers, potential health hazards associated with exposure to the MCs released from ordnance items would also be unlikely for recreational and research divers. The probability of divers coming in direct contact with MCs in the environment is remote. Therefore, this pathway is considered incomplete for recreational and research divers.

The main concerns regarding MCs in the vicinity of Kiska Island are likely related to impacts to the marine environment, as discussed in the following section.

3.5 MARINE EXPOSURE TARGETS

Exposure to MEC in the surface water of the Kiska Island NDSA is limited to mammals, birds, fish, and benthic organisms found in the marine environment. Marine mammals, fish, birds, and benthic organisms within the Kiska Island NDSA could potentially have daily exposures to any MEC lost or discarded there. The risk to these creatures from detonation of the ordnance is remote. However, release of the constituents contained in the munitions could potentially impact the quality of the surface water and sediments and present a potential hazard to the marine environment. Direct exposure of munitions by marine receptors could occur when munitions are washed up during storm events or tidal action onto beaches, or buried in sediment. Therefore, exposure to chemical constituents of the explosives within the 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. The main concerns include the following:

- The continued health of the biological community and its ability to support the ecosystem
- Potential uptake of chemicals into the plants and sea life that ultimately form part of the food chain for people and other marine life
- Chemical constituents of explosives that may be suspended in water and potentially available to marine life

Many MCs could be potentially toxic to aquatic organisms. However, the potential for aquatic toxicity is not completely understood because of the complexity of the marine environment. Aquatic toxicity is affected by the several factors that influence the fate and transport of the MCs

and the dose exposure of the aquatic organism. MCs are often not detected in the marine environment because of a variety of factors that includes advection, dispersion, diffusion, photolysis, plant uptake, and biotic transformation. There is also evidence that the some of the common compounds of MCs such as RDX do not bioaccumulate in aquatic tissue (USEPA 2003). In contrast, some of the common metals of MCs such as lead and mercury bioaccumulate in aquatic tissue. However, the effects of bioaccumulation depends on several factors: the concentrations of the chemicals (dose), the pathways by which receptors are exposed, the duration, and the sensitivity of the exposed population.

Surface water in the immediate vicinity of a continuing source such as constituents leaking from a cracked or leaking ordnance casing or a low-order detonation, may contain MCs in measurable quantities. The munitions compounds of interest include, but are not limited to, military explosive compounds such as trinitrotoluene (TNT), pentaerythriol tetranitrate, cyclotrimethylene trinitramine (RDX), and cyclotetramethylene tetranitramine (HMX) as they occur in munitions, as well as any breakdown products. There are many factors affecting the fate and transport of these chemicals. TNT is more water soluble than RDX and HMX and is therefore more likely to be found in small concentrations in water. Since RDX and HMX have low water solubilities, they are more likely to be dispersed as small particles by currents to sediments (which may be uptaken by plants), or dispersed in the water column (which exposes the aquatic biota via ingestion or dermal contact).

MCs differ in how easily they bind to sediments. MCs not easily bound to sediments may act as a source of continuing release to water, or as a source for aquatic life uptake. Since TNT is more water soluble than RDX or HMX, it is less likely to bind to sediments and more likely to be immediately absorbed into water. However, TNT also tends to be more susceptible to photodegradation and biotransformation, particularly in shallow water. The process of biotransformation causes TNT's amino biotransformation products to bind to the humic acids in sediments more strongly than RDX or HMX. This tendency to bind to sediment can reduce the overall concentration of TNT's biotransformation products in water, in spite of their relatively higher water solubility compared to RDX and HMX.

Biouptake and bioaccumulation of MCs into the food chain via aquatic plants and other organisms that grow in sediments is not well understood. Research on phytoremediation has shown that plants can take up MCs such as TNT, RDX, and HMX, which will also undergo some biotransformation in the plants' tissues (USEPA 2003). Research has shown that TNT has very low bioacummulation potential (Yoo et al. 2006). RDX also has low bioconcentration potential in aquatic organisms (ATSDR 2012).

The MCs (including the most common ones, TNT, RDX, and HMX) are likely to present low ecological risk under expected exposure scenarios in the marine environment. Although, there is

not extensive research on the toxicological effects of munitions in the marine environment, a study in 2005 (Rosen and Lotufo) concluded that exposure to RDX did not cause toxicity in amphipods (invertebrate species). Furthermore, MCs typically undergo extensive transformation upon contact with marine sediment and have low potential for bioaccumulation in aquatic organisms. Therefore, the exposures of terrestrial and aquatic populations to MCs via sediment and surface water at Kiska Island are considered complete, but insignificant.

4.0 SUMMARY AND CONCLUSIONS

This section presents a brief summary of the information presented in this PA report, as well as conclusions regarding the potential for exposure to MEC present in the marine environment for both human and marine species.

The stated objective of this project is to perform a review of activities related to the operations of in-water ranges located off Kiska and Little Kiska Islands in Alaska. These operations include all activities that had the potential for release of ordnance into the marine environment that may pose a potential threat to human health or the environment.

4.1 IDENTIFIED SOURCES

The sources of MEC released into the marine environment of the Kiska Island NDSA 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. Locations identified by this PA where these actions occurred are shown on Plate 4-1.

The presence of MEC within the NDSAs beyond the known limits of in-water ranges resulting from combat activities during World War II are beyond the scope of this investigation based on the Navy MRP. However, in the case of Kiska and Little Kiska Islands, ordnance dropped or fired by Allied forces may be the predominant source of MEC found.

Two piers were constructed into the northwest portion of Kiska Harbor and were used by Allied forces during their operations on island to offload supplies, including ordnance (Figure 2-3). Information obtained during an interview conducted for this PA indicates the presence of "thousands of small arms shells on the seafloor off the Kiska Docks" during 2007 (Deffendall 2012). Remnants of one of these piers are still visible in Kiska Harbor today.

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 2-4). No information was discovered to indicate if this was an isolated or common occurrence.

Information reviewed for this PA report identified the Allied coastal and AA gun batteries on Kiska and Little Kiska Islands consisting of one 90-mm AMTB gun, one 37-mm AMTB gun, four 40-mm M-1 AA guns, six 20-mm Mk-4 AA guns, ten .50-caliber water-cooled machine guns, and four 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 2-5).

Other sources of MEC may include the Japanese or Allied troops that may have disposed of or lost ordnance items overboard in the water, particularly in the Kiska Harbor, while they were present on the island. MEC of Japanese origin was photographed on the harbor bottom as presented in section 2.5.3.

4.2 EXPOSURE PATHWAYS

As Kiska Island is uninhabited and remote, the only two populations of potential human exposure to MEC 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. However, the likelihood of a diver coming into physical contact with UXO resulting from gun training exercises is considered low. There is a higher likelihood of a diver coming into physical contact with MEC (either Japanese or Allied) resulting from combat operations conducted during World War II.

Exposure to MCs within the 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. Therefore, the exposures of terrestrial and aquatic populations to MCs via

sediment and surface water within the Kiska Island NDSA are considered complete, but insignificant.

4.3 AREAS POTENTIALLY CONTAINING NONCOMBAT MEC IN THE MARINE ENVIRONMENT

Five areas within the Kiska Island NDSA have been identified as potentially containing DMM, practice-fired 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:

- The area within Kiska Harbor surrounding the ship pier, barge pier, three rocket/bombing targets, and the seafloor within the former gun range extending northeast, as shown on Figure 4-1
- The area off Little Kiska Island, as shown on Figure 4-2
- The area including all of Mutt and Jeff Coves and the adjacent seafloor between Bukhti and Hatchet Points, as shown on Figure 4-3
- The area including all of Gertrude Cove and the adjacent seafloor extending southwest, as shown on Figure 4-4
- The area including all of Beach and Bluff Coves and the adjacent seafloor, as shown on Figure 4-5

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

4.4 RECOMMENDATIONS

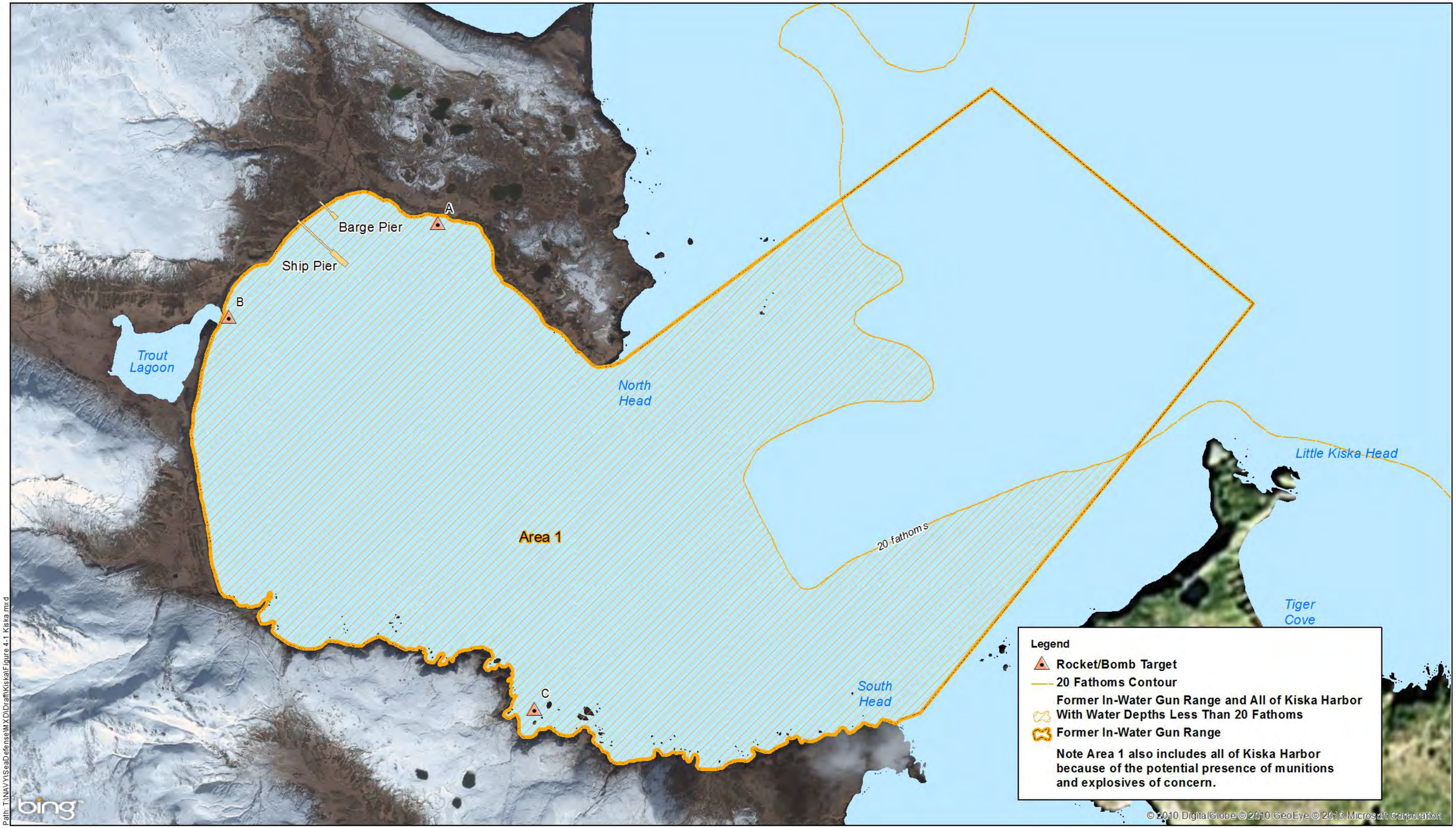
Based on this preliminary assessment of the NDSA at Kiska Island, the Navy recommends the following:

1. Kiska and Little Kiska are not eligible for inclusion in the MRP program because most of the potential MEC is the result of combat operations.
2. Site inspections or surveys are not recommended because

a. The frequency of human exposure to MEC (fishers or divers) is expected to be minimal because Kiska Island is remote and uninhabited.

b. It is illegal for anyone to remove items (including MEC) from the waters surrounding Kiska and Little Kiska Islands because the water in this area is part of a national historical landmark.

