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INVENTORY REPORT
GAMBELL FORMERLY USED DEFENSE SITE
ST. LAWRENCE ISLAND, ALASKA

Contract No. DACA85-91-D-0003
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ECOLOGY AND ENVIRONMENT, INC.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

EXECUTIVE SUMMARY

This inventory documents materials deemed eligible for either investigation or cleanup under the present Defense Environmental Restoration Program (DERP) at formerly used defense sites in the vicinity of Gambell, St. Lawrence Island, Alaska. Previous investigations performed at Gambell in 1985 and 1986 by URS Corporation identified 13 sites that potentially qualified for investigation or cleanup under a previous DERP program. Five additional sites were identified following a site reconnaissance and interviews performed by Ecology and Environment, Inc., (E & E) in 1991 and 1992 with Gambell residents who were present during Department of Defense occupation. Fifteen of the 18 sites contain significant amounts of material eligible for either investigation or cleanup under DERP guidelines. Total estimates of these materials are:

- 3,501 items characterized as containerized hazardous or toxic waste (CON/HTW);
- 1,997 square feet of potentially contaminated soil;
- 85 pounds of other potential hazardous waste;
- 142,613 pounds of unsafe surficial debris;
- 7,105 linear feet of unsafe surficial debris;
- Three areas of buried or submerged ordnance; and
- Two areas of an unknown quantity of exposed potential asbestos-containing material (ACM).

In addition, many sites reportedly contain buried CON/HTW and other potentially hazardous material which were not able to be quantified.

The information provided in this report will be used to update the forthcoming Chemical Data Acquisition Plan (CDAP) that addresses the sampling required to characterize and determine the extent of contamination at DERP-eligible sites. Both the Inventory Report and the CDAP are meant to help the United States Army Corps of Engineers implement future remediation activities at DERP-eligible sites without requiring extensive design phase investigations.

1. INTRODUCTION

Pursuant to Contract DACA85-91-D-0003, Delivery Order No. 0010, the United States Army Corps of Engineers, Alaska District (USACE) has tasked Ecology and Environment, Inc., (E & E) to investigate formerly used defense sites (FUDS) at Gambell, St. Lawrence Island, Alaska, under the Defense Environmental Restoration Program (DERP) of the United States Department of Defense (DOD).

1.1 PURPOSE OF REPORT

This inventory report presents the results of a review of previous investigations, interviews with knowledgeable local residents, and a site inspection. It documents the materials at the site determined to be eligible and qualified under DERP guidelines for inclusion in a future remediation contract. The report identifies suspected hazardous and toxic waste (HTW), suspected containerized HTW (CON/HTW), ordnance and explosive waste (OEW), and building demolition and debris removal (BD/DR). Radiological wastes are included as another DERP category, but none was found at Gambell. Sufficient detail is provided concerning locations, descriptions, and estimated volumes or quantities to minimize future investigation work during the design of a remediation project. Where further data are needed, recommendations for sampling are provided.

This effort is in support of a Chemical Data Acquisition Plan (CDAP) and an update to the Debris/Material Inventory prepared by URS Consultants (URS) in August 1985.

1.2 SITE BACKGROUND

1.2.1 Site Description

The Gambell site extends west from North Beach to West Beach, south to Nayvaghaq Lake, and east to portions of Sevuokuk Mountain. The site encompasses the village of Gambell. United States Army (Army) and United States Air Force (Air Force) installations were formerly located in the village of Gambell, on Sevuokuk Mountain, and south of Troutman Lake. The United States Navy (Navy) laid communication cables from the village of Gambell up Sevuokuk Mountain, across to Dovelawik Bay, and south to Bunnell Cape.

When the military occupied the area, there were two landing areas on North Beach. A Housing/Operations Area and Communications Facility were located near the base of Sevuokuk Mountain. The Main Camp was near the northeast corner of Troutman Lake. North of the Main Camp was a power facility. Power lines and a tramway extended up the mountain to a housing area, and an Air Force Radar Station sat on top of the mountain. An additional radar station was located at the south end of Troutman Lake.

Currently, the village of Gambell is located on the north side of Troutman Lake. The village is built in an "L" shape that parallels the north shore of Troutman Lake and West Beach. Access to the former military installation area is unrestricted. Local residents use all-terrain-vehicles (ATVs) or snow machines in the area for transportation.

1.2.2 Site History

The Gambell site was utilized by the Army, Navy, and Air Force. Limited activity occurred during World War II, but the major impacts occurred during the 1950s. The Air Force operated a temporary Aircraft Control and Warning (AC&W) site at Gambell as early as 1948 to provide intelligence on Russian shipping activities, but this facility was abandoned shortly after the Northeast Cape facility was completed. The Army operated a larger base at Gambell that reportedly included up to several hundred men.

1.2.3 Previous Investigations

URS conducted a file search and preliminary site reconnaissance in 1985. URS was unable to locate base plans or site information during a search of historical records (URS 1985).

URS collected a limited number of soil and water samples during the site reconnaissance. In addition, they inventoried materials left by the military and any potential contamination. No polychlorinated biphenyls (PCBs) were detected in the soil samples. Groundwater samples collected at Gambell revealed no detectable levels of PCBs; however, oil and grease were detected in many of the water samples.

This inventory provides general information about DOD responsibilities at Gambell. Information about the cultural and natural setting of the island is presented in Section 2; site descriptions and DERP-eligible materials are discussed in Section 3; summary and conclusions are discussed in Section 4; and references are presented in Section 5. Select photographs taken during the Gambell site inventory are presented in Appendix A.

2. SITE DESCRIPTION/BACKGROUND INFORMATION

2.1 PHYSIOGRAPHY

St. Lawrence Island is located in the Bering Sea, southwest of Nome, Alaska, near the territorial waters of Russia. The village of Gambell is located on the western and northernmost point on the island. The Gambell site is located approximately 200 air miles southwest of Nome (see Figure 2-1).

Two villages are located on St. Lawrence Island, Gambell and Savoonga. Both consist mainly of residential housing and community service facilities. Several seasonal hunting and fishing camps are located on the perimeter of the island. The majority of the island is wilderness, consisting of tundra-covered flatland and small lakes. Barren mountains rise out of the tundra and naturally divide the island into western, central, and eastern areas. This wilderness area provides habitat for a variety of seabirds, waterfowl, and mammals. The soils and vegetation provide range suitable for reindeer. The island and surrounding waters are used extensively for subsistence hunting (URS 1985).

2.2 ECOLOGY

There are no known endangered species of plants or animals on the island (50CFR17 1991). The vegetation, birds, mammals, and fish of St. Lawrence Island are discussed below.

2.2.1 Vegetation

Vegetation in the Gambell area is classified as moist or wet tundra. Gambell's vegetation is dominated by heaths, sedges, mosses, and lichen. Where microrelief provides drier sites, shrubs such as dwarf birch, willow, cranberry, and narrow leaf labrador tea are

found. Although wet tundra is dominant in the low marshy/bog areas, alpine tundra can be found on the slopes and exposed ridges immediately south of the community, especially on Sevuokuk Mountain. There is little or no vegetation on the coarse gravels around Gambell and Troutman Lake. Military ATVs and other general community activities have denuded large areas (URS 1985).

2.2.2 Birds

St. Lawrence Island provides habitat for a majority of the seabirds species in the northern Bering Sea. Seventeen breeding colonies of species such as auklets, murres, puffins, guillemots, gulls, and cormorants occur on the island's perimeter. Local natives report that they hunt many bird species on the island including ducks and geese (URS 1985).

During the winter, common ravens and stray glaucous gulls occur in the vicinity of Gambell (URS 1985). The wide variety of bird populations that are found in spring attract birdwatching groups numbering up to 200 in May and June (Tobish 1992).

2.2.3 Mammals

Generally, large mammals are not abundant on St. Lawrence Island. Polar bear may be found on the island year round, and their presence is common when the ice pack is near shore. Some may become stranded on the island from late spring to fall when the ice pack retreats. A reindeer herd, which once numbered in the thousands, has dwindled to a population of several hundred. Pacific walrus may be found on or near portions of the island year round; however, no walrus haul-out areas exist within the project area (URS 1985).

Arctic fox are found throughout the island and are trapped by the residents of Savoonga and Gambell (URS 1985).

2.2.4 Fish

St. Lawrence Island's streams and tundra ponds are dominated by blackfish, nine-spined stickleback, grayling, arctic char, and perhaps whitefish (URS 1985). All five species of Pacific salmon occur around the island, but there are no anadromous fish streams in the project area. Troutman Lake, the largest lake in northwest St. Lawrence Island, is

located just south of the village of Gambell. The lake is approximately 10 feet deep, and the fishery resources have not yet been determined (Georgette 1992).

2.3 GEOLOGY

Western St. Lawrence Island is underlain by a variety of volcanic, plutonic, metamorphic, and sedimentary rocks ranging in age from middle Paleozoic to late Cenozoic. The areas north, west, and south of Troutman Lake are Quaternary surficial deposits consisting of a thin cover of beach, bar, and alluvial deposits overlaying a wave-cut bedrock platform. Geology in the areas around Troutman Lake, including Sevuokuk Mountain, is typified by Cretaceous granite rocks, specifically quartz monzonite (Patton and Csejtey 1980; Patton and Csejtey 1971).

Gambell lies on a flat sand and a gravel spit created by accreting beach ridges. The spit is composed of unconsolidated, well-rounded gravels, and coarse sand-sized granitic rock clasts. The community has very little relief; maximum elevation is approximately 20 feet above sea level. Sevuokuk Mountain is an eroded headland immediately east of Gambell that rises abruptly to an elevation of approximately 619 feet (URS 1985).

The surficial deposits of western St. Lawrence Island are underlain by discontinuous permafrost. In Gambell, permafrost has been encountered as shallow as 6.5 feet below ground surface (bgs) and as deep as 31.7 feet bgs (URS 1985).

2.4 HYDROLOGY

2.4.1 Surface Water

Freshwater resources at Gambell consist of Troutman Lake (approximately 574 acres) and Nayvaghag Lake (approximately 93 acres). The gravelly, sandy beach soils are well drained. The terrain east of Gambell is wet tundra with standing water and sheet flow. Only the highest elevations do not have extensive standing water. Rivulets are formed on steeper slopes by snowmelt runoff (URS 1985).