3. The Navy will perform a non-time-critical removal action (NTCRA) to initiate a Notice to Mariners and an information advisory to increase awareness of the presence of MEC in the area. The Navy will request that the National Oceanic and Atmospheric Administration include a Notice to Mariners on navigational charts for Kiska Island. The warning will notify fishers and divers to be extremely careful when within the NDSA for Kiska Island because MEC exist in the waters around Kiska Island. In 2013, the Navy intends to distribute copies of an educational fact sheet titled *3Rs Explosives Safety Guide, Maritime Industry* (U.S. Army Technical Center for Explosives Safety 2010) to fishers in the main fishing ports in the Aleutians which include Dutch Harbor and Kodiak areas. The full-color 12-page fact sheet informs readers of the dangers of encountering munitions from the seafloor and promotes safety by following the "3Rs" of explosives safety: recognize, retreat, and report. A copy of this fact sheet is included in Appendix C

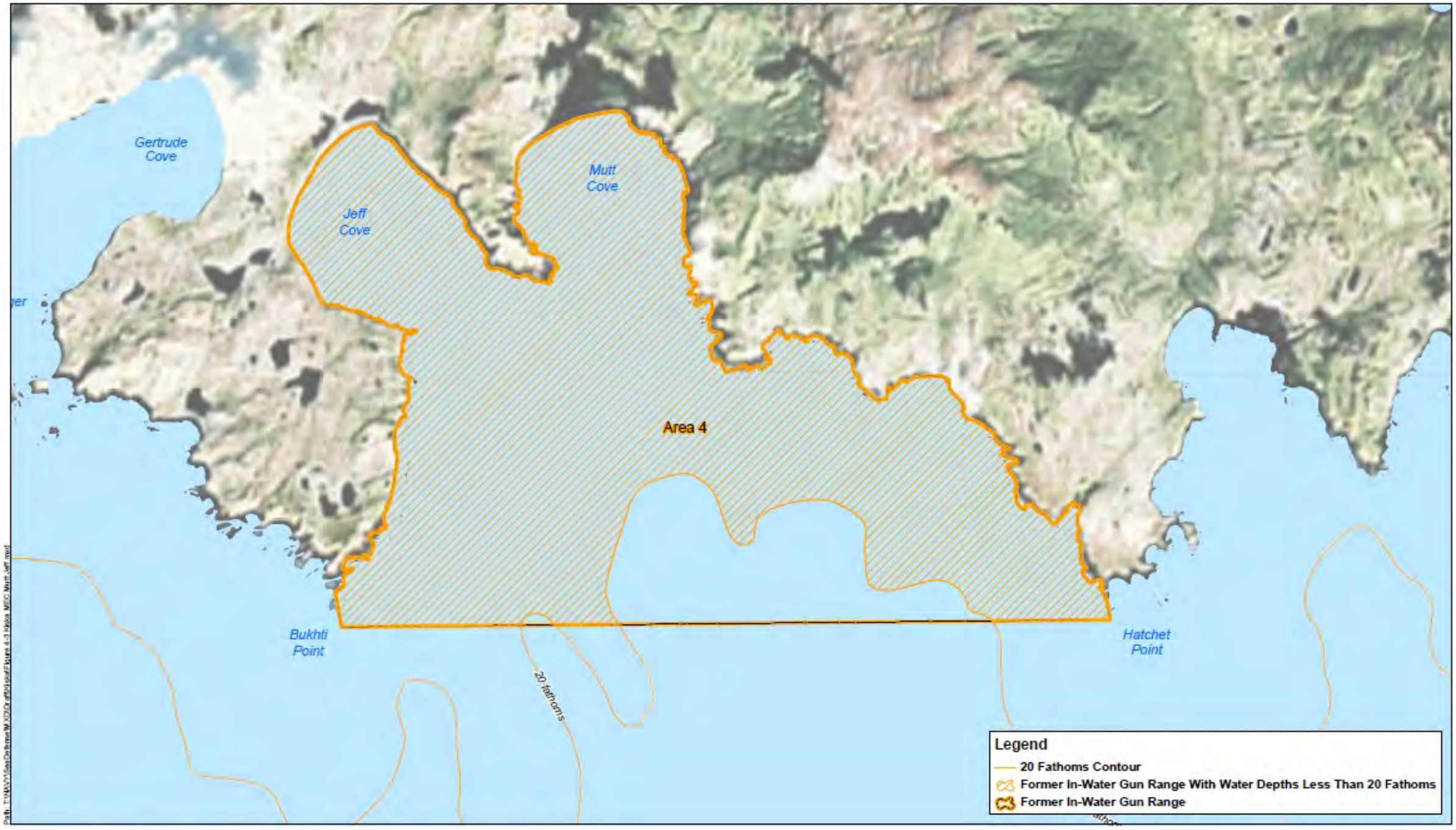


Path: T:\NAVY\SeaDefense\MXD\Draft\KiskaFigure 4-1 Kiska.mxd

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,000 2,000 Scale in Feet	Kiska Island

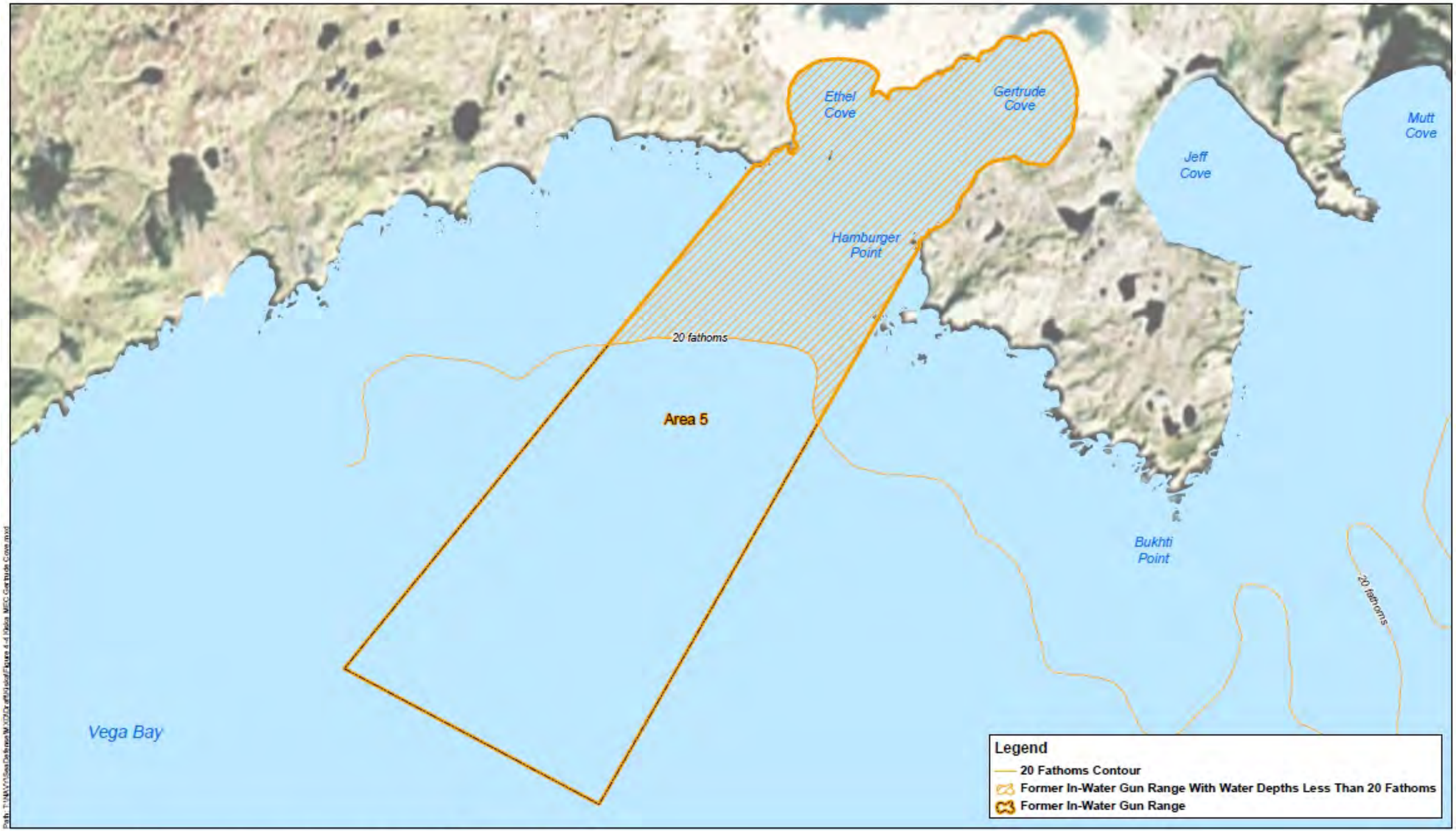
Figure 4-1
Former Range Area and Kiska Harbor Potentially Containing MEC at Kiska Harbor, Kiska Island

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	N 0 1,000 2,000 Scale In Feet	Kiska Island	**Figure 4-2** **Former Range Area Potentially Containing MEC at Little Kiska Island**



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,000 2,000 Scale in Feet	Kiska Island

Figure 4-3
Former Range Area Potentially Containing
MEC Off Mutt and Jeff Coves, Kiska Island



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,100 2,200 Scale in Feet	Kiska Island

Figure 4-4
Former Range Area Potentially Containing
MEC Off Gertrude Cove, Kiska Island

3 Nautical Miles Limit

Area 6

20 fathoms

Barley Cove

Beach Cove

Bluff Cove

Salmon Lagoon

Legend

20 Fathoms Contour

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

C3 Former In-Water Gun Range

Path: T:\NAVY\1SeaDefense\MXD\Draft\Kiska\Figure 4-5 Kiska MEC Beach Bluff Coves.mxd

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,300 2,600 Scale in Feet	Kiska Island

Figure 4-5
Former Range Area Potentially Containing
MEC Off Beach and Bluff Coves, Kiska Island

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APPENDIX A

Executive Order 8680

Executive Order 8680--Establishing naval defensive sea areas around and naval airspace reservations over the islands of Kiska and Unalaska

Source: The provisions of Executive Order 8680 of Feb. 14, 1941, appear at 6 FR 1014, 3 CFR, 1938-1943 Comp., p. 892, unless otherwise noted.

Alaska

By virtue of the authority vested in me by the provisions of section 44 of the Criminal Code, as amended (U.S.C., title 18, sec. 96), and section 4 of the Air Commerce Act approved May 20, 1926 (44 Stat. 570, U.S.C., title 49, sec. 174), the territorial waters between the extreme high-water marks and the three-mile marine boundaries surrounding the islands of Kiska and Unalaska are hereby established and reserved as naval defensive sea areas for purposes of national defense, such areas to be known, respectively, as "Kiska Island Naval Defensive Sea Area", and "Unalaska Island Naval Defensive Area" and the airspaces over the said territorial waters and islands are hereby set apart and reserved as naval airspace reservations for purposes of national defense, such reservations to be known, respectively, as "Kiska Island Naval Airspace Reservation", and "Unalaska Island Naval Airspace Reservation".

At no time shall any person, other than persons on public vessels of the United States, enter either of the naval defensive sea areas herein set apart and reserved, nor shall any vessel or other craft, other than public vessels of the United States, be navigated into either of said areas, unless authorized by the Secretary of the Navy.

At no time shall any aircraft, other than public aircraft of the United States, be navigated into either of the naval airspace reservations herein set apart and reserved, unless authorized by the Secretary of the Navy.

The provisions of the preceding paragraphs shall be enforced by the Secretary of the Navy, with the cooperation of the local law enforcement officers of the United States and of the Territory of Alaska; and the Secretary of the Navy is hereby authorized to prescribe such regulations as may be necessary to carry out such provisions.

Any person violating any of the provisions of this order relating to the above-named naval defensive sea areas shall be subject to the penalties provided by section 44 of the Criminal Code as amended (U.S.C., title 18, sec. 96), and any person violating any of the provisions of this order relating to the above-named naval airspace reservations shall be subject to the penalties prescribed by the Civil Aeronautics Act of 1938 (52 Stat. 973).

This order shall take effect ninety days after date hereof.

[EO 8680 amended by EO 8729 of Apr. 2, 1941, 6 FR 1791, 3 CFR, 1938-1941 Comp., p. 919]

APPENDIX B

Historical Aerial Photo Interpretation

INSERT TEXT FROM PHOTO INTREPRETATION SUBCONTRACTOR

APPENDIX C

3Rs Explosives Safety Guide, Maritime Industry

Plate 4-1
Locations of Areas Potentially Containing Munitions and Explosives of Concern within the Naval Defensive Sea Area at Kiska Island

3.0 EXPOSURE PATHWAYS AND TARGETS

This section of the PA report discusses the release mechanisms and associated exposure pathways for MEC residing in the marine environment. This includes evaluation of the surface water migration pathway, the sediment exposure pathway, and target organisms that are potentially exposed to the hazards. When evaluating the fate and transport of the MCs and the actual potential impact of releases of these MCs on both humans and aquatic life, a variety of complex interactions between the physical and chemical properties of these chemicals must be understood (USEPA 2003).

3.1 MARINE SETTING

As described in Executive Order 8680, the Kiska Island NDSA includes the territorial waters between the extreme high-water marks and the 3-mile marine boundaries (Appendix A). Typical maximum water depths in this area reach approximately 40 to 60 fathoms (240 to 360 feet), but exceed 300 fathoms (1,800 feet) off Cape Saint Stephen at the southern end and Sirius Point at the northern end of Kiska Island.

These waters are adjacent to the AMNWR, established on December 2, 1980 when the Alaska National Interest Lands Conservation Act was signed into law by President Jimmy Carter. This act combined 11 previously established refuges totaling about 3 million acres, dating back to the early 1900s with 1.9 million additional acres. The AMNWR includes the islands of the Aleutian chain, including Kiska and Little Kiska Islands. The purpose of the AMNWR is "to conserve fish and wildlife populations and the marine resources upon which they rely" and provide "the opportunity for continued subsistence uses by local residents."

3.2 PHYSICAL RELEASE PATHWAY

As stated previously, releases of MEC into marine surface water results from the following activities:

- Ordnance fired over water from coastal defense guns and AA batteries during target training and gun function testing that did not detonate as intended
- Ordnance lost into the water during transfer from transport ships to the shore, either at a fixed dock or an explosive anchorage situated in the harbor away from shore installations

- Ordnance lost overboard during fleet operations, including the sinking of ships
- DMM deliberately disposed of into the marine environment at the conclusion of hostilities
- In the case of Kiska and Little Kiska, ordnance deliberately dropped or fired by Allied forces during the Japanese occupation of the islands that did not detonate as intended

Reviewed records and interviews suggest that the activities listed above may have released DMM or UXO into the marine surface waters of the Kiska Island NDSA.

A number of complex factors affect the fate and transport of MCs released in the underwater environment. These factors include the nature of the delivery of the ordnance item to the underwater environment, its potential for corrosion, and associated release of MCs.

Underwater releases of MCs can occur when casings deteriorate (most notably from corrosion), rupture upon impact, or undergo a low-order detonation. MCs may be released immediately after impact or only partially contained within the remains of the delivery system. When ordnance undergoes a low-order detonation or breaks apart upon impact, the MCs, such as bulk explosives, can be scattered over the impact area (USEPA 2003).

3.3 CHEMICAL RELEASE PATHWAY

Because MEC can remain relatively intact in the marine environment, MCs can be released through pinhole cracks that develop over time as a result of corrosion, or through the screw threads linking the fuse assembly to the main charge.