2.4.2 Groundwater

Groundwater occurs within the surficial deposits of western St. Lawrence Island. Depth to water within these deposits has been measured at 4 to 11 feet bgs throughout the

vicinity of Gambell and south of Troutman Lake (URS 1986). Due to the existence of discontinuous permafrost, groundwater in these unconsolidated deposits is believed to exist under perched, unconfined aquifer conditions (Waller 1959). Since permafrost development is discontinuous, the variance in depth to groundwater may reflect underlying existence of permafrost and local topographic variations. Groundwater which occurs above permafrost is known as suprapermafrost water. As a consequence of the discontinuous permafrost, groundwater may also occur within the permafrost or beneath it (Williams 1970).

An infiltration gallery was developed by the Public Health Service as a potable water source on the west slope of Sevuokuk Mountain. It was designed to collect shallow groundwater above relatively impermeable permafrost (DeChristofaro 1992). The permafrost was believed to represent a barrier to downward migration of groundwater; however, excavation to construct the infiltration gallery has apparently led to the melting of permafrost, a deepening of the top of permafrost, and consequently, an elimination of the relatively impervious property of permafrost directly beneath the infiltration gallery. The infiltration gallery method of groundwater collection was used because previous attempts to locate a dependable, year-round groundwater supply capable of supporting the needs of the entire village were unsuccessful (URS 1986; DeChristofaro 1992).

During early 1992, efforts were made to identify a continuous source of potable groundwater for the village of Gambell (DeChristofaro 1992). Following completion of a resistivity survey to identify depth to permafrost of surficial deposits east of Gambell, a location was selected to install test well drive points (well points) to investigate the depth to groundwater and permafrost. Three well points were installed northwest of the suspected transformer burial area at Site No. 5. Groundwater was encountered at a depth of 6 to 8 feet bgs, and permafrost was encountered 11.2 to 19.8 feet bgs between the three well points (DeChristofaro 1992).

Groundwater in the vicinity of Gambell that is within the unconsolidated surficial deposits is dependant on the existence of permafrost and the degree to which the permafrost retards downward migration of groundwater. Therefore, the shallower the depth at which permafrost exists, the shallower the depth at which a perched, unconfined aquifer will exist.

2.5 CLIMATE

St. Lawrence Island has a cool, moist, subarctic maritime climate. Some continental influences occur during the winter when much of the Bering Sea freezes. Winds and fog are common and precipitation is persistent, occurring approximately 300 days each year in Gambell. Precipitation at Gambell consists of light rain, mist, or snow, with an annual total of only 10 to 15 inches which includes annual snowfall of 60 to 80 inches, which is usually distributed evenly from November to May. Winter temperatures range from -2°F (-19°C) to 10°F (-12°C). Summer temperatures average between 34°F (1°C) and 48°F (9°C). The island's most complete wind data were collected at the Northeast Cape area. The mean wind speed at Northeast Cape is approximately 10 knots, with winds exceeding 22 knots approximately 10% of the year. Calm weather occurs only about 10% of the year. Generally, the island has constant wind (URS 1985).

2.6 SITE HISTORY

2.6.1 Island History

Currently, St. Lawrence Island is occupied by the descendants of the original Russian Yupik Eskimos who apparently traversed the Bering Land Bridge approximately 12,000 to 14,000 years ago. The Yupiks survive in a subsistence lifestyle of hunting and fishing, as well as selling ivory or ivory carvings.

During the winter months, the permanent population of approximately 1,200 Eskimos and a small number of non-natives reside in the villages of Gambell and Savoonga. However, in the warmer months, many residents travel to coastal hunting and fishing camps.

As a result of archaeological investigations on St. Lawrence Island during the past 50 years (e.g., Collins 1937; Giddings 1960; Ackerman 1961; Bandi 1969; Bowers 1975; Yesner 1976; Holmes and Stern 1983; and Crowell 1985), six archaeological sites and a number of burial locations are recorded within the Gambell project area. The Gambell sites include Hillside, Myowagh, Ievoghiyoq, Sevoghiyog, Seklowaghyaget, and Old Gambell, and they have been designated collectively as a national historic landmark (URS 1985).

The Gambell sites have been excavated by both archaeologists and local people. The sites are highly visible as large, deeply pitted midden mounds. Scattered soil piles remain from ongoing digging by local residents for artifacts. Sea mammal bones, wooden and bone

structural members, pottery fragments, ground stone tools, and historic metal and glass fragments are scattered within and between soil piles. Military debris consisting of rusted barrels, cable, and miscellaneous pieces of metal also occur within the boundaries of the Myowagh, Old Gambell, and Seklowaghyaget mounds (URS 1985).

2.6.2 Land Ownership

St. Lawrence Island is jointly owned by Sivuqaq, Inc., and the Savoonga Native Corporation. The private ownership of the island by the native corporations resulted from the Alaska Native Claims Settlement Act (ANCSA) of 1971, which entitled native village corporations to select and receive specific amounts of federal land.

The non-native land on St. Lawrence Island consists of state land used for airstrips and related facilities in Gambell and Savoonga. The St. Lawrence Island native corporations are not subject to reconveyance provision 14(c) of ANCSA, and there are no native allotments on the island (URS 1985).

Much occurred on St. Lawrence Island with regard to land ownership, the military presence, and use of sites on the island between 1903 when the island was established as a Reindeer Reserve by Executive Order and 1971 when ANCSA was enacted. In 1950, 1,700 acres and two rights-of-way near the village of Gambell were withdrawn from the reservation for use by the Air Force (Public Land Order [PLO] 671). This land was used by the military until 1960 when PLO 2077 restored the withdrawn acreage to the reserve. PLO 2077 revoked PLO 671 and left no overriding military interest in that area. Interim Conveyance 203 of June 27, 1979, conveyed unsurveyed lands of St. Lawrence Island to Sivuqaq, Inc., and the Savoonga Native Corporation. Excepted from transfer were surveyed land, easements, and land-use permits effective prior to the conveyance (URS 1985).

2.6.3 Demographic Characteristics

The ethnic makeup of the St. Lawrence Island population is approximately 95% native. Caucasians, Blacks, and Indians compose the remaining 5% of the population (URS 1985). Table 2-1 identifies the historic and projected populations of St. Lawrence Island.

Table 2-1

VILLAGE POPULATION DATA
ST. LAWRENCE ISLAND, ALASKA

	DATE:	GAMBELL	SAVOONGA	TOTAL
Historic:	1903	261	-	261
	1910	221	-	221
	1930	250	139	389
	1940	296	209	505
	1950	309	249	558
	1960	258	299	657
	1970	372	264	636
	1980	445	491	936
	1984	432	477	909
Projected:	1990	461	501	962
	2000	484	527	1011

Key:

– = Population not recorded.

Source: URS Corporation 1985.

3. DERP ELIGIBILITY

The DERP program was established to investigate, clean up, or remove hazards left at a site by a DOD agency. DERP categorizes hazards as BD/DR, HTW, CON/HTW, OEW, and radiological wastes. No evidence of radiological wastes was apparent at Gambell.

According to DERP guidelines, DERP-eligible BD/DR must have been hazardous as a result of DOD usage and must have been inherently dangerous when the property was transferred. If former DOD property has fallen into disrepair under the ownership of another party, then it is ineligible. The Air Force first acquired tracts at Gambell in 1950. Its lands were all transferred to the Bureau of Land Management (BLM) by 1962. The Army acquired land at Gambell in 1954. The last tracts of Army land were transferred to BLM in 1963. It is uncertain how long it took either branch of the military to transfer its lands to BLM after they left the island, but Winfred James, a local resident, claims that the Air Force left in 1956 and the Army left in 1957 (James 1992). According to DERP guidelines, BD/DR eligible for DERP-funded cleanup must present a clear danger that is likely to cause or has already caused death or serious injury to a person exercising ordinary and reasonable care.

Although the same criteria pertain to HTW, CON/HTW, and OEW, they may not be applied as rigorously. Materials in these categories may be eligible for DERP-funded investigation even if they were not hazardous when the property was transferred from DOD. Ordnance is addressed as a safety hazard.

Materials considered to be DERP eligible for either investigation or cleanup at the Gambell site and their respective categories are presented in Table 3-1. Many items included under the categories of OEW and CON/HTW were reportedly buried when military

installations were abandoned (E & E 1992); therefore, no counts of materials were performed. Most surficial materials were inventoried as BD/DR or CON/HTW.

Items are included in the BD/DR category if they meet the criteria and present a potential hazard when considering the lifestyle of local inhabitants. Debris is potentially dangerous to people who come in contact with it. Therefore, the potential physical hazard is greater for the remaining debris that is in proximity to the Village of Gambell than debris found farther away. Many sites are within the Gambell town site. The residents of Gambell travel primarily by ATV or snow machine. Surficial debris is often obscured by vegetation in the summer and by snow in the winter. Objects were considered potentially hazardous if a rider could be injured if they hit or run over debris. Accidents have reportedly occurred when individuals in snow machines encounter partially exposed landing mat (E & E 1992). None of the BD/DR areas are fenced or otherwise secured; therefore, all aboveground debris areas are accessible to all residents, including children. Children occasionally play on the debris, and they reportedly play with the sonar cables that extend down the mountainside. Children commonly play throughout the village and on the mountainside chasing squirrels and birds (James 1992). However, for purposes of this report, sonar cable is not considered inherently dangerous since it is coated with rubber and has no protruding metal edges. Other types of steel and copper cable and wire have been included in the inventory due to possible hazards associated with exposed sharp metal edges.