Corrosion of the iron and steel in casings is a complex process that occurs in the presence of water and oxygen. The potential corrosiveness of the local environment could vary greatly. The effects of immersion and corrosion on the release of MCs in various underwater environments depend on site conditions. Even though salt water is potentially more corrosive the higher the salt saturation, exposure to oxygen is a key requirement for corrosive effects. In environments where wave action and tides cause mixing with the atmosphere (typical of the Aleutian Islands), the oxygen content of the water, especially shallow water, can create a high potential for oxidation (USEPA 2003).

A variety of factors in the underwater environment may either reduce the potential for corrosion, or affect the nature of the release from an ordnance item releasing MCs. At higher pH levels, if the right conditions are present (e.g., carbon dioxide saturation or temperature), submerged or

buried metal may develop a coating of calcium carbonate, with a corresponding increase in corrosion resistance. In the absence of oxygen, such as the anaerobic conditions that can exist where there are large concentrations of unoxidized metals or high content of organic matter, or in deeper, cold waters, corrosion in the underwater environment can be virtually stopped. It is also possible that submerged MEC can develop a coating consisting of biological materials (e.g., coral, barnacles, and plants) that can seal the item off from the environment, as well as make it more difficult to locate (USEPA 2003).

Although no empirical evidence exists regarding the rate of corrosion or encrustation acting on MEC in the marine environment at Kiska Island, photographs were taken of Japanese UXO on the bottom of Kiska Harbor during a 1989 underwater survey conducted by the National Park Service in cooperation with the U.S. Third Fleet (Cohen 1993). These photographs indicate varying degrees of corrosion or encrustation of the ordnance items after approximately 46 years in the marine environment. However, even after this length of time, these items are easily identified as MEC in the photographs (Figure 2-6).

3.4 HUMAN EXPOSURE TARGETS

Although Kiska Island is part of the AMNWR, commercial fishing does occur in the surrounding waters, including the associated NDSA. Therefore, human exposure to MEC could occur through accidental direct contact resulting from commercial fishing, anchoring in the area, or direct contact as a result of recreational or research dives into the marine environment of the NDSA.

The risks from MEC in the underwater environment are driven by two different effects: the physical explosive hazard associated with direct encounter with DMM or UXO and the environmental health hazard associated with the release of the MCs contained in MEC. As mentioned in Section 2.4.2, Regulatory Compliance, current Navy policy is to include sites in the Navy MRP where munitions releases of shallow water areas are known or suspected and for only those sites covered by water no deeper than 20 fathoms (120 feet) (U.S. Navy 2007), which is the approximate depth limit of recreational diving. Although MEC items may be located at depths greater than 20 fathoms (120 feet), human and marine exposures at 20 fathoms (120 feet) or less are the primary exposures of concern in this report, based on the Navy MRP policy.

During fishing operations, MEC have been pulled up in fishing equipment from depths greater than 20 fathoms (120 feet). The skipper of the *Aleutian Sable* (Jay Hebert 2012) said that he has pulled up ordnance on several occasions, as recent as June 2012, near the Chelan Bank where he fishes. The *Aleutian Sable* typically fishes for sablefish in water that is 250 to 450 fathoms (1,500 to 2,700 feet) but has fished as deep as 650 fathoms (3,900 feet). Therefore, human

exposure to MEC exists at depths greater than the 20-fathom (120-foot) limit specified in the Navy MRP.

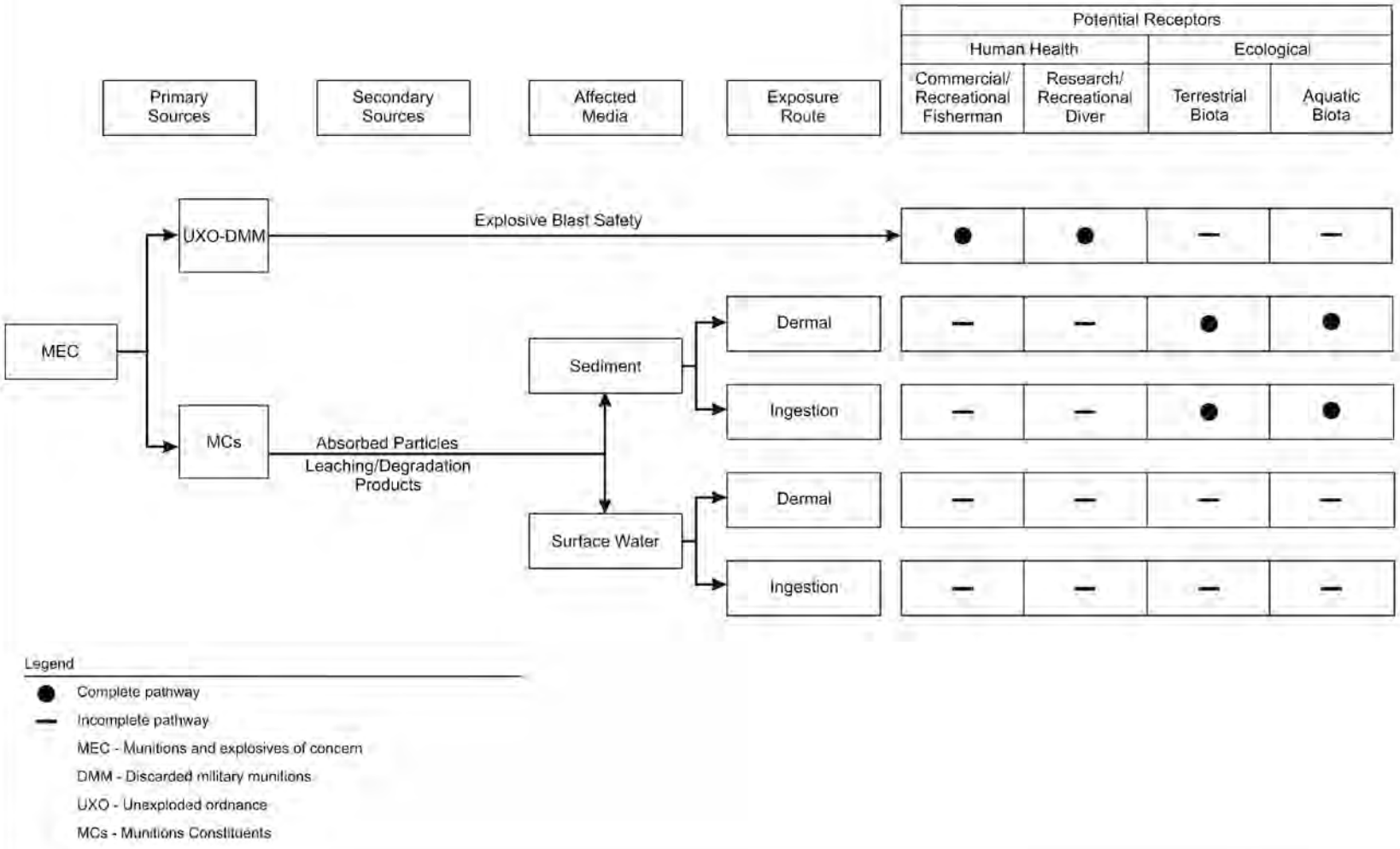
The conceptual site model of the Kiska Island NDSA is presented on Figure 3-1. Because Kiska Island is uninhabited and remote, the only two populations of potential exposure to MEC are commercial fishers and recreational or research divers. These populations are discussed in the following paragraphs.

Recreational or Commercial Fishers: The physical explosive hazard is a completed pathway for fishers (recreational or commercial), who may accidently detonate MEC. Commercial fishers could potentially bring up MEC in their fishing nets, as reported in two articles of such an event in the Bering Sea near Dutch Harbor (Paulin 2012 and Rosenthal 2012a). In addition, a commercial vessel's anchor could potentially detonate or get caught on MEC on the seafloor. Therefore, potential physical explosive hazards for recreational and commercial fishers are considered complete and could be significant.

In addition to the physical explosive hazards associated with MEC, potential health hazards are also associated with exposure to the MCs released from ordnance items. However, because any release would be occurring into such an enormous volume of water that is subject to significant mixing by tidal movements and storms, the probability of fishers coming in direct contact with dangerous concentrations of MCs in the environment is remote. Therefore, this pathway is considered incomplete for recreational and commercial fishers.

Recreational or Research Divers: Recreational or research divers could come into direct contact with MEC during an underwater dive. Recreational or research divers will not typically dive deeper than 20 fathoms (120 feet). Divers could encounter MEC in these shallow waters, 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 of the area. Divers may be drawn to known wrecked ships in Kiska Harbor and Gertrude Cove, although the waters of Kiska Island are not an area of popular diving as they are extremely remote. There were conversations posted on www.scubaboard.com of divers wanting to explore the areas containing shipwrecks at Kiska Island.

It is also known that the wrecked ships in Kiska Harbor were used as targets in training exercises during the 1950s. These shipwrecks are located close to the shoreline (approximately 20 to 50 feet) in water depths ranging from 2 to 8 fathoms (12 to 48 feet) (Figure 2-4). 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 considered complete in these areas. However, the likelihood of a diver coming into physical contact with UXO from these gun-training activities is considered low. There is a



U.S.NAVY

Figure 3-1
Conceptual Site Model

Delivery Order 0040
Naval Defensive Sea Area
Kiska Island, Alaska

higher likelihood of a diver coming into physical contact with MEC (either Japanese or Allied) resulting from combat operations conducted during World War II.

As discussed above for fishers, potential health hazards associated with exposure to the MCs released from ordnance items would also be unlikely for recreational and research divers. The probability of divers coming in direct contact with MCs in the environment is remote. Therefore, this pathway is considered incomplete for recreational and research divers.

The main concerns regarding MCs in the vicinity of Kiska Island are likely related to impacts to the marine environment, as discussed in the following section.

3.5 MARINE EXPOSURE TARGETS

Exposure to MEC in the surface water of the Kiska Island NDSA is limited to mammals, birds, fish, and benthic organisms found in the marine environment. Marine mammals, fish, birds, and benthic organisms within the Kiska Island NDSA could potentially have daily exposures to any MEC lost or discarded there. The risk to these creatures from detonation of the ordnance is remote. However, release of the constituents contained in the munitions could potentially impact the quality of the surface water and sediments and present a potential hazard to the marine environment. Direct exposure of munitions by marine receptors could occur when munitions are washed up during storm events or tidal action onto beaches, or buried in sediment. Therefore, exposure to chemical constituents of the explosives within the 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. The main concerns include the following:

- The continued health of the biological community and its ability to support the ecosystem
- Potential uptake of chemicals into the plants and sea life that ultimately form part of the food chain for people and other marine life
- Chemical constituents of explosives that may be suspended in water and potentially available to marine life

Many MCs could be potentially toxic to aquatic organisms. However, the potential for aquatic toxicity is not completely understood because of the complexity of the marine environment. Aquatic toxicity is affected by the several factors that influence the fate and transport of the MCs

and the dose exposure of the aquatic organism. MCs are often not detected in the marine environment because of a variety of factors that includes advection, dispersion, diffusion, photolysis, plant uptake, and biotic transformation. There is also evidence that the some of the common compounds of MCs such as RDX do not bioaccumulate in aquatic tissue (USEPA 2003). In contrast, some of the common metals of MCs such as lead and mercury bioaccumulate in aquatic tissue. However, the effects of bioaccumulation depends on several factors: the concentrations of the chemicals (dose), the pathways by which receptors are exposed, the duration, and the sensitivity of the exposed population.

Surface water in the immediate vicinity of a continuing source such as constituents leaking from a cracked or leaking ordnance casing or a low-order detonation, may contain MCs in measurable quantities. The munitions compounds of interest include, but are not limited to, military explosive compounds such as trinitrotoluene (TNT), pentaerythriol tetranitrate, cyclotrimethylene trinitramine (RDX), and cyclotetramethylene tetranitramine (HMX) as they occur in munitions, as well as any breakdown products. There are many factors affecting the fate and transport of these chemicals. TNT is more water soluble than RDX and HMX and is therefore more likely to be found in small concentrations in water. Since RDX and HMX have low water solubilities, they are more likely to be dispersed as small particles by currents to sediments (which may be uptaken by plants), or dispersed in the water column (which exposes the aquatic biota via ingestion or dermal contact).

MCs differ in how easily they bind to sediments. MCs not easily bound to sediments may act as a source of continuing release to water, or as a source for aquatic life uptake. Since TNT is more water soluble than RDX or HMX, it is less likely to bind to sediments and more likely to be immediately absorbed into water. However, TNT also tends to be more susceptible to photodegradation and biotransformation, particularly in shallow water. The process of biotransformation causes TNT's amino biotransformation products to bind to the humic acids in sediments more strongly than RDX or HMX. This tendency to bind to sediment can reduce the overall concentration of TNT's biotransformation products in water, in spite of their relatively higher water solubility compared to RDX and HMX.

Biouptake and bioaccumulation of MCs into the food chain via aquatic plants and other organisms that grow in sediments is not well understood. Research on phytoremediation has shown that plants can take up MCs such as TNT, RDX, and HMX, which will also undergo some biotransformation in the plants' tissues (USEPA 2003). Research has shown that TNT has very low bioacummulation potential (Yoo et al. 2006). RDX also has low bioconcentration potential in aquatic organisms (ATSDR 2012).

The MCs (including the most common ones, TNT, RDX, and HMX) are likely to present low ecological risk under expected exposure scenarios in the marine environment. Although, there is

not extensive research on the toxicological effects of munitions in the marine environment, a study in 2005 (Rosen and Lotufo) concluded that exposure to RDX did not cause toxicity in amphipods (invertebrate species). Furthermore, MCs typically undergo extensive transformation upon contact with marine sediment and have low potential for bioaccumulation in aquatic organisms. Therefore, the exposures of terrestrial and aquatic populations to MCs via sediment and surface water at Kiska Island are considered complete, but insignificant.

4.0 SUMMARY AND CONCLUSIONS

This section presents a brief summary of the information presented in this PA report, as well as conclusions regarding the potential for exposure to MEC present in the marine environment for both human and marine species.

The stated objective of this project is to perform a review of activities related to the operations of in-water ranges located off Kiska and Little Kiska Islands in Alaska. These operations include all activities that had the potential for release of ordnance into the marine environment that may pose a potential threat to human health or the environment.

4.1 IDENTIFIED SOURCES

The sources of MEC released into the marine environment of the Kiska Island NDSA 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. Locations identified by this PA where these actions occurred are shown on Plate 4-1.

The presence of MEC within the NDSAs beyond the known limits of in-water ranges resulting from combat activities during World War II are beyond the scope of this investigation based on the Navy MRP. However, in the case of Kiska and Little Kiska Islands, ordnance dropped or fired by Allied forces may be the predominant source of MEC found.

Two piers were constructed into the northwest portion of Kiska Harbor and were used by Allied forces during their operations on island to offload supplies, including ordnance (Figure 2-3). Information obtained during an interview conducted for this PA indicates the presence of "thousands of small arms shells on the seafloor off the Kiska Docks" during 2007 (Deffendall 2012). Remnants of one of these piers are still visible in Kiska Harbor today.

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 2-4). No information was discovered to indicate if this was an isolated or common occurrence.

Information reviewed for this PA report identified the Allied coastal and AA gun batteries on Kiska and Little Kiska Islands consisting of one 90-mm AMTB gun, one 37-mm AMTB gun, four 40-mm M-1 AA guns, six 20-mm Mk-4 AA guns, ten .50-caliber water-cooled machine guns, and four 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 2-5).

Other sources of MEC may include the Japanese or Allied troops that may have disposed of or lost ordnance items overboard in the water, particularly in the Kiska Harbor, while they were present on the island. MEC of Japanese origin was photographed on the harbor bottom as presented in section 2.5.3.

4.2 EXPOSURE PATHWAYS

As Kiska Island is uninhabited and remote, the only two populations of potential human exposure to MEC 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. However, the likelihood of a diver coming into physical contact with UXO resulting from gun training exercises is considered low. There is a higher likelihood of a diver coming into physical contact with MEC (either Japanese or Allied) resulting from combat operations conducted during World War II.

Exposure to MCs within the 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. Therefore, the exposures of terrestrial and aquatic populations to MCs via

sediment and surface water within the Kiska Island NDSA are considered complete, but insignificant.

4.3 AREAS POTENTIALLY CONTAINING NONCOMBAT MEC IN THE MARINE ENVIRONMENT

Five areas within the Kiska Island NDSA have been identified as potentially containing DMM, practice-fired 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:

- The area within Kiska Harbor surrounding the ship pier, barge pier, three rocket/bombing targets, and the seafloor within the former gun range extending northeast, as shown on Figure 4-1
- The area off Little Kiska Island, as shown on Figure 4-2
- The area including all of Mutt and Jeff Coves and the adjacent seafloor between Bukhti and Hatchet Points, as shown on Figure 4-3
- The area including all of Gertrude Cove and the adjacent seafloor extending southwest, as shown on Figure 4-4
- The area including all of Beach and Bluff Coves and the adjacent seafloor, as shown on Figure 4-5

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

4.4 RECOMMENDATIONS

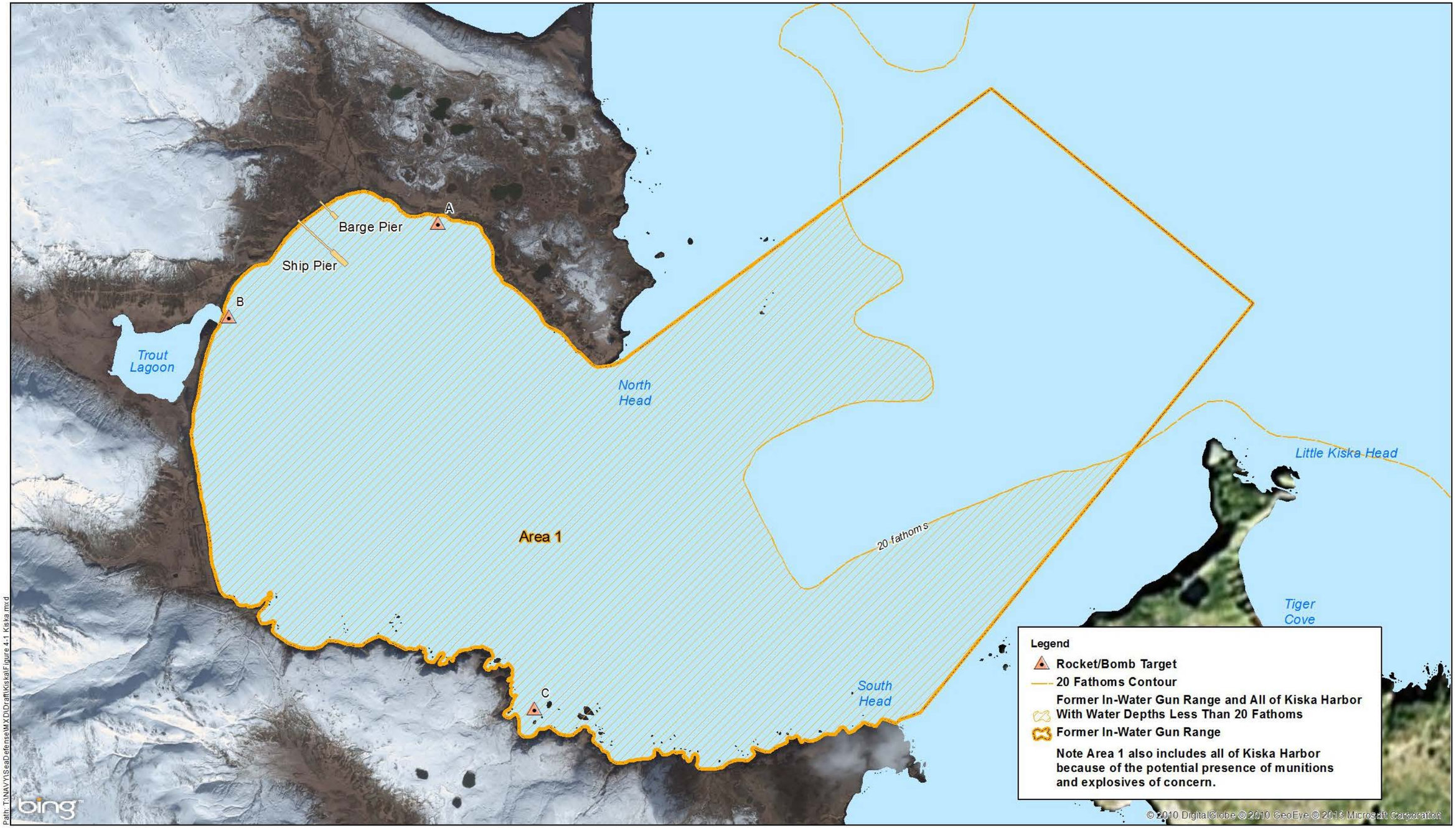
Based on this preliminary assessment of the NDSA at Kiska Island, the Navy recommends the following:

1. Kiska and Little Kiska are not eligible for inclusion in the MRP program because most of the potential MEC is the result of combat operations.
2. Site inspections or surveys are not recommended because

a. The frequency of human exposure to MEC (fishers or divers) is expected to be minimal because Kiska Island is remote and uninhabited.

b. It is illegal for anyone to remove items (including MEC) from the waters surrounding Kiska and Little Kiska Islands because the water in this area is part of a national historical landmark.

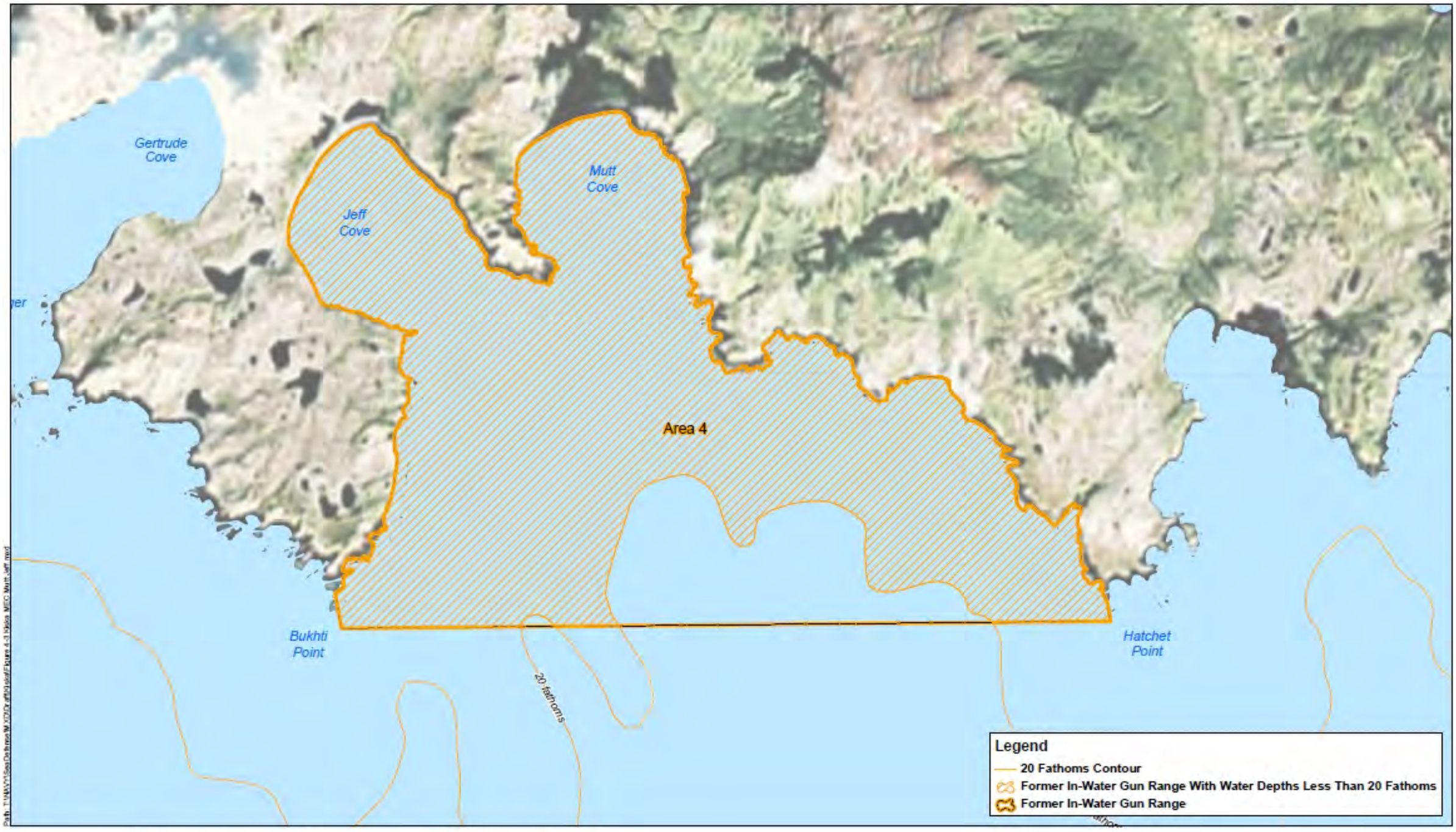
3. The Navy will perform a non-time-critical removal action (NTCRA) to initiate a Notice to Mariners and an information advisory to increase awareness of the presence of MEC in the area. The Navy will request that the National Oceanic and Atmospheric Administration include a Notice to Mariners on navigational charts for Kiska Island. The warning will notify fishers and divers to be extremely careful when within the NDSA for Kiska Island because MEC exist in the waters around Kiska Island. In 2013, the Navy intends to distribute copies of an educational fact sheet titled *3Rs Explosives Safety Guide, Maritime Industry* (U.S. Army Technical Center for Explosives Safety 2010) to fishers in the main fishing ports in the Aleutians which include Dutch Harbor and Kodiak areas. The full-color 12-page fact sheet informs readers of the dangers of encountering munitions from the seafloor and promotes safety by following the "3Rs" of explosives safety: recognize, retreat, and report. A copy of this fact sheet is included in Appendix C



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,000 2,000 Scale in Feet	Kiska Island

Figure 4-1
Former Range Area and Kiska Harbor Potentially Containing MEC at Kiska Harbor, Kiska Island

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska			**Figure 4-2** **Former Range Area Potentially Containing MEC at Little Kiska Island**



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska		**Figure 4-3** Former Range Area Potentially Containing MEC Off Mutt and Jeff Coves, Kiska Island

Ethel Cove
Gertrude Cove
Mutt Cove
Jeff Cove
Hamburger Point
20 fathoms
Area 5
Bukhti Point
20 fathoms
Vega Bay

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

Path: T:\NAVY\1SeaDefense\MXD\Draft\Kiska\Figure 4-4 Kiska MEC Gertrude Cove.mxd

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,100 2,200 Scale in Feet	Kiska Island

Figure 4-4
Former Range Area Potentially Containing
MEC Off Gertrude Cove, Kiska Island

3 Nautical Miles Limit

Area 6

20 fathoms

Barley Cove

Beach Cove

Bluff Cove

Salmon Lagoon

Legend

20 Fathoms Contour

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

C3 Former In-Water Gun Range

Path: T:\NAVY\1SeaDefense\MXD\Draft\Kiska\Figure 4-5 Kiska MEC Beach Bluff Coves.mxd

U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 1,300 2,600 Scale in Feet	Kiska Island

Figure 4-5
Former Range Area Potentially Containing
MEC Off Beach and Bluff Coves, Kiska Island

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APPENDIX A

Executive Order 8680

Executive Order 8680--Establishing naval defensive sea areas around and naval airspace reservations over the islands of Kiska and Unalaska

Source: The provisions of Executive Order 8680 of Feb. 14, 1941, appear at 6 FR 1014, 3 CFR, 1938-1943 Comp., p. 892, unless otherwise noted.