Only visible BD/DR, HTW, and CON/HTW has been quantified in this report. According to local residents, the military buried most of their equipment and buildings in place at the time they left St. Lawrence Island. Reportedly, material was buried only to a depth that it would be covered. This method of disposal has proven to be inadequate for long-term disposal because many objects protrude through the surface of the gravel spit. Therefore, when the military left the island, the buried material was in a potentially hazardous state. Partially buried objects were included if they were considered potential hazards. Such objects include many buried drums that protrude through the ground surface on the gravel spit. The deteriorated drum lids could cave in under the weight of pedestrians or ATVs. Soil contamination was classified as potential HTW if the soil was visibly stained by materials other than rust. All buried human waste was considered eligible for investigation under DERP guidelines as possible HTW. Lead contamination may be present in the soil in areas

containing broken batteries on the ground surface. Debris identified as or associated with engines that were presumably part of a fuel delivery system are eligible for cleanup as CON/HTW. According to DERP guidelines, other items such as intact drums and transformers are also eligible for investigation under the CON/HTW category. Estimated quantities of buried ordnance and human waste were provided by Mr. Winfred James, a lifelong resident of Gambell (E & E 1992).

Estimated quantities of transportable materials, such as sections of landing mat, were determined in the field using an assumed weight per unit length. The weight of landing mat was estimated to be 10 pounds per linear foot. Quantity estimates are often based on judgment calls that could not be field verified. In addition, there is undoubtedly debris present in the surveyed areas that was buried or not readily visible. Due to the extent of the military occupation, parts of the island that were not surveyed probably contain some debris. No estimates of quantity or weight have been made for hidden or unsurveyed debris. The reader is cautioned that the DB/DR estimates are intended to be used as preliminary, reconnaissance-level estimates only. They are subject to the inaccuracies of the assumptions and contain only the BD/DR noted in this survey. They are not intended to be complete and inclusive of the entire island and are not meant to be used as the basis for construction cost estimates.

Former DOD facilities at Gambell have been divided into 18 sites according to the use when the military was active on St. Lawrence Island or the categorization in previous investigations (see Figure 3-1):

- Site No. 1: North Beach;
- Site No. 2: Former Military Housing/Operations Area;
- Site No. 3: Former Communication Facility;
- Site No. 4: Sevuokuk Mountain;
- Site No. 5: Former Tramway Site;
- Site No. 6: Military Landfill;
- Site No. 7: Former Military Power Facility;

- Site No. 8: West Beach;
- Site No. 9: Asphalt Barrel Cache;
- Site No. 10: Sevuokuk Mountain Trail System;
- Site No. 11: Communication Cable Route;
- Site No. 12: Nayvaghaq Lake Disposal Site;
- Site No. 13: Former Radar Power Station;
- Site No. 14: Navy Plane Crash Site;
- Site No. 15: Troutman Lake Ordnance Burial Site;
- Site No. 16: Gambell Municipal Building Site;
- Site No. 17: Army Landfills; and
- Site No. 18: Former Main Camp.

The information in the following sections regarding the former locations of DOD facilities, and types and location of debris, and potential HTW reported to be buried was derived from conversations with Mr. James. As previously stated, Mr. James is a lifelong resident of Gambell and was a member of the military. He was present when the military had installations at Gambell. His accounts were confirmed by other residents, but not by military officials.

Sections 3.1 through 3.17 include the following associated with each site:

- Description of site and location;
- Inventory of visible debris, reported buried debris, and potential HTW and CON/HTW;
- Nature and extent of potential contaminant sources;
- Potential routes of contaminant exposure or migration;
- Potential receptors of contaminants; and

- Recommended environmental media samples and analytical parameters.

Upon completion of the debris inventory and identification of potential contaminant sources for each site, potential routes of contaminant exposure and migration pathways were identified to determine whether receptors were present along the migration routes. Stained surface gravel represents the only potential route of direct contact exposure with potential HTW. Stained surface gravel was identified at site nos. 1, 2, 4, 7, 10, 13, and 16. Potential receptors of suspected contamination associated with stained gravel are primarily pre-adolescent residents who may frequent these areas. Stained surface gravel also represents a potential source of contaminants to the surface water and groundwater migration pathways. Surficial debris and potential buried debris and/or HTW also represent potential contaminant sources to the surface water and groundwater migration pathways.

The ground surface in the vicinity of the Village of Gambell, with the exception of the surface of Sevuokuk Mountain, is composed of gravel, very minor amounts of fine-grained matrix material, and localized areas containing a minimal amount of organic soil cover. Based on the permeability of the surface sediments and the minimal amount of soil, the amount of overland surface water runoff is negligible due to rapid infiltration. Sustained pathways of surface water migration or runoff exist only in exposed bedrock on the top and western flank of Sevuokuk Mountain. Surface water runoff from the surface of exposed bedrock rapidly infiltrates into alluvial and colluvial sediment on the flank of the mountain and into gravels at the base. Rapid infiltration also occurs from precipitation, snowmelt, and possible surface spills or releases of liquid. Infiltration water or fluids may leach soluble compounds from potential contaminant sources, or directly dissolve soluble compounds from surface spills or subsurface fluid leakage or release, and thereby create a contaminant plume within the groundwater, primarily beneath the sites where a gravel surface predominates. Potential contaminant plumes may then migrate both laterally and vertically under the influence of differences in hydraulic head (Driscoll 1986).

Migration may be retarded by the presence of discontinuous permafrost which exists within the unconsolidated sediments of the unconfined aquifer beneath Gambell. The frozen soil and interstitial fluid of permafrost creates a barrier to groundwater migration (Williams 1970). However, if barriers to migration do not exist, then potential contaminant plumes may

migrate to areas of potential groundwater discharge to surface water bodies such as Troutman Lake and the Bering Sea (Waller 1959). At this time, it is hypothesized that a potential for groundwater discharge to surface water bodies exists in the vicinity of Gambell. Furthermore, tidal changes within the Bering Sea may exert influences to groundwater migration. Therefore, groundwater and surface water resources in the vicinity of Gambell are at risk if the unconfined aquifer is in hydraulic continuity with Troutman Lake and the Bering Sea.

Receptors to the potential contaminant migration exist in the vicinity of Gambell if the following statements are true:

- Surficial and/or buried debris and/or HTW are sources of contaminants to groundwater leachate plumes;
- Hydraulic connection exists between the unconfined aquifer and surface water features;
- Residents consume water or have dermal contact with groundwater or surface water resources; and
- There is potential for impact to resident plant and animal populations exposed to contaminants.

Given the paucity of prior environmental sampling and the absence of a detailed hydrologic/ hydrogeologic investigation, the veracity of the first two statements is not yet known. Currently, the population primarily uses water collected for consumption by an emergency infiltration gallery on the western slope of the Sevuokuk Mountain. Water from Troutman Lake is utilized for non-consumptive purposes (E & E 1992). However, the infiltration gallery does not provide a sufficient supply to continue to serve the village's needs. A geophysical survey was conducted in the area at the base of Sevuokuk Mountain to identify a larger supply of water for consumption that utilizes groundwater resources (Williams 1992). The location recommended as a result of this survey is presented on Figure 3-1. The proximity of this location to reported former DOD sites indicates a potential impact to the village's proposed water supply.

Sections 3.1 through 3.17 describe suspected DERP-eligible materials at the former DOD sites and the potential environmental concerns associated with each category. General sample collection scopes are recommended for each site.

3.1 SITE 1: NORTH BEACH

North Beach extends approximately 7,000 feet along the north shoreline of St. Lawrence Island, from the base of Sevuokuk Mountain to West Beach (Site No. 8; see Figure 3-2). The apparent north to south dimension of the site varies from approximately 300 to 560 feet. North Beach includes two areas of reported buried debris associated with the former military landing areas. North Beach is largely undeveloped, except for the area immediately surrounding the Village of Gambell. Local residents often fish along the beach and ride ATVs throughout the site. In the vicinity of the village, there is a human waste landfill which is under construction, a drum dump, and a partially fenced landfill which is in use. The drum dump includes rusty aboveground tanks and household refuse (E & E 1992). A previous investigation indicated that the drum dump was possibly a military drum dump (URS 1985). During the current investigation, Mr. James stated that the Federal Aviation Administration (FAA) used this area for drum disposal (E & E 1992)

The Air Force and Army reportedly operated separate Landing Areas within Site No. 1 (see Figure 3-2). Each Landing Area allegedly used dead-man anchors to anchor barges off shore. There is very little surficial debris from the base of the mountain west to the Air Force Landing Area (E & E 1992).

The Air Force Landing Area is reportedly located adjacent to the beach berm, approximately 900 feet west of the 100-foot contour of Sevuokuk Mountain. (Generally, the beach berm is represented by the 10-foot contour line shown in Figure 3-2.) The Air Force Landing Area is approximately 275 feet by 80 feet. Near the northeast corner of the Air Force Landing Area, within the beach berm, is a decaying drum, black oil or tar-like material, and rust-stained gravel. In addition, there is a 5-foot by 4-foot patch of tar-stained gravel near the center of this area. An area of rust-colored gravel is visible in an ATV road that is oriented east to west and bisects the southern third of the area. Mr. James claims that there are buried drums of heavy weight oils, tars, and asphalt in the Air Force Landing Area (E & E 1992).

The Army Landing Area is allegedly located immediately east of an area used to beach whaling boats. Mr. James estimated that the Army Landing Area is approximately 410 feet by 340 feet, and two well-established ATV roads bisect the area. The roads have sinuous patterns, and both begin near the northeast corner of the area. One road exits the area near the midpoint of the southern boundary, and the other exits the area near the midpoint of the western boundary. Dead-man anchors, engines formerly used to run pulley systems, and a 100-foot crane are reportedly buried in the Army Landing Area. A pit containing drums, landing mat, and weasel track is located in the northeast corner of the Army Landing Area near the junction of the two ATV roads (see Appendix A; E & E 1992).

The Army Landing Area is characterized by small round gravel mounds, many of which include small metal/rust fragments from deteriorating material. Debris is scattered between the Air Force Landing Area and the Army Landing Area and is concentrated on the beach front and near the berm (E & E 1992).

3.1.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of potentially contaminated soils, CON/HTW, and unsafe debris which are reportedly attributable to DOD activities. All items have been categorized according to DERP guidelines and the assumptions described in Section 3.

The BD/DR located at North Beach is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents in a well-traveled section of the village as discussed in Section 3. Protruding hazardous debris is a result of inadequate BD/DR disposal (burial) during the time of military occupation. All items listed as BD/DR are pervasive throughout the site thus increasing the potential for accidental ATV or snow machine collisions and consequential personal harm to vehicle operators.

The CON/HTW and potential HTW present at Site No. 1 could possibly have contributed to surface or subsurface contamination and are therefore potentially eligible for DERP-funded investigation. Debris that is not considered eligible for DERP-funded BD/DR cleanup includes wood debris (90 pounds) and sonar cable (210 feet). Wood debris is not inherently dangerous and does not pose a hazard to persons exercising reasonable care. Since

the sonar cable is rubber-coated and no sharp metal is exposed, it is also not considered inherently dangerous.

3.1.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

Unsafe surficial BD/DR, CON/HTW, and HTW present at the North Beach Site include:

Air Force Landing Area

Item	Quantity	DERP Category
Drum remnants associated with potential hazardous waste	40 lbs.	HTW
Sheets of landing mat	60 lbs.	BD/DR
Strips of sheet metal	5 lbs.	BD/DR
Tar-stained gravel	20 sq. ft.	HTW

Area between Air Force Landing Area and Army Landing Area

Item	Quantity	DERP Category
Sheet metal	40 lbs.	BD/DR
Landing mat	965 lbs.	BD/DR
2-inch-diameter steel cable	50 feet	BD/DR
1-inch-diameter steel cable	10 feet	BD/DR

Army Landing Area

Item	Quantity	DERP Category
2-inch-diameter steel cable	20 feet	BD/DR
3-inch-diameter steel cable	100 feet	BD/DR
Landing mat	2,160 lbs.	BD/DR
Corrugated sheet metal roofing material	20 lbs.	BD/DR
Steel weasel tracks	500 lbs.	BD/DR

Area Between Army Landing Area and West Beach (Site No. 8)

Item	Quantity	DERP Category
Empty drums	16	CON/HTW
Corrugated roofing material	15 lbs.	BD/DR
Piping	30 feet	BD/DR
Landing mat	2,280 lbs.	BD/DR
1-inch-diameter braided metal cable	120 feet	BD/DR
1.5-inch-diameter steel cable	30 feet	BD/DR
Miscellaneous steel heavy machinery parts	790 lbs.	BD/DR.

Potential CON/HTW which could not be quantified includes the allegedly buried crane, engines, and drums.

3.1.2.1 Nature and Extent of Contamination

The nature and extent of surface soil staining, subsurface soil contamination, and groundwater contamination at Site No. 1 must be determined through a sampling investigation.

3.1.2.2 Potential Sources of Contamination

Most potential sources of contamination associated with the Army Landing Area are located underground. These potential sources are based on reports by residents of Gambell. Such sources include large engines formerly used to run pulley systems attached to buried deadman anchors, a 100-foot crane, and drums with unknown contents. Potential sources at the Air Force Landing Area include a decaying drum that has released an unknown tar-like material onto the beach berm and a 5-foot by 4-foot patch of tar-stained gravel. In addition, drums of heavy-weight oils, tars, and asphalt are allegedly buried beneath the Air Force Landing Area. The quantity and exact location of these drums are unknown.

3.1.2.3 Potential Routes of Migration

Groundwater is the primary potential migration pathway associated with suspected contaminants at Site No. 1. Given the hydrogeologic conditions present in the Gambell spit discussed in Section 3, any leaking hazardous or toxic substances from the buried drums, equipment, debris, and waste could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto subsurface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the Bering Sea, which may influence groundwater migration.

Surface water is another potential migration route due to the potentially contaminated surface soils. During storms or high tides, the beach berm may erode to expose buried material. Wave action may relocate the buried material. As discussed previously, precipitation infiltration is expected to be rapid due to nature of the soil; therefore, runoff is not expected to play a role in off-site migration.

3.1.2.4 Potential Receptors

Potential receptors of contaminant migration from this site include the users of the freshwater aquifer, fish, wildlife, vegetation in the Bering Sea, and people who subsistence fish and hunt in the area.

Dermal contact with or ingestion of the stained soils or exposed buried material, if they are hazardous, could present a risk to public health.

3.1.3 Recommended Sampling and Analytical Parameters

Surface soil sampling should be conducted in areas of stained soil at the Air Force Landing Area to determine whether the staining is caused by hazardous materials. Due to the potential presence of heavy oil and asphalt, surface soil samples should be analyzed for total residual petroleum hydrocarbons (TRPH), base/neutral and acid extractables (BNA), PCBs, and toxicity characteristic leaching procedure (TCLP) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Subsurface soil sampling should occur in and around the areas in which debris, drums, and waste are reportedly buried to determine whether any hazardous substances are leaching from buried material. Subsurface soil samples should be analyzed for gasoline-range organics (GRO), diesel-range organics (DRO), TRPH, volatile organic compounds (VOC), PCBs, and TCLP metals. In addition, monitoring wells should be installed and groundwater sampled to determine whether any hazardous or toxic substances have leached from the buried material or soils to groundwater. Groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and total metals.

3.2 SITE NO. 2: FORMER MILITARY HOUSING/OPERATIONS AREA

The Former Military Housing and Operations Site reportedly includes: Former Military Housing/Operations Burial Area, a Power Plant Burial Area, and an Ordnance Burial Site, all of which are located in the southeast portion of the site (see Figure 3-3). The Former Housing/Operations Area is estimated to be approximately 365 feet by 150 feet. The Ordnance Burial Site is supposedly located at the southern end of the Former Housing/Operations Area. Mr. James estimated that the Power Plant Burial Area is approximately 110 feet by 70 feet (E & E 1992).

All facilities associated with these areas were demolished, and the debris was buried at Site No. 2. The Former Housing/Operations Area included two rows of six quonset huts oriented north to south. North of the quonset huts was a mess hall and a utility building. The utility building contained showers and a day room. The remnants of an apparent fireplace and a concrete pad, pieces of burned wood, and metal debris are scattered throughout the area (see Appendix A). There are two locations of discolored gravel in the Former Housing/Operations Burial Area; one apparently rust-stained area is located in the northeast corner and the other 2-foot-square area is located near the center of the area and includes burned wood (E & E 1992).

The Ordnance Burial Site reportedly contains 20-mm ammunition, 30- and 50-calibre ammunition, carbine ammunition, and hand grenades in metal and creosote-coated wooden boxes buried approximately 6 feet bgs (E & E 1992). It is assumed that USACE will refer this problem to the Explosive Ordnance Demolition Division.

East of the Former Housing/Operations Area was a small power plant. The power plant and all associated machinery were reportedly buried in the Former Power Plant Burial Area. On the surface of the former Power Plant Burial Area is a large gear, and rectangular metal boxes are located in the southeast corner of the area. Part of a tiltdozer blade protrudes from the ground at the northwest corner of this area. Adjacent to the tiltdozer blade is a portion of a weasel track and rusted metal fragments. The underlying gravel is rust stained (E & E 1992).

North of the Former Housing/Operations Area is mounded gravel that reportedly covers the remains of a buried machine gun nest. Fibrous material which may potentially contain asbestos was observed in the gravel mound during the site inventory. Mr. James explained that the machine gunners would sit on this material to insulate themselves from the ground (E & E 1992).

3.2.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of potentially contaminated soils, CON/HTW, and unsafe debris that are reportedly attributable to DOD activities. All items have been categorized according to DERP guidelines using the assumptions described in Section 3.

The BD/DR located at Site No. 2 is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents in a commonly used section of the village (see Section 3). Protruding hazardous debris, such as the miscellaneous metal and piping listed below, is a result of inadequate burial by the military. These items protrude from the gravel surface such that a possible hazard exists to vehicle operators traveling through the area. Potential ACM is also present among the debris. This material is in a friable state and is therefore a potential health hazard to Gambell residents who could inhale airborne fibers. The CON/HTW and potential HTW located at Site No. 2 could have contributed to surface or subsurface contamination and is therefore potentially eligible for DERP-funded investigation.

Items which are not inherently dangerous or a hazard to persons exercising reasonable care are 55 pounds of wood, 2 pounds of ceramic pipe, and 50 pounds of concrete. These materials are not eligible for DERP-funded cleanup. The reportedly buried ordnance is potentially DERP-eligible for investigation. The amount of potentially buried ordnance could not be quantified.

3.2.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

Unsafe BD/DR, CON/HTW, and HTW at Site No. 2 include:

Item	Quantity	DERP-Category
Miscellaneous metal	30 lbs.	BD/DR
Metal piping	100 lbs.	BD/DR
Empty drum	1	CON/HTW
Discolored Gravel	2 sq. ft.	HTW.

The potential ACM (5 pounds) at Site No. 2 could be classified as DB/DR if sampling confirms that it actually is asbestos.

3.2.2.1 Nature and Extent of Contamination

The nature and extent of surface soil staining, subsurface soil contamination, and groundwater contamination at Site No. 2 must be determined through a sampling investigation.

3.2.2.2 Potential Sources of Contamination

Potential sources of contamination include stained soil and buried ordnance. Potential underground sources of contamination include military ordnance that is reportedly buried in wooden boxes at 6 feet bgs. Potential sources of surficial contamination consists of discolored and darkened gravel (black coating).

3.2.2.3 Potential Routes of Migration

The potential routes available for contaminant migration include groundwater, surface water and air. Given the hydrogeologic conditions present in the Gambell spit, discussed in Section 3, any leaking hazardous or toxic substances from the buried power plant equipment or ordnance could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto subsurface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with an underlying unconsolidated gravel aquifer which may be hydraulically connected to the Bering Sea and Troutman Lake.

Since there are potentially contaminated soils, surface water represents a potential pathway. As discussed previously (Section 3), precipitation infiltration is expected to be rapid due to the nature of the soil; therefore, runoff is not expected to play a role in off-site migration.

3.2.2.4 Potential Receptors

Potential receptors of contaminant migration from this site include users of groundwater, vegetation, fish, and wildlife of the Bering Sea, and people who subsistence fish and hunt in the area. Dermal contact with or ingestion of the stained soils, if they are hazardous, could pose a risk to public health.