Alaska

By virtue of the authority vested in me by the provisions of section 44 of the Criminal Code, as amended (U.S.C., title 18, sec. 96), and section 4 of the Air Commerce Act approved May 20, 1926 (44 Stat. 570, U.S.C., title 49, sec. 174), the territorial waters between the extreme high-water marks and the three-mile marine boundaries surrounding the islands of Kiska and Unalaska are hereby established and reserved as naval defensive sea areas for purposes of national defense, such areas to be known, respectively, as "Kiska Island Naval Defensive Sea Area", and "Unalaska Island Naval Defensive Area" and the airspaces over the said territorial waters and islands are hereby set apart and reserved as naval airspace reservations for purposes of national defense, such reservations to be known, respectively, as "Kiska Island Naval Airspace Reservation", and "Unalaska Island Naval Airspace Reservation".

At no time shall any person, other than persons on public vessels of the United States, enter either of the naval defensive sea areas herein set apart and reserved, nor shall any vessel or other craft, other than public vessels of the United States, be navigated into either of said areas, unless authorized by the Secretary of the Navy.

At no time shall any aircraft, other than public aircraft of the United States, be navigated into either of the naval airspace reservations herein set apart and reserved, unless authorized by the Secretary of the Navy.

The provisions of the preceding paragraphs shall be enforced by the Secretary of the Navy, with the cooperation of the local law enforcement officers of the United States and of the Territory of Alaska; and the Secretary of the Navy is hereby authorized to prescribe such regulations as may be necessary to carry out such provisions.

Any person violating any of the provisions of this order relating to the above-named naval defensive sea areas shall be subject to the penalties provided by section 44 of the Criminal Code as amended (U.S.C., title 18, sec. 96), and any person violating any of the provisions of this order relating to the above-named naval airspace reservations shall be subject to the penalties prescribed by the Civil Aeronautics Act of 1938 (52 Stat. 973).

This order shall take effect ninety days after date hereof.

[EO 8680 amended by EO 8729 of Apr. 2, 1941, 6 FR 1791, 3 CFR, 1938-1941 Comp., p. 919]

APPENDIX B

Historical Aerial Photo Interpretation

STATEMENT OF OPINIONS
WAYNE M. GRIP
AERO-DATA CORPORATION
CONCERNING INTERPRETATION OF AERIAL PHOTOGRAPHS
OF KISKA ISLAND NAVAL DEFENSIVE SEA AREA

IN

THE ALEUTIAN ISLANDS, ALASKA

NOVEMBER 2012

Wayne M. Grip

Introduction
I was engaged to perform an historical aerial photography study of Kiska Harbor within the Kiska Island Naval Defensive Sea Area. I was asked to obtain and interpret aerial photography for the World War II time period.

Aerial imagery, satellite imagery and maps were acquired of the Site from both public and private sources. In addition, I obtained the USGS 1:250,000 topographic map of Kiska. The imagery and maps were registered to a common coordinate system and interpreted. Oblique photographs and ground photographs were also obtained, which showed locations where munitions were probably offloaded from ships.

The primary purpose of this study was to use historical aerial photography to identify potential areas impacted by legacy ordnance activities.

Statement of Qualifications
My name is Wayne M. Grip. I have a BS degree in Geology from the University of Wisconsin, Madison. After I received my degree in Geology, I served as a cartographic officer in the US Air Force for four years from 1967 through 1971. In this position, I interpreted aerial photography and satellite imagery to produce air target charts (maps). Following my release from active duty, I worked for the Louisiana Department of Natural Resources (LADNR) for five years as a geologist. In this position, I flew photomissions and interpreted aerial photography to evaluate mining permit applications and to monitor oil and gas and mining operations. I also conducted many on-site inspections to determine the compliance of regulated facilities with environmental standards.

In 1982, I co-founded Aero-Data Corporation. I worked part-time for Aero-Data until 1985 when I left the LADNR and went full time with Aero-Data as its president. As of 2012, I have worked for Aero-Data for thirty years. I am currently the president and principal owner. Aero-Data specializes in aerial mapping and environmental studies using aerial photography and historical maps. I have over thirty-five years of professional experience in this field. I have served as an expert witness in the areas of photointerpretation, photogrammetry, and hydrology in both Federal and State courts in the United States. I am also an active licensed pilot with over 2,500 hours of flying time as pilot in command including over 1,000 hours of photomissions. In the past thirty years with Aero-Data Corporation, I have completed over 700 environmental site investigations in more than thirty states using historical aerial photography.

Information Considered
This report is based upon vertical monoscopic aerial photography, oblique photography, ground photography and maps of the Site as well as my experience and training. Attachment A is a listing of the aerial photography, documents and other information that I have relied upon.

Production of Geo-Registered Images and Maps
Following my standard procedures, I have produced geo-registered imagery of the vertical aerial photography obtained for this study. In addition, maps showing the boundary of the Site and maps of other features were geo-registered to the aerial photography. The imagery and maps are included in the attachments to this report.

Methods and Materials

Aerial research and acquisition
The historical aerial photography study of the Site began with research for available photo coverage from public and private vendors. Vertical, oblique and ground imagery were acquired.

Because of the typically poor flying weather and remoteness of Kiska Island, the availability of photography during the war years was very limited. There was almost no aerial photography identified that was taken during WWII. Conventional aerial photography is normally taken of developed areas during clear weather with good visibility and lack of cloud cover. These conditions are very rare in the Aleutians

and there are no developed areas on Kiska.

The National Archives and Records Administration (NARA) catalog was researched using their Online Public Access (OPA) system. Through OPA, several record groups were identified as having possible photographic coverage. The record groups were as follows:

- RG 18 – Records of the Army Air Forces
- RG 23 – Records of the Coast and Geodetic Survey
- RG 37 – Records of the Hydrographic Office
- RG 80 – General Records of the Department of the Navy
- RG 373 – Records of the Defense Intelligence Agency

Aero-Data Corporation forwarded this information to Do You Graphics in Maryland, who performed onsite research at NARA to verify coverage. Upon completing their research, Do You Graphics sent Aero-Data Corporation the results of their findings. ***No aerial photographs from the requested World War II time period were found at NARA.***

Additional photographic collections were reviewed, including the Alaska Digital Archives, which provides online access to the Alaska State Archives, Alaska State Library, Alaska State Museum and University of Alaska collections; the Library of Congress, the National Geodetic Survey; the Naval History and Heritage Command; the United States Department of Agriculture Aerial Photography Field Office; the Alaska District of the United States Army Corps of Engineers; and the United States Geological Survey. ***No stereoscopic aerial photography from World War II was available from these sources.*** When available, ground shots and oblique imagery were obtained from these sources.

All imagery that was obtained was examined for proper geographic coverage of the Site. Although some of the ground photos obtained do show the offloading of munitions on beaches, the photos lack sufficient identifiable geographical features that would enable us to map the precise geographical position where these ordnance activities occurred on Kiska Island. The dates of the imagery were included in metadata and other documentation provided to us from the photo providers.

Scanning of Selected Photography
The vertical and oblique photographs that were obtained from the Naval History and Heritage Command were scanned using a flatbed scanner. All other imagery was obtained in digital format.

Geo-referencing of Imagery and Maps
The chosen coordinate system of UTM Zone 60 NAD83 was derived from the already geo-referenced 5/12/2012 DigitalGlobe WorldView2 satellite imagery. I compared the historical vertical aerial photos and maps with the 2012 satellite imagery to identify common features that would allow me to register the photo or map geographically. Using ArcGIS, each historical photo or map was scaled and registered to the UTM coordinate system using photo-identifiable features common with the satellite imagery. These features included a stream channel, a road network and the shoreline.

Photointerpretation
It is an accepted practice in photointerpretation to rely upon different types of information such as oblique aerial photography, ground photography, maps and ground surveys in addition to vertical aerial photography and the interpreter's experience and training. This study relied primarily upon aerial photography, maps and my experience and training.

Photointerpretation of the Site was conducted in the GIS using the oblique and ground photos as the primary source of data. The locations of features visible on the historical imagery were transferred to the current scene satellite imagery and historical maps when possible.

The interpreted images, registered maps, oblique photography and ground photography located in the

interpretations section of this report contain specific information that must be viewed by the reader in order to fully understand this report. The mapped images (Attachment B) constitute the primary source of information in this report.

Summary

The mapped images depict symbols locating areas where ships and landing crafts were visible in the aerial photography. Ground photographs revealed that the beach was crowded with supplies and probably munitions. Bull dozers were being used to move the supplies about the beach as the tracks from tracked vehicles were clearly visible on the photography. No features were detected in the water offshore although a few ships were anchored in deeper water.

The recent photography reveals many bomb and shell craters which still remain today on the surface of the barren landscape of Kiska. These craters could be accurately mapped should it become necessary at some time in the future.

ATTACHMENT A - AERIAL PHOTOGRAPHS AND MAPS

DATE	SOURCE	TYPE	RATIO	FRAMES	DESCRIPTION
1951 - Limited revisions in 1983	USGS	MAP	1:250,000		"Kiska" Topographic Map
12/30/1942	United States Army Corps of Engineers	MAP			From "Defense Environmental Restoration Program for Formerly Used Defense Sites Ordnance and Explosives, Archive Search Report Kiska Island Garrison (B & L), Project Number F10AK013704, Final 16 August 2004"
5/12/2012	DigitalGlobe WorldView2	COLOR		Orthophoto	Satellite Imagery.
Jun-1942	Naval History & Heritage Command	BW		80-G-11691	Vertical Aerial Photograph. Kiska Harbor. Layout of Japanese landings used for the United States attack on the Japanese base there on June 18, 1942.
Aug-1943	Naval History & Heritage Command	BW		80-G-42784	Oblique Aerial Photograph. Five LCTS and an LCM Land Supplies on a Kiska Beach, soon after the initial landings of the Allied Forces. Supplies, vehicles, and men on beach, and many troops on hills inland.
3/24/1943	Alaska Digital Archives	BW		UAF-1970-11-73	Vertical Aerial Photograph. Bombing damage from a U.S. air raid on Japanese forces on Kiska Island.
Aug-1943	Alaska Digital Archives	BW		ASL-P430-33	Ground Shot. Invasion craft unload supplies on beach at Kiska Harbor.
1942-1945	Alaska Digital Archives	BW		AMRC-b80-75-10	Oblique Aerial Photograph. Aerial view of Kiska Harbor and surrrounding area.
8/22/1943	Alaska Digital Archives	BW		ASL-P80-007	Ground Shot. Camp area. Trout Lagoon.
Aug-Sept 1943	Alaska Digital Archives	BW		ASL-P40-06	Ground shot. Disabled landing craft at Kiska Harbor.
Aug-1943	Alaska Digital Archives	BW		ASL-P430-27	Dump near Kiska Harbor for wrecked Japanese aircraft. Disassembled airplane parts are strewn across ground. Behind the dump are a line of ships pulled up on beach.
Aug-1943	Alaska Digital Archives	BW		ASL-P430-26	Ground shot. Coast Guard operated LST (Landing Ship, Tanks) discharging equipment through bow doors onto beach at Kiska Harbor.
8/29/1943	Alaska Digital Archives	BW		ASL-P80-051	Ground shot. Panorama of Kiska Harbor.

ATTACHMENT A - AERIAL PHOTOGRAPHS AND MAPS

DATE	SOURCE	TYPE	RATIO	FRAMES	DESCRIPTION
Aug-1943	Alaska Digital Archives	BW		ASL-P430-47	Ground shot. Fleet Air Wing Four personnel move boxes of ammunition from landing barge onto beach at Kiska Harbor.

Attachment B

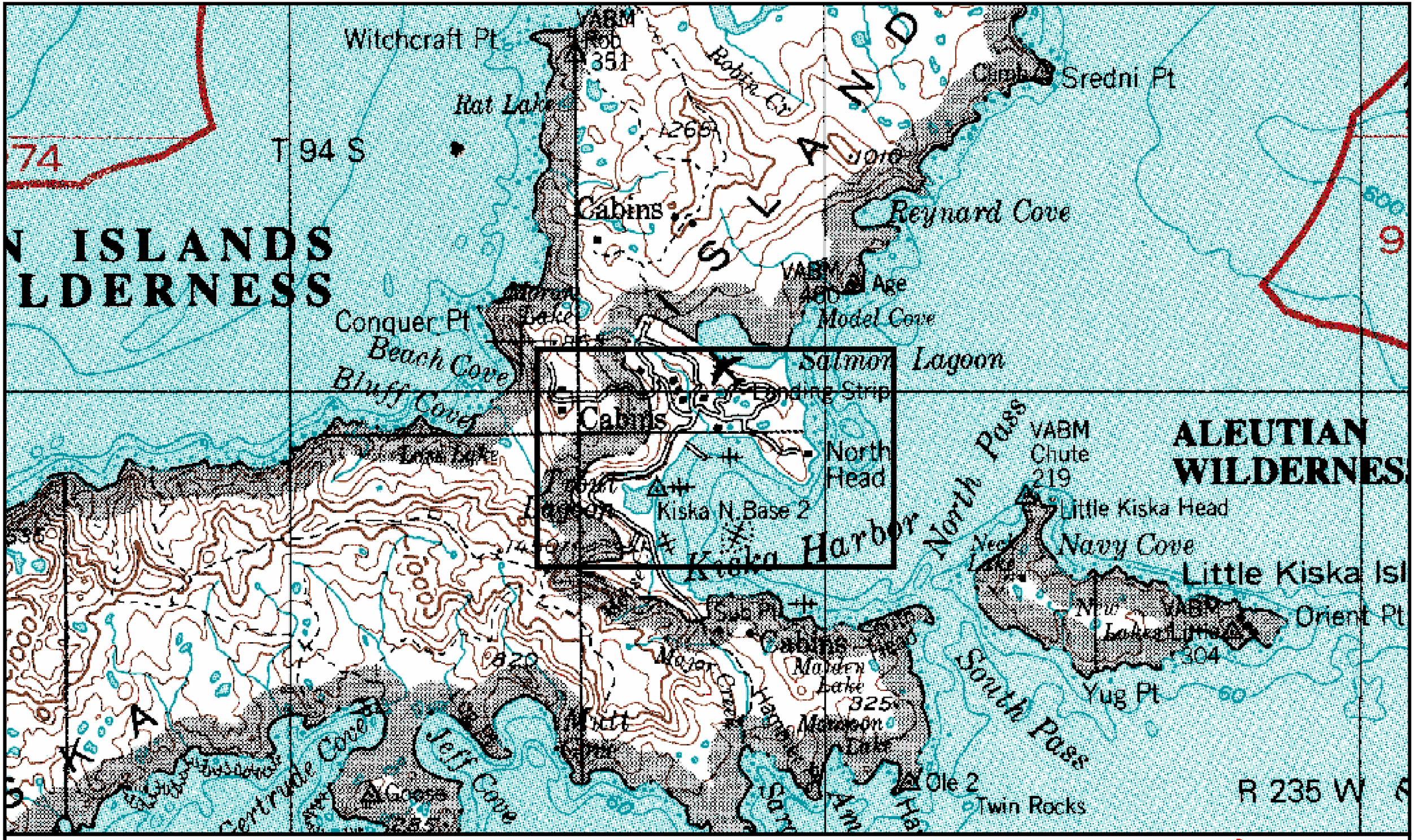

Exhibit 1 - Kiska Site Map

Map Source: USGS

N

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Environmental
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Interpretation and Mapping
225.767.5725