3.2.3 Recommended Sampling and Analytical Parameters

Sampling at this site should include both surface and subsurface soil, groundwater, and the fibrous material. Since staining appears to be petroleum related, surface soil samples should be collected in areas of visible staining (other than rust) and analyzed for TRPH, BNA, and TCLP metals. Subsurface soil and groundwater samples should be collected on the perimeter of areas reported to contain buried debris and ordnance to determine whether

contaminants are leaching through interaction with groundwater. Subsurface soil samples should be analyzed for GRO, DRO, TRPH, TCLP metals, VOCs, and ordnance. Groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, total metals, and explosives. Asbestos sampling is also recommended for exposed fibrous materials.

3.3 SITE NO. 3: FORMER COMMUNICATIONS FACILITY

The Former Communications Facility Site is located parallel to the 100-foot contour of Sevuokuk Mountain. It extends from the southeast corner of North Beach (Site No. 1) to the north boundary of the former Tramway Site (Site No. 5; see Figure 3-4). The site has a north-to-south dimension of 1,875 feet and an east-to-west dimension that varies from 250 feet to 435 feet. The site includes debris (drums and drum remnants) scattered the entire length of the site and the area in which the communications facility was allegedly buried (E & E 1992).

The suspected Former Communications Facility Burial Area is a slightly irregular rectangular area estimated to be approximately 75 feet by 45 feet. Two Jamesway huts and a 10- to 15-kw power plant are reportedly buried in the area. The power plant probably contained auxiliary generators, transformers, oils, fuels, and batteries which may have been buried in the area. In addition, approximately 12 5- to 10-gallon glass carboys of sulfuric acid were reportedly buried on site (URS 1986; E & E 1992).

Currently, one drum, some pipe, anchors for guy wire, and a 275-gallon tank are scattered on the surface, most of which are located on the eastern half of the Burial Area (see Appendix A). The following identifying marks are on the 275-gallon tank:

> Stainless Steel Products, Co.
> Manufacturers 275 Gal
> St. Paul - Minnesota.

A 1.5-inch-diameter polyvinyl chloride (PVC) well point, apparently from the URS investigation, is located near the center of the area. In contrast to the URS findings, there is no apparent staining or stressed vegetation remains in the suspected burial area (URS 1986; E & E 1992).

3.3.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of CON/HTW and unsafe debris that are reportedly attributable to DOD activities. All items have been categorized according to DERP guidelines and using the assumptions described in Section 3.

The BD/DR located at Site No. 3 is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents in this frequently traveled area. Debris such as weasel track and metal protrudes from the native gravel surface so that a possible hazard exists to vehicle operators traveling through the site. Sharp metal edges may also present a hazard to children playing in the vicinity.

The CON/HTW could possibly have contributed to surface or subsurface contamination and is therefore eligible for DERP-funded investigation.

Sixty pounds of miscellaneous wood identified at Site No. 3 is ineligible for DERP-funded cleanup since it does not present a hazard to persons exercising ordinary and reasonable care and is not inherently dangerous.

3.3.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

Unsafe BD/DR and CON/HTW at Site No. 3 includes:

Item	Quantity	DERP Category
Weasel track	200 lbs.	BD/DR
Empty drums	19	CON/HTW
Drum remnants	20 lbs.	BD/DR
Empty fuel 275-gallon storage tank	1	CON/HTW
Miscellaneous metal	500 lbs.	BD/DR.

Potential CON/HTW which could not be quantified includes reportedly buried generators, glass carboys, transformers, and batteries.

3.3.2.1 Nature and Extent of Contamination

There was no visibly stained surface soil at this site. The nature and extent of subsurface soil and groundwater contamination must be determined through a sampling investigation.

3.3.2.2 Potential Sources of Contamination

The potential source of contamination at Site No. 3 is reportedly buried CON/HTW. Sources include allegedly buried generators, transformers, oil, fuel, and batteries. In addition, 12 5- to 10-gallon glass carboys of sulfuric acid are allegedly buried on site. If any of this material was broken during burial or has deteriorated over time, product may have been released to soil or groundwater and a leachate generated.

3.3.2.3 Potential Routes of Migration

Groundwater is the primary media for potential contaminant migration at Site No. 3. Due to hydrogeologic conditions present at the Gambell spit that were discussed in Section 3, any buried hazardous or toxic substances could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto subsurface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer which may be hydraulically connected to the Bering Sea and Troutman Lake.

3.3.2.4 Potential Receptors

Potential receptors of contaminant migration from this site are the users of the groundwater, vegetation, fish, wildlife of the Bering Sea and Troutman Lake, and people who subsistence fish and hunt in the area.

3.3.3 Recommended Sampling and Analytical Parameters

Subsurface soil and groundwater samples should be collected from the area in which generators, transformers, acids, oil, fuel, and batteries are reportedly buried to determine whether any potential sources have released hazardous substances into the surrounding soil or groundwater. Due to the nature of the buried material, analytical parameters for subsurface soil samples should include GRO, DRO, TRPH, VOCs, PCBs, TCLP metals, sulfates, and pH. Analytical parameters for aqueous samples should include GRO, DRO, TRPH, VOCs, PCBs, total metals, sulfates, and pH.

3.4 SITE NO. 4: SEVUOKUK MOUNTAIN

The Sevuokuk Mountain Site occupies an extensive area of the top and uppermost western flank of Sevuokuk Mountain. However, the remains of DOD activity are relatively concentrated in three locations: the Former Air Force Radar Station Area, the remains of two quonset huts and the surrounding area, and the area containing three transformers and miscellaneous debris (see Figure 3-4; Appendix A). Site No. 4 occupies an area that is approximately 4,175 feet north to south and ranges from 965 feet to 3,125 feet west to east. The Former Air Force Radar Station is an irregularly shaped area located at the northern end of the site; the Former Quonset Hut Area is located near the middle of Site No. 4; and the transformers and miscellaneous debris are located within a stream drainage near the southwest corner of the site (E & E 1992).

Power cables were reportedly strung from the Former Military Power Facility (Site No. 7) to secondary transformers at the base of the mountain at the Tramway Site (Site No. 5), along a drainage course on the west flank of Sevuokuk Mountain, and up to a set of tertiary transformers, the quonset huts, and the Air Force Radar Station in Site No. 4 (E & E 1992). The Navy placed sonar cables along the Communications Cable Route (Site No. 11) from the Former Military Power Facility (Site No. 7) to the same drainage course and up the mountain to the radar station and several other locations. Although there is no evidence of the power cable, it is reportedly buried at the former Tramway Site (Site No. 5). Sonar cable and remnants of structures remain on the west flank of Sevuokuk Mountain below Site No. 4 (E & E 1992).

The Air Force Radar Station Area is an approximate 375-foot by 500-foot area at the north end of Sevuokuk Mountain. The Air Force Radar Station burned and its debris remain. Mr. James claims that ordnance exploded when the station burned, thereby scattering debris. There is a 30-foot-square area of stained soil near the center of the Air Force Radar Station that contains scattered rusted debris and burned timbers (E & E 1992).

Along the western edge of the mountain ridge near the middle of Site No. 4 is the 65-foot by 75-foot quonset hut area. It contains frames of two fallen quonset huts, 55-gallon drums filled with gravel used as tie-downs for the quonset huts, and one transformer (see Appendix A). The 55-gallon drums surround the former building, and the transformer sits on the ground east of the former quonset huts. The transformer has the following identification:

LINE Material Co.
Dry Type Transformer
1251809 Serial Number, 7.5 KVA
WA11102-7 - Catalog Number.

Although the transformer is labeled as a dry-type transformer, its coils are coated with an oily substance. Some white friable material, potential ACM, remains in piles 20 feet north of the quonset huts. Debris is irregularly scattered within an approximate 100-foot radius of the quonset hut remains. Scattered debris including drum remains, pipe, tar paper, and sonar cable is also in the immediate vicinity of the quonset huts (E & E 1992).

Barbed wire, 55 gallon drums, an ammeter/voltmeter, pipes, and a transformer are located approximately 500 feet south of the former quonset huts. There was no visibly stained soil near the transformer (E & E 1992). Six Jamesway buildings and one wooden structure were reportedly located in this vicinity. The transformer has the following identification:

Westinghouse CSP Transformer
Additive Polarity
Single Phase 60 Cycles
Serial Number - 3260692
Style Number - 2T347.

Approximately 100 yards north-northeast of the former quonset huts are guy wires, guy wire anchors, poles, and radar dish support legs. Approximately 50 yards northeast of the quonset huts are a pile of decaying cans (E & E 1992). Approximately 500 feet southeast of the former quonset huts are the remains of a 10-kw generator and some drums (E & E 1992).

The area containing three transformers and miscellaneous debris is located at the southwest corner of Site No. 4 (see Appendix A). The area is on a ledge below the quonset hut remains on the west flank of the mountain. Three empty electrical transformer casings lie within a mountainside drainage in a 25-foot by 25-foot area. The transformers have no identifying marks. Debris such as spools of cable, drums, and the framing for a quonset hut is located in the general vicinity of the transformers (see Appendix A; E & E 1992).

Although an oil-stained area was reported by URS in 1985, no evidence of an oil-stained area was found in Site No. 4 during this investigation (E & E 1992).

3.4.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of potentially contaminated soils, CON/HTW, and unsafe debris that are reportedly attributable to DOD activities. All items have been categorized according to DERP guidelines using the assumptions described in Section 3.

Since this site is somewhat distant from the major traffic and living areas of the Gambell residents, many of the inventoried items mentioned above are considered less hazardous than similar objects present in more commonly used areas. Also, the geography of Site No. 4 is rocky terrain, where upon some of the debris is strewn, therefore making it less likely to interfere with vehicular traffic. For these reasons, items such as cable and wire (3,530 feet), wood debris (110 pounds), tar paper (50 pounds), rusted cans (20 pounds), fire extinguishers (200 pounds), and sonar cable (three spools) are not likely to be hazardous to persons exercising reasonable care in the area.