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5759500 5759000 5758500 5758000 5757500

Kiska N. Base 2

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Exhibit 2 - Kiska Harbor DRG

Map Source: USGS

1000 0 1000 Feet

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Tic Marks : UTM Zone 60N NAD83 Meters

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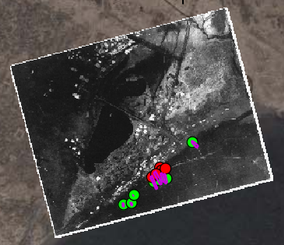

Exhibit 3 - Kiska Harbor
6/1942 Aerial
Superimposed on 2012 Imagery

Image Source: Naval History

537000 537500 538000 538500 539000 539500 540000

1000 0 1000 Feet

N

- Approx. ship location mapped from 6/1942 imagery
- Possible Pier/Mooring Point mapped from 6/1942 imagery

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5759400 5759300 5759200 5759100 5759000 5758900 5758800 5758700

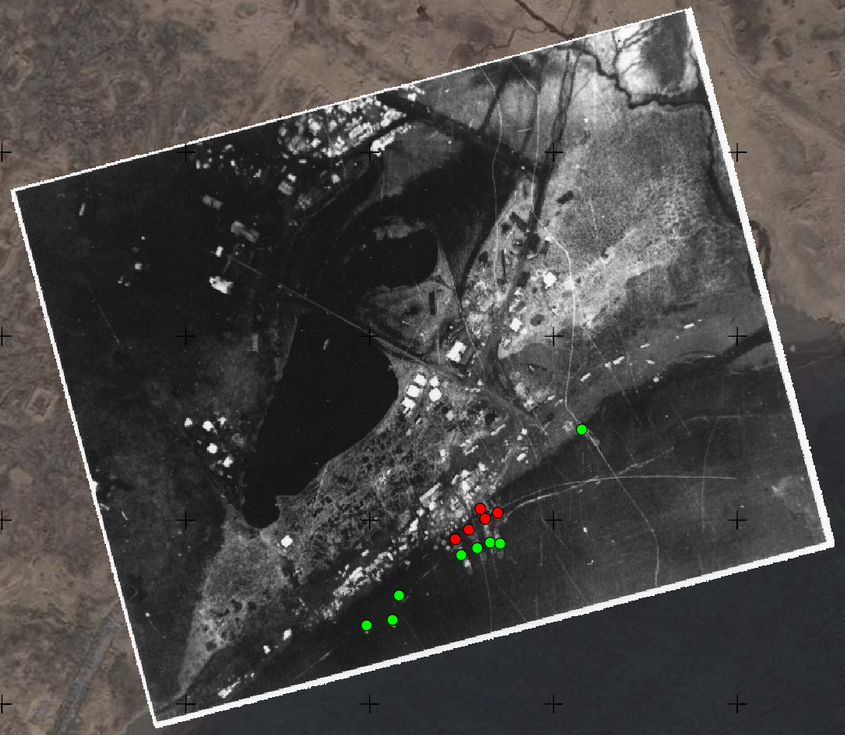

Exhibit 4 - Kiska Harbor
6/1942 Aerial Zoom
Superimposed on 2012 Imagery

Image Source: Naval History

537100 537200 537300 537400 537500 537600 537700 537800 537900

300 0 300 Feet

Tic Marks : UTM Zone 60N NAD83 Meters

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- Approx. ship location mapped from 6/1942 imagery
- Possible Pier/Mooring Point mapped from 6/1942 imagery

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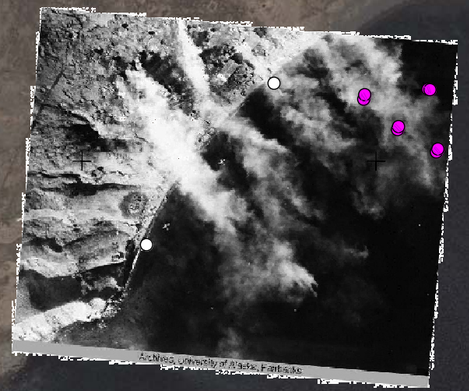

Exhibit 5 - Kiska Harbor
3/24/1943 Aerial
Superimposed on 2012 Imagery

Image Source: Alaska Digital

537000 537500 538000 538500 539000 539500 540000

1000 0 1000 Feet

Tic Marks : UTM Zone 60N NAD83 Meters

N

● Approx. Ship Location mapped from 3/24/1943 imagery

○ Possible Pier/Mooring Point mapped from 3/24/1943 imagery

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225.767.5725

536900 537000 537100 537200 537300 537400 537500 537600 537700 537800 537900 538000 538100

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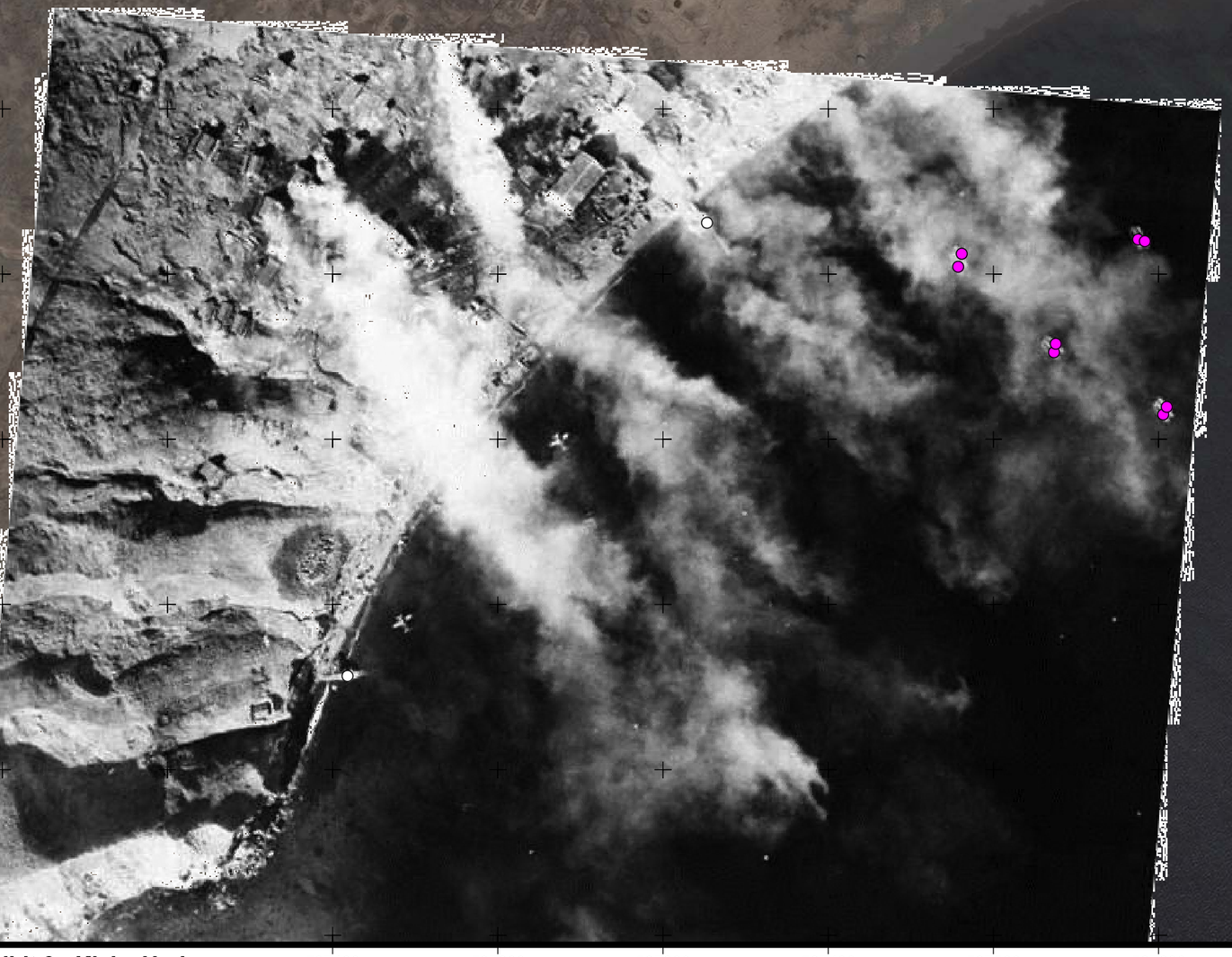

Exhibit 6 - Kiska Harbor
3/24/1943 Aerial Zoom
Superimposed on 2012 Imagery

Image Source: Alaska Digital

537100 537200 537300 537400 537500 537600 537700 537800 537900

300 0 300 Feet

N

Tic Marks : UTM Zone 60N NAD83 Meters

● Approx. Ship Location mapped from 3/24/1943 imagery

○ Possible Pier/Mooring Point mapped from 3/24/1943 imagery

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Exhibit 7 - Kiska Harbor
5/12/2012

Image Source: Digital Globe

1000 0 1000 Feet

Tic Marks : UTM Zone 60N NAD83 Meters

N

○ Possible Pier/Mooring Point mapped from 5/12/2012 imagery

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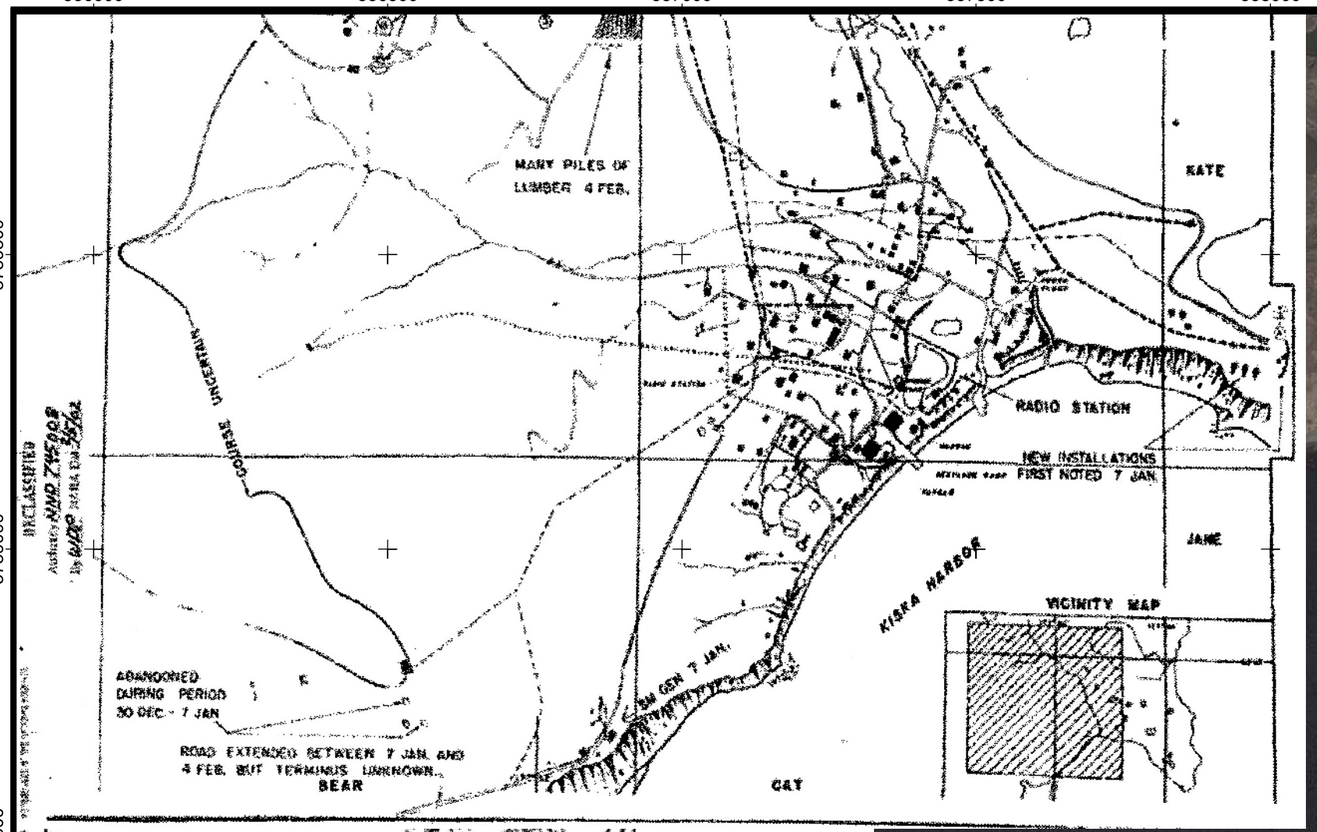
5759500 5759000 5758500 5758000 5757500