However, since portions of this site are visited by villagers who hunt, trap small game, or collect sea bird eggs, or by children and adolescents who may explore areas with concentrated amounts of debris, much of the inventoried BD/DR is included as potentially eligible for DERP-funded cleanup. Potential ACM is also present among the debris. This material is in a friable state and is therefore a potential health hazard to persons who could inhale airborne fibers. Items such as metal sheeting, quonset hut framing, and landing mat are a hazard due to sharp edges. Other BD/DR near the quonset hut area such as steel poles, triangle frame supports, and triangle metal framing poses a hazard to persons operating ATVs or snow machines since the debris may be up to 6 feet high in areas accessible by these vehicles. Foggy conditions which reduce visibility are common on the mountain top, increasing the chance of possible collision.

The CON/HTW and potential HTW present at Site No. 4 are reportedly former military property and could have contributed to surface or subsurface contamination and are therefore potentially eligible for DERP-funded investigation.

3.4.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The surficial unsafe BD/DR, CON/HTW, and HTW at the Air Force Radar Station located in the northern end of Site No. 4 include:

Item	Quantity	DERP Category
Metal gas tank	1	CON/HTW
Miscellaneous metal debris	890 lbs.	BD/DR
Metal sheeting	15 lbs.	BD/DR
Empty drums	4	CON/HTW
Generators (Howelite)	7	CON/HTW
Engine block	(2) 200 lbs.	CON/HTW
Stained soil	30 sq. ft.	HTW.

The unsafe BD/DR and CON/HTW in and around the quonset hut area located in Site No. 4 include:

Item	Quantity	DERP Category
Steel poles	450 lbs.	BD/DR
Triangle frame supports	150 lbs.	BD/DR
Triangle metal framing	60 lbs.	BD/DR
Steel supports	90 lbs.	BD/DR
Framing structure	4,000 lbs.	BD/DR
Empty drums	34	CON/HTW
Transformers	2	CON/HTW
Generator	1,000 lbs.	CON/HTW.
Sheet metal	30 lbs.	BD/DR
Miscellaneous metal	50 lbs.	BD/DR
Barbed wire	275 feet	BD/DR.

The unknown quantity of potential ACM may be classified as BD/DR, if analysis proves that it actually is asbestos.

The unsafe BD/DR and CON/HTW near the transformer and miscellaneous area (south end of Site No. 4) include:

Item	Quantity	DERP Category
Transformers	3	CON/HTW
Sheet metal	70 lbs.	BD/DR
Quonset hut framing	500 lbs.	BD/DR
Landing mat	100 lbs.	BD/DR.

3.4.2.1 Nature and Extent of Contamination

The nature of the stained soil at Site No. 4 must be determined through a sampling investigation.

3.4.2.2 Potential Sources of Contamination

Potential sources of contamination include the CON/HTW and stained soils. Transformers, generators, engine blocks, and drums may have contained petroleum, oil, and lubricants (POLs); PCBs; and metals.

3.4.2.3 Potential Routes of Migration

The routes available for contaminant migration are surface water (runoff or snow melt) and possibly groundwater. Contaminants in surface soils at Site No. 4 may become entrained in surface water runoff. Sustained runoff is only expected on the exposed bedrock on the top and western flank of Sevuokuk Mountain. Runoff flowing over the exposed bedrock is expected to rapidly infiltrate into the sediments on the flank of the mountain and the gravels at the base. Therefore, potentially contaminated runoff could enter the unconsolidated gravel aquifer if it exists at the base of the mountain.

3.4.2.4 Potential Receptors

Potential receptors of contaminant migration from this site include users of the freshwater aquifer, vegetation, fish and wildlife of the Bering Sea, and people who subsistence fish and hunt in the area.

Dermal contact with or ingestion of the stained soils, if they are hazardous, could present a risk to public health.

3.4.3 Recommended Sampling and Analytical Parameters

Surface soil and sediment sampling should be conducted in areas of stained soil. Soil and sediment samples from the soil adjacent to each transformer should be analyzed for PCBs. Surface soil samples collected from the burned area should be analyzed for TRPH, BNA, dioxin, PCBs, and TCLP metals. Fibrous material located near the quonset hut area should be sampled and analyzed for bulk asbestos.

3.5 SITE NO. 5: FORMER TRAMWAY SITE

The Former Tramway Site extends approximately 2,400 feet from the southeast corner of the Former Military Power Facility (Site No. 7) to the southwest corner of Site No.

4 (see Figure 3-5). The north-to-south dimension of Site No. 5 varies from approximately 125 feet to 315 feet. The Former Tramway Site includes two areas of suspected debris and potential HTW burial that are referred to as the Cable Burial Area and the Secondary Transformer Burial Area. The Cable Burial Area was estimated by Mr. James to be approximately 100-feet by 55-feet and the Secondary Transformer Burial Area to be 70 feet by 50 feet (E & E 1992).

Remnants of the steel cable, sonar cable, and miscellaneous metal debris from a military tramway remain on the mountain east of the burial areas. Power cables reportedly extended from the primary transformers at the Former Military Power Facility (Site No. 7) to secondary transformers at the base of the mountain to the tertiary transformers on the mountain ridge, and reportedly continued to the quonset huts and the Air Force radar station in Site No. 4. The Navy placed sonar cables up the mountain that followed the same route, which is known as the Communications Cable Route (Site No. 11). Most of the tramway has been removed, and the power cable is reportedly buried in the Cable Burial Area west of the Secondary Transformer Burial Area (URS 1986; E & E 1992). There is no visible staining in this area or in the Cable Burial Area.

Six secondary transformers are reportedly buried near the base of the mountain (see Figure 3-5). These transformers were reported to be 8 to 10 feet in height. No debris is visible on the surface, but there is a mound in the middle of the area. An ATV trail extends between the suspected burial areas (E & E 1992).

Debris is scattered on the ground between the Former Military Power Facility (Site No. 7) and the present power plant. The military buried bottles and cans of beer, whiskey, and soft drinks near the power plant. Other debris in this area includes concrete, cable, miscellaneous metal objects, and drums.

3.5.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of CON/HTW and unsafe debris that are reportedly attributable to DOD activities. All items have been categorized according to DERP guidelines and using the assumptions described in Section 3.

The BD/DR located at Site No. 5 is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents frequenting this area, either by traveling through to other destinations or to gather artifacts from nearby archaeological sites (see Figure 3-5). Debris such as sharp-edged miscellaneous metal and large quantities of cable and conduit could become entangled with ATVs or snow machines causing potential injury to vehicle operators. This presence of hazardous debris is a result of inadequate burial by the military during operations at Gambell, as discussed in Section 3.

The CON/HTW located at Site No. 5 could possibly have contributed to surface or subsurface contamination and is therefore potentially eligible for DERP-funded investigation.

The approximately 5,544 pounds of concrete located in the area is not inherently dangerous or hazardous to a person exercising reasonable care and is therefore not eligible for DERP-funded cleanup.

3.5.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

Unsafe surficial BD/DR and CON/HTW at Site No. 5 include:

Item	Quantity	DERP Category
Miscellaneous metal	105 lbs.	BD/DR
Steel cable of various diameters	525 feet	BD/DR
Conduit	10 feet	BD/DR
Drum	1	CON/HTW.

Potential CON/HTW which could not be quantified are the allegedly buried secondary transformers and drums.

3.5.2.1 Nature and Extent of Contamination

There were no visibly stained surface soils at this site. The nature and extent of subsurface soil and groundwater contamination must be determined through a sampling investigation.

3.5.2.2 Potential Sources of Contamination

Potential sources of contamination are the partially buried drum of unknown contents and the reportedly buried secondary transformers.

3.5.2.3 Potential Routes of Migration

Given that there are only reportedly buried materials at this site, the only probable route available for contaminant migration is groundwater. Due to the hydrogeologic conditions present at the Gambell spit, contaminants from the potentially leaking transformers could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto subsurface soil and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer. As previously discussed, the aquifer may be hydraulically connected to the Bering Sea and Troutman Lake.

3.5.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater migration include users of the freshwater aquifer, vegetation, fish, and wildlife of Troutman Lake and the Bering Sea, and people who subsistence fish and hunt in the area.

3.5.3 Recommended Sampling and Analytical Parameters

Subsurface soil and groundwater samples should be collected in, and on the perimeter of, the vicinity of the reported buried transformers to determine whether hazardous substances have been released. Subsurface soil and groundwater samples should be analyzed for GRO, DRO, TRPH, and PCBs.

3.6 SITE NO. 6: MILITARY LANDFILL

The Military Landfill is located north of Gambell High School. The Army reportedly buried approximately 3,000 barrels of lime-stabilized human waste in an estimated 275-foot by 135-foot area (see Figure 3-5). According to Mr. James, the Army excavated an area at this site to a depth equal to the height of a drum. Over a period of six years, the Army filled the excavation from south to north, placing drums side by side (E & E 1992). Landfilled material may have included materials generated from the Former Military Power and Former Communication Facility (site nos. 7 and 3, respectively; URS 1986).

The entire landfill surface is characterized by mounded gravel. Drum tops and remnants of approximately 20 drums protrude through the gravel surface throughout the site

(see Appendix A). Two drums and weasel tracks are on the surface at the east end of the site. A 1.5-inch-diameter PVC riser pipe, an apparent well point from the 1985 URS investigation, is located in the southeast quadrant of the site. No organic vapors were detected using an Organic Vapor Analyzer (OVA) in the well casing or from any of the exposed drums (E & E 1992).

Particular concern is posed by Site No. 6 due to the site's proximity to the village and the desirability of the area for future community growth (URS 1986).

3.6.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation due to the presence of CON/HTW that is reportedly attributed to DOD activities. The debris has been categorized according to DERP guidelines and using the assumptions described in Section 3.

The items inventoried below, drums of human waste reportedly buried during military activity at Gambell, are considered as potentially eligible for DERP-funded investigation as CON/HTW. Surficial drum remnants, mostly drum lids, could be in contact with possible HTW contained in the remaining buried drums or could be considered as potentially hazardous BD/DR due to the possibility of collapse or cave-in under the weight of persons walking or driving in the area. This location is well traveled and very close to the center of village activity. For these reasons, the drum remnants are also considered potentially eligible for DERP-funded investigation or possible cleanup.

3.6.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The site contains the following quantity of CON/HTW:

Item	Quantity	DERP Category
Drums remnants associated with potential hazardous waste	30 lbs.	HTW or BD/DR.