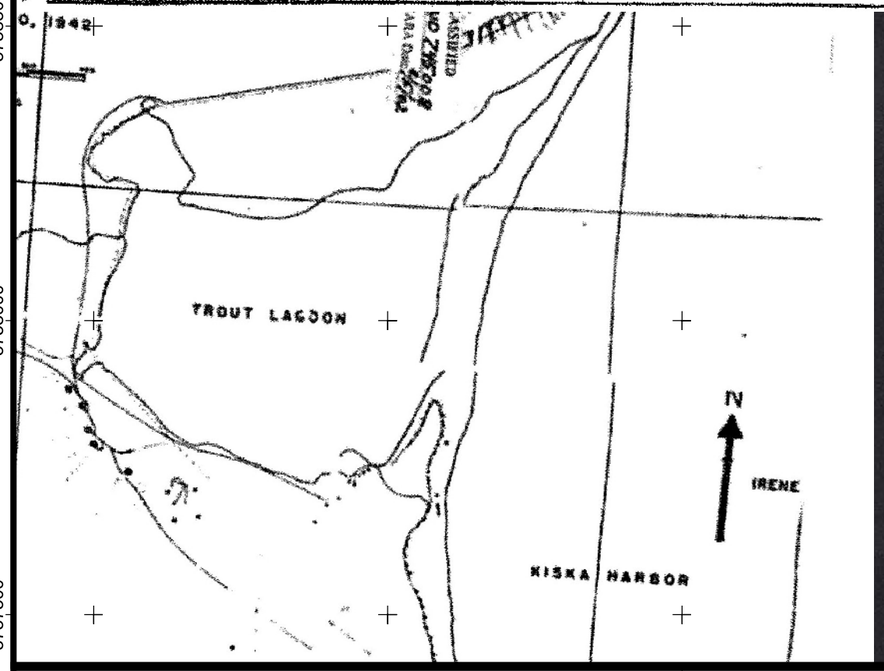


Exhibit 8 - Kiska Harbor
12/30/1942 Map Date
Superimposed on 2012 Imagery

Map Source: USACE

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1000 0 1000 Feet

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Tic Marks : UTM Zone 60N NAD83 Meters

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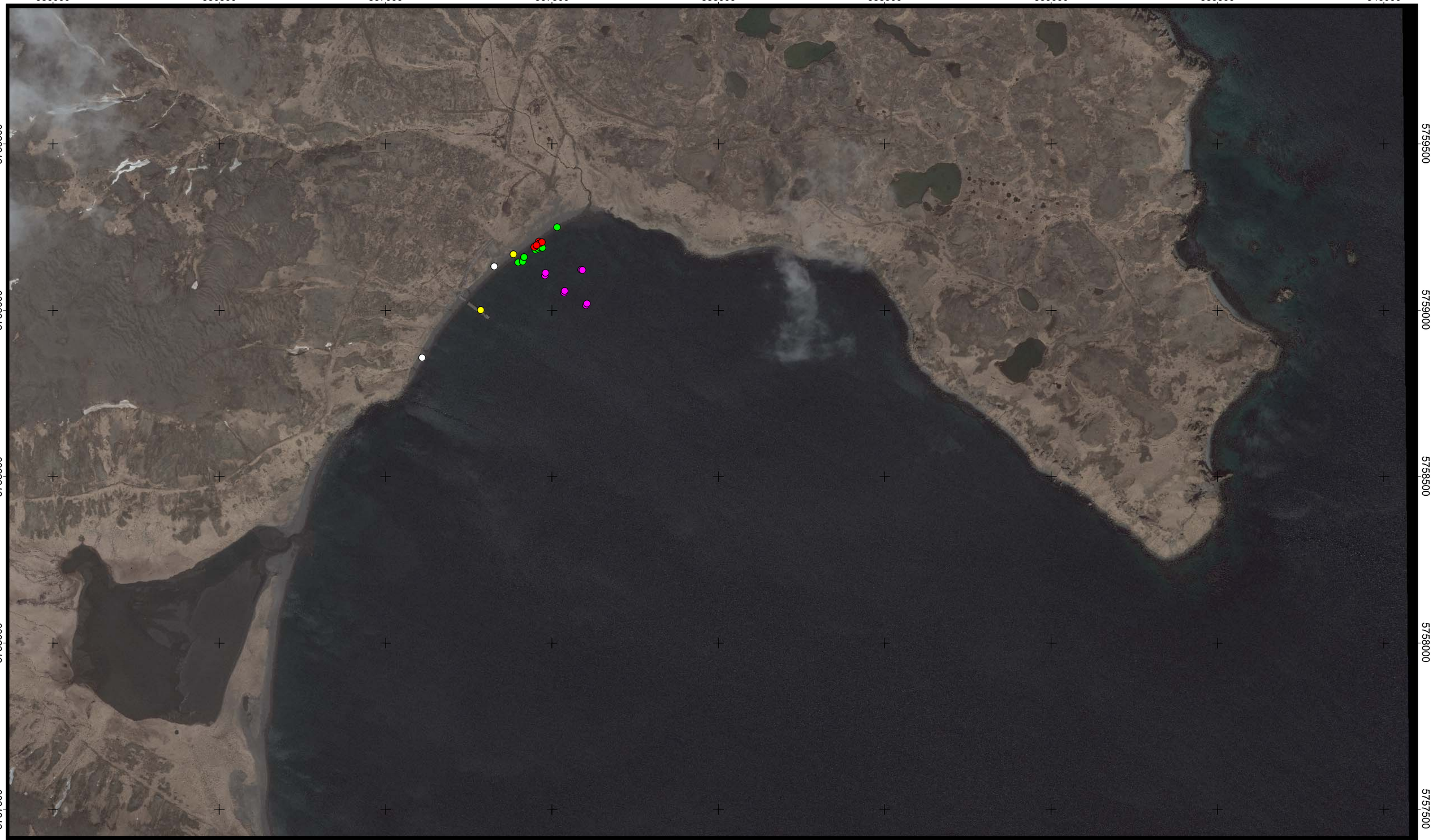

Exhibit 9 - All Mapped Features Superimposed on 5/12/2012 Imagery

Image Source: Digital Globe

537000 537500

1000 0 1000 Feet

Tic Marks : UTM Zone 60N NAD83 Meters

N

- Possible Pier/Mooring Point 6/1942
- Possible Pier/Mooring Point 3/24/1943
- Possible Pier/Mooring Point 2012
- Approx. Ship Location 6/1942
- Approx. Ship Location 3/24/1943

539500 540000

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Exhibit 10
Kiska Harbor
6/1942
Image Source: Naval History

LAYOUT OF JAPANESE LANDINGS USED FOR THE UNITED STATES ATTACK ON THE JAPANESE BASE THERE, 18 JUNE 1942.

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Exhibit 11
Kiska Harbor
8/1943
Image Source: Naval History

FIVE LCTs AND AN LCM LAND SUPPLIES ON A KISKA BEACH, SOON AFTER THE INITIAL LANDINGS OF ALLIED FORCES ON 15 AUGUST 1943. NOTE SUPPLIES, VEHICLES AND MEN ON BEACH, AND MANY TROOPS ON HILLS INLAND. LEFT TWO LCTs ARE (1-r): LCT-278 AND LCT-353.

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Archives, University of Alaska, Fairbanks

Exhibit 12
Kiska Harbor
3/24/1943
Image Source: Alaska Digital

Photograph of bombing damage from a U.S. air raid on Japanese forces on Kiska Island

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Alaska State Library - Historical Collections

Exhibit 13
Kiska Harbor
8/1943
Image Source: Alaska Digital

Invasion craft unload supplies on beach at Kiska Harbor.

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Anchorage Museum of History & Art. Library & Archives.

Exhibit 14
Kiska Harbor
1942-1945
Image Source: Alaska Digital

Aerial view of Kiska Harbor and surrounding area.

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Exhibit 15
Kiska Harbor
8/22/1943
Image Source: Alaska Digital

Camp area, Trout Lagoon - Kiska, August 22,1943.

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Exhibit 16
Kiska Harbor
Aug-Sept 1943
Image Source: Alaska Digital

Disabled landing craft, Kiska Harbor, Aug-Sept 1943.

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Alaska State Library - Historical Collections

Exhibit 17
Kiska Harbor
August 1943
Image Source: Alaska Digital

Dump near Kiska Harbor for wrecked Japanese aircraft, August 1943.

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Exhibit 18
Kiska Harbor
August 1943
Image Source: Alaska Digital

LST (Landing Ship, Tanks) discharging through bow onto beach at Kiska Harbor, August 1943.

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Alaska State Library - Historical Collections

Exhibit 19
Kiska Harbor
8/29/1943
Image Source: Alaska Digital

Panorama of Kiska Harbor, August 29, 1943.

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Alaska State Library - Historical Collections

Exhibit 20
Kiska Harbor
August 1943
Image Source: Alaska Digital

U.S. forces land ammunition at Kiska Harbor.

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Attachment C - Exhibit Notes

	Name	***Description***	***Notes***
Exhibit 1	Kiska Site Map	Site Map on USGS Quad Map with ares of study delineated with black boxes	
Exhibit 2	Kiska Harbor DRG	Study area of Kiska Harbor - USGS Quad Map	
Exhibit 3	Kiska Harbor 6/1942 Aerial Superimposed on 2012 Imagery	Georeferenced monoscopic aerial photo from 1942 with mooring points and ships mapped	
Exhibit 4	Kiska Harbor 6/1942 Aerial Zoom Superimposed on 2012 Imagery	Same as Exhibit 3 but zoomed in	
Exhibit 5	Kiska Harbor 3/24/1943 Aerial Superimposed on 2012 Imagery	Georeferenced monoscopic aerial photo from 1943 with mooring points and ships mapped	
Exhibit 6	Kiska Harbor 3/24/1943 Aerial Zoom Superimposed on 2012 Imagery	Same as Exhibit 5 but zoomed in	
Exhibit 7	Kiska Harbor 5/12/2012	Recent Monoscopic satellite image of study area	two piers mapped from 2012 imagery
Exhibit 8	Kiska Harbor 12/30/1942 Map Date Superimposed on 2012 Imagery	Two maps georeferenced to 2012 imagery	
Exhibit 9	Kiska Harbor All Mapped Features in Study Superimposed on 5/12/2012 Imagery	Composite map showing all pier/mooring features and ships in the study	
Exhibit 10	Kiska Harbor 6/1942	Vertical Monoscopic photo showing layout of Japanese landings	georeferenced and mapped on Ex. 3 and Ex. 4
Exhibit 11	Kiska Harbor 8/1943	Oblique Photo of LCTs and an LCM landing on beach	insufficient features in imagery to register photo
Exhibit 12	Kiska Harbor 3/24/1943	Vertical Monoscopic photo showing damage from US Air Raid	georeferenced and mapped
Exhibit 13	Kiska Harbor 8/1943	Ground photo of invasion craft on beach	insufficient features in imagery to register photo
Exhibit 14	Kiska Harbor 1942-1945	Oblique Photo of Kiska Harbor	
Exhibit 15	Kiska Harbor 8/22/1943	Camp area, Trout Lagoon - Kiska.	insufficient features in imagery to register photo

Exhibit 16	Kiska Harbor Aug - Sept 1943	Ground photo of disabled landing craft	insufficient features in imagery to register photo
Exhibit 17	Kiska Harbor Aug 1943	Ground photo of dump for wrecked Japanese aircraft	insufficient features in imagery to register photo
Exhibit 18	Kiska Harbor Aug 1943	Ground photo of LST on beach	insufficient features in imagery to register photo
Exhibit 19	Kiska Harbor 8/29/1943	Panorama of Kiska Harbor	insufficient features in imagery to register photo
Exhibit 20	Kiska Harbor August 1943	Ground Photo of US forces with ammunition	insufficient features in imagery to register photo

APPENDIX C

3Rs Explosives Safety Guide, Maritime Industry

3Rs Explosives Safety Guide

Maritime Industry

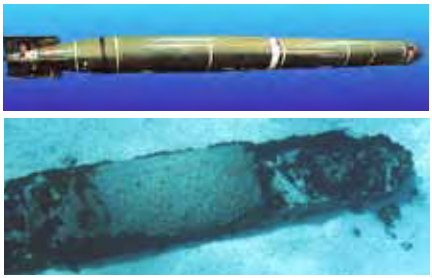
Recognize
Retreat
Report

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.

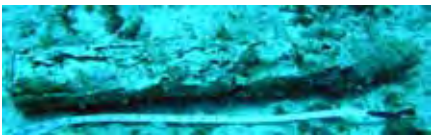
ORecognize
ORetreat
OReport

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.

- 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.

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

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

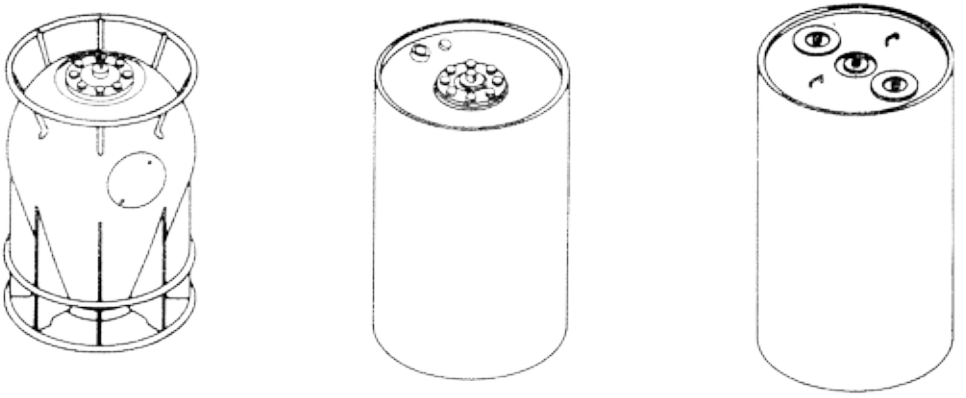
When actual or suspect munitions are encountered at sea, the vessel's captain should notify the U.S. Coast Guard and provide the below information, as soon as possible. (Note: If a munition is encountered while in port [e.g., during off loading or processing] call 911.)

- 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.

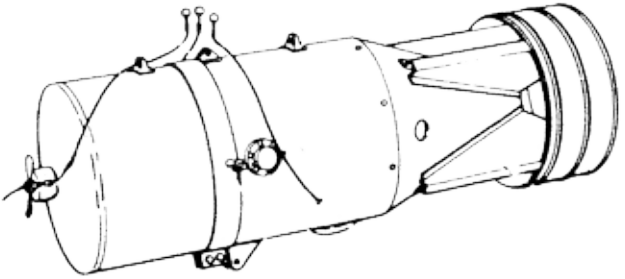
DEPTH CHARGES

Length 28" / Diameter 18" to 25"

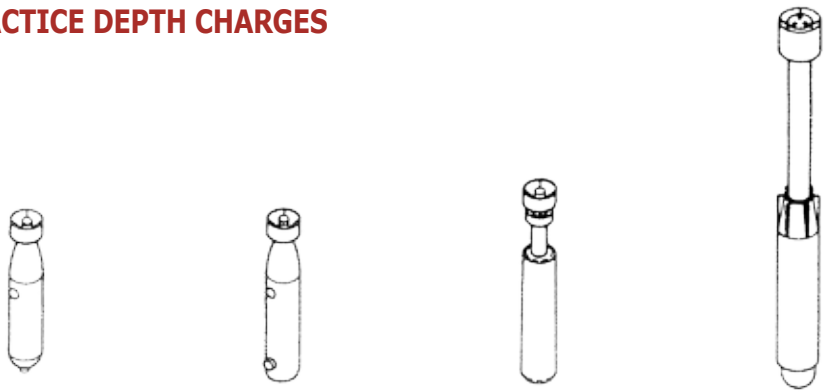


DEPTH BOMB

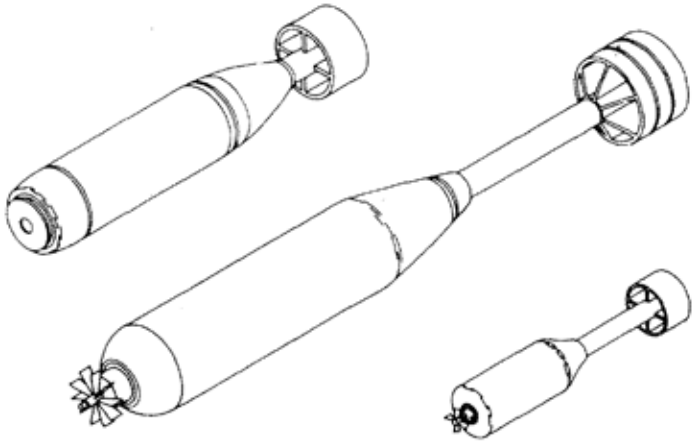
Length 50" to 59" / Diameter 15" to 18"



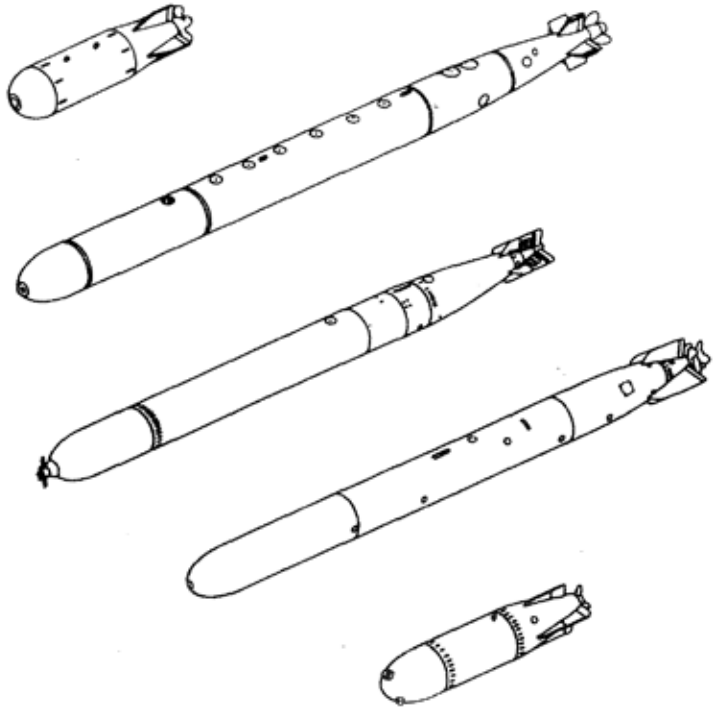
PRACTICE DEPTH CHARGES



PROJECTED ANTI-SUBMARINE-WARFARE WEAPONS



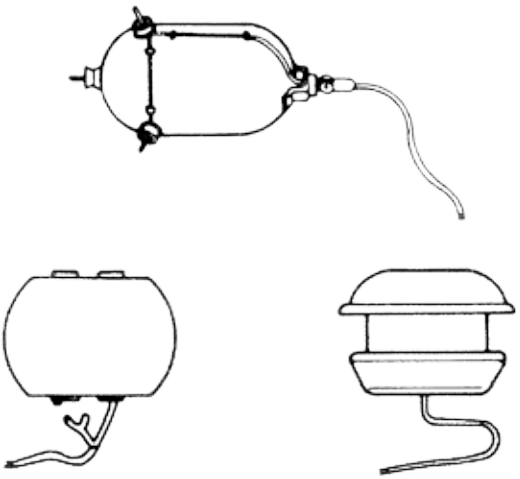
REPRESENTATIVE TORPEDOES



MISCELLANEOUS MINE FLOATS

Length 10" to 24"

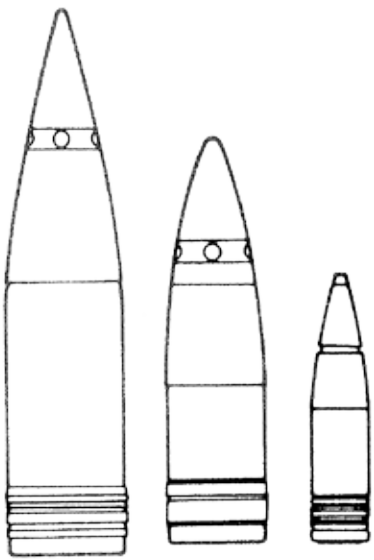
Diameter 12" to 18"



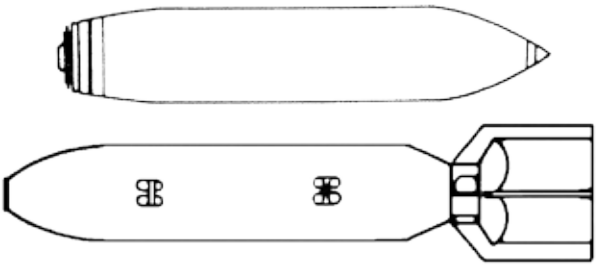
PROJECTILES

Lengths 20 mm to 16"

3" to 5" in Diameter (Typically)

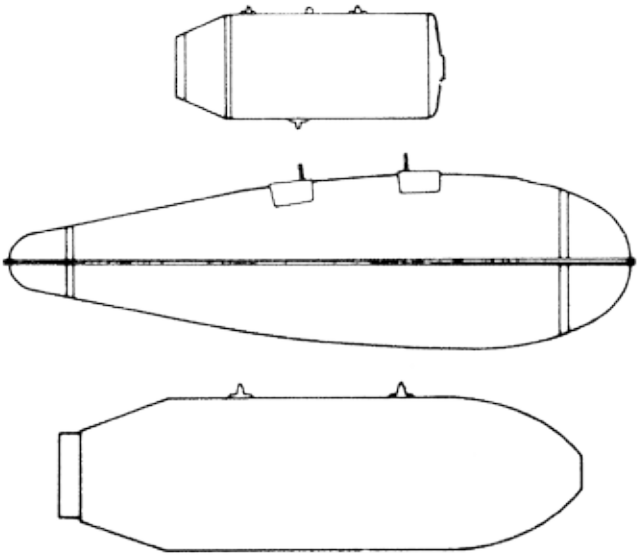


AERIAL BOMBS



Bomb Body Lengths 39" to 97"

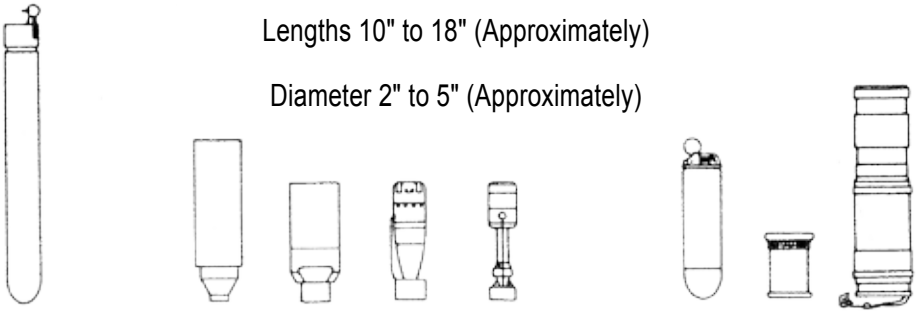
Diameter 7" to 19"



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:

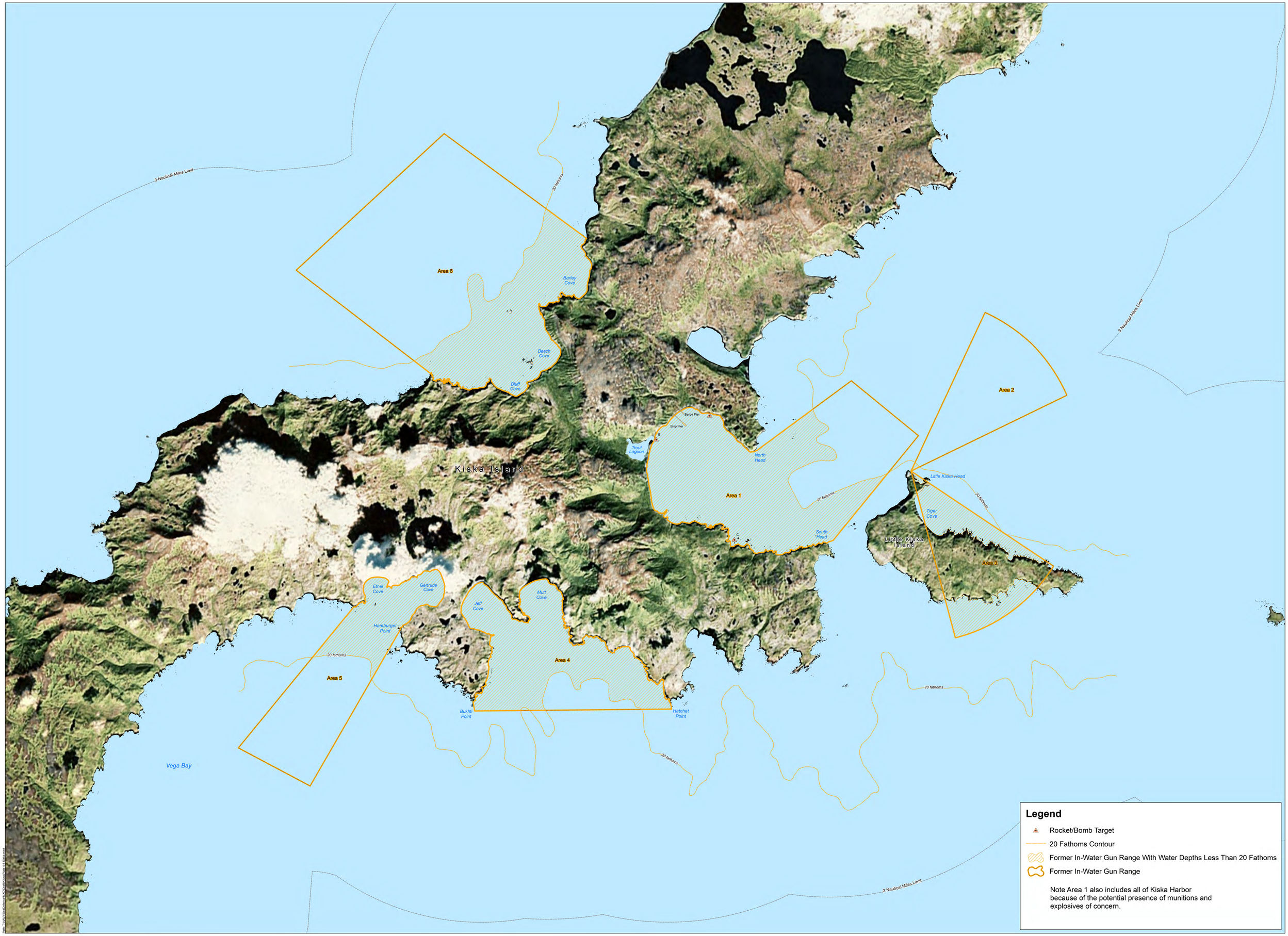
- In Port: Call 911
- At sea: Use Channel 16 (156.800 MHz)

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

Plate 4-1
Locations of Areas Potentially Containing Munitions and Explosives of Concern within the Naval Defensive Sea Area at Kiska Island



U.S. NAVY	Delivery Order 0040 Naval Defensive Sea Area Kiska Island, Alaska	0 0.25 0.5 1 1.5 Scale In Miles	**Plate 4-1** **Locations of Areas Potentially Containing Munitions and Explosives of Concern within the Naval Defensive Sea Area at Kiska**