The drums of buried human waste could potentially be classified as CON/HTW. URS reported the quantity to be 3,000 drums; E & E could not confirm this number.

In addition, the landfill is reported to contain an unknown quantity of waste generated at the Former Military Power and Former Communication Facility.

3.6.2.1 The Nature and Extent of Contamination

No surface soil staining other than rust was noted at Site No. 6. The nature and extent of groundwater contamination must be determined through a sampling investigation.

3.6.2.2 Potential Sources of Contamination

Potential sources of contamination at this site include potential leachate produced from the 3,000 barrels of reportedly buried human waste and unknown allegedly buried material from the Former Military Power and Former communication facilities. Several drums were protruding from the ground surface and could cause previously buried contaminants to migrate onto the surface soils.

3.6.2.3 Potential Routes of Migration

Groundwater is the primary route of contaminant migration from this site. Any substance leaking from the potentially buried decaying human waste drums or wastes from the Former Military Power or Former Communications facilities could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto to subsurface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer. As discussed in Section 3, the aquifer may be hydraulically connected to the Bering Sea and Troutman Lake.

3.6.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater are users of the freshwater aquifer, vegetation, fish, and wildlife of the Bering Sea and Troutman Lake, and people who subsistence fish and hunt in the area.

3.6.3 Recommended Sampling and Analytical Parameters

Groundwater samples should be collected on the perimeter of buried drums of human waste to determine whether a hazardous leachate is being produced and the nature of the leachate, and to determine whether it has entered the groundwater. Due to the presence of human and unknown wastes, groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, ammonia, nitrates, sulfates, total dissolved solids, total suspended solids,

coliform and fecal bacteria, biochemical oxygen demand, chemical oxygen demand, and total metals. Since the primary concern at this site is potential groundwater contamination, no surface or subsurface soil samples are recommended for collection at this time.

3.7 SITE NO. 7: FORMER MILITARY POWER FACILITY

The Former Military Power Facility was allegedly buried north of the municipal building in an estimated 375-foot by 85-foot area. The primary transformers associated with the facility were reportedly buried within the 35-foot by 60-foot area in the southwest corner of the site (see Figure 3-5). An area of mounded gravel with protruding power cable, copper wire, and rusted metal is located within the Primary Transformer Burial Area (see Appendix A; E & E 1992).

A diesel/gasoline pipeline runs south from North Beach and branches east and west near the center of the site. There are seven areas of stained gravel on the west side of the pipe junction, and there is a concrete pad near the east end of the site (see Appendix A). Burned wood, sonar cable, and landing mat are located near the concrete pad. Some residents remember a motor pool that was adjacent to the concrete pad and an area next to the motor pool in which military personnel worked on pipes (see Appendix A; E & E 1992).

3.7.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of HTW, CON/HTW, and unsafe debris reportedly attributable to DOD. Although visibly stained soil is apparent at the site, it is doubtful that it is attributable to DOD, but this must be determined through a sampling investigation. All items have been categorized according to DERP guidelines using the assumptions described in Section 3.

The BD/DR located at Site No. 7 is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents traveling through this well-used section of town. Debris such as sharp-edged metal and quantities of various-sized cable and wire could become entangled with ATVs or snow machines causing potential injury to vehicle operators. This hazardous debris is a result of inadequate burial by the military during its occupation at Gambell.

3.7.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The unsafe surficial BD/DR and HTW present at Site No. 7 include:

Item	Quantity	DERP Category
Landing mat	10 lbs.	BD/DR
3-inch-diameter steel cable	20 feet	BD/DR
Braided copper wire	50 feet	BD/DR
Miscellaneous metal	15 lbs.	BD/DR
Stained soil	7 sq. ft.	HTW

Potential CON/HTW which could not be quantified includes the reportedly buried primary transformers.

3.7.2.1 Nature and Extent of Contamination

There are seven areas of visibly stained soils from unknown sources, each is approximately 1 foot in diameter. The nature and extent of potential subsurface and groundwater contamination must be determined through a sampling investigation.

3.7.2.2 Potential Sources of Contamination

Potential sources of contamination include the reportedly buried transformers and stained soils.

3.7.2.3 Potential Routes of Migration

Groundwater is the likely route for contaminant migration from this site. POLs or PCBs in the allegedly buried, possibly deteriorating transformers could migrate to subsurface soils or groundwater. Infiltrating water may leach any contaminants sorbed onto subsurface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer. As discussed in Section 3, the aquifer may be hydraulically connected to the Bering Sea and Troutman Lake.

3.7.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater include the users of the freshwater aquifer, vegetation, fish, and wildlife of the Bering Sea and Troutman Lake, and the people who subsistence fish and hunt in the area. Dermal

contact with or ingestion of the stained soils, if they are hazardous, could present a risk to public health.

3.7.3 Recommended Sampling and Analytical Parameters

Surface soil sampling should be conducted in areas of visibly stained soil. Subsurface soil and groundwater sampling should occur in the area in which the power facility is reportedly buried to determine whether any hazardous substances have entered the groundwater. Recommended parameters for surface soils include GRO, DRO, TRPH, and TCLP metals to determine the nature of the petroleum products. Since there are buried transformers and petroleum-related contamination is possible, recommended analytical parameters for subsurface soils include GRO, DRO, TRPH, VOCs, PCBs, and TCLP metals. Recommended parameters for groundwater include GRO, DRO, TRPH, VOCs, PCBs, and total metals.

3.8 SITE NO. 8: WEST BEACH

The West Beach Site extends from the southwest end of North Beach to Nayvaghaq Lake along the western shore for approximately 3 miles (see figures 3-1, 3-2, and 3-6). Near the south end of the site, adjacent to the high water mark of Nayvaghaq Lake, is a previously undocumented Army Landfill. In addition, the Ordnance Burial Site in which the military buried approximately 1 ton of ordnance according to Mr. James, is reportedly located northwest of Nayvaghag Lake (E & E 1992).

The West Beach Site contains scattered metal debris (barrels and landing mat) and small quantities of wood and concrete (see Appendix A). Debris is scattered along an existing runway (especially on the east side of the runway) south to the end of Troutman Lake and west to the beach. In addition, erosion has exposed landing mat on the east side of the airstrip and road running south from the airstrip (see Appendix A). A 25- to 30-foot-wide layer of landing mat reportedly underlies the airstrip and road south of the airstrip for approximately 4,500 feet. There is no apparent soil staining, with the exception of rust, along the beach (E & E 1992).

The Ordnance Burial Site is reportedly located approximately 225 feet east of the shoreline on West Beach. In either fall 1956 or spring 1957, the military reportedly buried

crates of live ammunition, including hand grenades, 30- and 50-calibre shells, and TNT at approximately 3 to 6 feet bgs. Currently, the Ordnance Burial Site contains two pits in the northwest corner of the area and some surface debris. There is no visibly stained soil (E & E 1992). It is assumed that USACE will refer the alleged ordnance problem to the Explosive Ordnance Demolition Division.

The Army Landfill adjacent to Nayvaghaq Lake is approximately 145 feet by 145 feet. The southern boundary of the area is the high water mark of the lake. The Army reportedly excavated the area and filled the excavation with several loads of material but never graded the area. Currently, there is no visible debris or stained soil on the surface, but there are two 4-foot-deep pits on the south side of the suspected landfill area (E & E 1992).

3.8.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and BD/DR cleanup due to the presence of CON/HTW, unsafe debris, and ordnance that are reportedly attributable to DOD. The CON/HTW and unsafe debris have been categorized according to DERP guidelines and using the assumptions described in Section 3. All ordnance has been assumed to be eligible for investigation with DERP funding. The quantity of ordnance provided by Mr. James could not be confirmed by E & E.

The BD/DR located at West Beach is included as potentially eligible for DERP-funded cleanup due to the possible hazard it presents to Gambell residents who frequently travel in this area of the village. Large quantities of landing mat are present. Some of the protruding hazardous debris is a result of inadequately buried BD/DR during military occupation. Much of the debris scattered throughout the site is landing mat. Mr. James reported that other state and federal agencies (FAA), as well as the Army and Air Force, utilized landing mat at Gambell; however, it is difficult to attribute the occurrence of landing mat in specific areas to a particular governmental branch. FAA reportedly dismantled the landing mat runway in an attempt to build a sea wall; however, the Army and Air Force reportedly utilized landing mat wherever they had installations, subsequently leaving it behind in bundles or burying it as a means of disposal. Wave action and storm winds have also contributed to the widespread occurrence of landing mat throughout Site No. 8. Since it is

impossible to ascertain the percentage of inventoried landing mat attributable to DOD activities, the total amount is listed as potentially eligible for DERP-funded cleanup.

- The CON/HTW present at West Beach could possibly have contributed to surface or subsurface contamination and is therefore potentially eligible for DERP-funded investigation.

3.8.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

BD/DR and CON/HTW present at Site No. 8 include:

Item	Quantity	DERP Category
Landing mat	121,910 lbs.	BD/DR
Empty drums	66	CON/HTW
Drums containing asphalt	8	CON/HTW
Steel cable and wire (various diameters)	2,335 feet	BD/DR
Metal crate strapping	235 lbs.	BD/DR
Corrugated roofing metal	135 lbs.	BD/DR
Metal grate	300 lbs.	BD/DR
Hot water heater	100 lbs.	BD/DR
Metal sled	1,000 lbs.	BD/DR
Miscellaneous metal	600 lbs.	BD/DR.

The landing mat that is exposed along the road and runway has not been quantified because its removal would involve destroying portions of the airstrip. However, the landing mat is a physical hazard and more of it will become exposed as a result of erosion.

3.8.2.1 Nature and Extent of Contamination

There is no visibly stained soil at Site No. 8. The nature and extent of potential subsurface soil and groundwater contamination at the Army Landfill must be determined through a sampling investigation.

3.8.2.2 Potential Sources of Contamination

Potential sources of contamination include the reported 2,000 pounds of buried ordnance and allegedly buried material at the Army Landfill north of Nayvaghaq Lake.

3.8.2.3 Potential Routes of Migration

The potential route for contaminant migration from Site No. 8 is groundwater. Any deteriorating ordnance could contaminate subsurface soils or groundwater. Infiltrating water

may leach any contaminants sorbed onto to subsurface soils and cause them to migrate to groundwater. There may be an underlying unconsolidated gravel aquifer at the Ordnance Dump. Tidal effects of the Bering Sea may influence groundwater migration in this location. Any leachate produced from the decay of wastes at the Army Landfill could contaminate subsurface soils or groundwater. Groundwater under the landfill may be hydraulically continuous with an underlying aquifer or Nayvaghaq Lake.

3.8.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater are the vegetation, fish, and wildlife of the Bering Sea and Nayvaghaq Lake, and people who subsistence fish and hunt in the area.

3.8.3 Recommended Sampling and Analytical Parameters

Subsurface soil and groundwater samples should be collected in, and on the perimeter of, the Army Landfill Area to determine whether leachate is being produced, whether it has entered the groundwater, and whether it has the potential to enter Nayvaghaq Lake. Since the materials buried in the landfill are unknown, subsurface soil samples should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and TCLP metals. Groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and total metals.

No sampling is recommended at the ordnance dump because of the hazards associated with drilling at this site.

3.9 SITE NO. 9: ASPHALT BARREL CACHE

The Asphalt Barrel Cache is located on the east side of the airstrip. It was identified by URS as a former military site containing approximately 150 55-gallon leaking barrels of asphalt. However, Mr. James claims that the site was not used by the military and that FAA used this area as barrel cache during airstrip construction. According to Mr. James, the barrels were covered with gravel during a severe storm in fall 1990. Currently, there is little surficial evidence of the barrels except for scattered asphalt (E & E 1992).

During the E & E site inventory, several deteriorating 55-gallon drums from which a tar-like substance was leaking were observed. These drums are located an unspecified

distance north of the approximate location of the Asphalt Barrel Cache. Mr. James claims that these are also the responsibility of FAA (E & E 1992).

3.9.1 DERP Eligibility

This site is not eligible for DERP-funded cleanup since the debris was not produced by DOD.

3.10 SITE NO. 10: SEVUOKUK MOUNTAIN TRAIL SYSTEM

The Sevuokuk Mountain Trail System Site consists of unpaved trails in the tundra from atop Sevuokuk Mountain into the areas east and south of Nayvaghaq Lake (see Figure 3-1). The trail system originates at the southeast end of Troutman Lake and separates to form individual trails to the north, south, and east. Individual trails to the north include two trails that provide access to the top of Sevuokuk Mountain; the westernmost trail is known as the Army Trail, and the other trail is known as the Air Force Trail (E & E 1992). These trails are marked by approximately 157 empty 55-gallon barrels in various conditions which are located approximately 200 feet apart (see Figure 3-1 and Appendix A). Some drums reportedly contained petroleum product that was subsequently salvaged by local residents. Several drums contained gravel, but most were empty. However, there was a tar-like substance leaking from one of the drums examined. Since not every drum was examined, other drums may contain remaining product. Landing mat and weasel track are located near the top of the mountain along the trail system (E & E 1992).

Portions of the trail system near the base of the mountain are not marked by 55-gallon barrels; however, a group of barrels was observed west of the trail system and east of Site No. 13. The drums may have accumulated in this area as a result of winds that blew the drums westward from the southern portion of the Sevuokuk Mountain Trail System (E & E 1992).

3.10.1 DERP Eligibility

This site is eligible for DERP-funded investigation due to the potential presence of CON/HTW and potentially contaminated soil and for DERP-funded cleanup due to the

presence of unsafe debris. All items have been categorized according to DERP guidelines and using the assumptions described in Section 3.

Although the BD/DR at Site No. 10, the landing mat, and weasel track are located outside the main village, they are located within a major trail system. Therefore, they could be eligible for DERP-funded cleanup due to the potential hazard posed by the debris to Gambell residents using the trail system. The landing mat and weasel track have sharp edges which could cause injury to a snow machine or ATV rider.

The CON/HTW and potential HTW at this site could cause surface or subsurface contamination.

3.10.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

BD/DR, HTW, and CON/HTW present at Site No. 10 include:

Item	Quantity	DERP Category
Drums	157	CON/HTW
Landing mat	700 lbs.	BD/DR
Weasel tracks	600 lbs.	BD/DR
Stained soil	4 sq. ft.	HTW.

3.10.2.1 Nature and Extent of Contamination

There was one 4-foot-square area of visibly stained soil at Site No. 10. The nature of the staining is unknown.

3.10.2.2 Potential Sources of Contamination

Potential sources of contamination are any drums that may have contained petroleum product and leaked after being placed on Sevuokuk Mountain.

3.10.2.3 Potential Routes of Migration

The possible routes for migration of contaminants are surface water and groundwater. With the exception of the area of visibly stained soil, this site appears to have little potential for migration unless the groundwater beneath the drums was contaminated when they were placed on the mountain. There were no signs of stressed vegetation near the drums that were inspected.

3.10.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through surface water include vegetation, fish, and wildlife in the vicinity of the stained soil. The potential for impact to humans through groundwater is limited due the distance from the present drinking water source.

3.10.3 Recommended Sampling and Analytical Parameters

Currently, sample collection is not recommended at this site, but soils beneath the barrels should be inspected for stressed vegetation or stained areas. Representative samples should be collected from these areas based upon inspection results.

3.11 SITE NO. 11: COMMUNICATION CABLE ROUTE

The Communication Cable Route extends eastward approximately 2,700 feet from the Former Military Power Facility (Site No. 7) across the Tramway Site (Site No. 5) to the base of Sevuokuk Mountain (see Figure 3-1). Four sonar cables extend from the base of the mountain to a destroyed Jamesway building that served as the Navy Sonar Pick-up Station. The building is located approximately 300 feet west of the Army Trail of Site No. 10 (not shown on figures; see Appendix A). Most of the wood from buildings remains on the ground in piles with the sonar cable. Sonar cable formerly extended east from the former Navy Sonar Pick-up Station across the tundra approximately 6 miles to Dovelawik Bay, south 35 miles to Bunnell Cape, north to the top of Sevuokuk Mountain, and then down the mountain to the Bering Sea (see Figure 3-1). Metal spools are placed at 0.25-mile intervals along each cable route. Mr. James said that the cable was used for sonar by the Navy to track Soviet submarines during the Cold War (E & E 1992).

3.11.1 DERP Eligibility

This site is not eligible for DERP-funded cleanup or investigation. The cables and spools do not present a physical hazard. The spools and cables are located outside the town and are not on the major trail systems. The cable lies on the ground and is intact. Although the spools may present a hazard to vehicle riders, the hazard is not significantly different from that posed by a rock. Although the destroyed James Way building does have potential

hazards of nails in the wood, the area is outside of town and off the main trail system and not visited frequently.

3.11.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

No known debris is eligible for DERP-funded cleanup at Site No. 11.

3.11.2.1 Nature and Extent of Contamination

There is no visibly stained soil at Site No. 11.

3.11.2.2 Potential Sources of Contamination

No potential sources of contamination exist at Site No. 11.

3.11.2.3 Potential Routes of Migration

Since no contamination is present, there are no potential routes of migration.

3.11.2.4 Potential Receptors

There are no potential receptors at Site No. 11.

3.11.3 Recommended Sampling and Analytical Parameters

Sampling is not recommended at this site since there is no evidence of potential surface or subsurface contamination.

3.12 SITE NO. 12: NAYVAGHAQ LAKE DISPOSAL SITE

The Nayvaghaq Lake Disposal Site is located south of Site No. 13 and north of Nayvaqhaq Lake. The site is on the southwest side of an ATV road that extends south from the airstrip (see figures 3-1 and 3-6). This site includes two drum disposal areas, the northern area is located at the intersection of two ATV trails, and the southern area is located approximately 470 feet south of the intersection (see Figure 3-6 and Appendix A). The north area contains drums, battery remnants, and household refuse (see Appendix A). Drums are concentrated near the road, but some are scattered westward toward Nayvaghaq Lake. Batteries are located at the north area and have the following identification:

Goodyear
Dry Proof Construction
Commercial Type
- Heavy Duty.

A shallow pit containing standing water and one drum is located 30 feet west of the main drum disposal area. An empty rusted can labeled "ethylene glycol" was also found in this area. There is no apparent staining aside from rust in the drum area (E & E 1992).

The south area includes approximately 50 drums immediately adjacent to the west side of the road and five or six drums scattered further west of the main concentration of drums. There is no visible staining of the soil except for what appears to be rust (E & E 1992).

3.12.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation due to the presence of CON/HTW that is reportedly attributable to DOD activities. The CON/HTW located at Site No. 12 could possibly contribute to surface or subsurface contamination. All items have been categorized according to DERP guidelines and using the assumptions described previously in Section 3.

3.12.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The CON/HTW associated with this site include:

Item	Quantity	DERP Category
Empty drums	170	CON/HTW
Batteries	10	CON/HTW.

3.12.2.1 Nature and Extent of Contamination

No visibly stained surface soil is present at Site No. 12. Due to the presence of lead-acid batteries, however, lead contamination may have occurred. Any contamination at this site must be determined through a sampling investigation.

3.12.2.2 Potential Sources of Contamination

Potential sources of contamination include unknown drum contents. The acids and metals from batteries and drums may have been buried beneath this site.

3.12.2.3 Potential Routes of Migration

The possible routes for migration for the contaminants at Site No. 12 include surface water, groundwater, and air. Site No. 12 is located at the northern end of Nayvaghaq Lake, and it appears to be located within the boundaries of Nayvaghaq Lake's highest seasonal fluctuation. Several of the nearly 200 drums appear to have been scattered due to the rise and fall of the lake's water elevation. Empty drums may have been transported by flotation to these scattered locations. Deteriorating batteries could have released acid and lead into the soils which could spread contamination through wind or overland flow.

3.12.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater include vegetation, fish, and wildlife of the Bering Sea and Nayvaghaq Lake, and people who subsistence fish and hunt in the area.

Dermal contact with or ingestion of potentially lead-contaminated soil could present a risk to public health or could enter the food chain.

3.12.3 Recommended Sampling and Analytical Parameters

Surface soil samples should be collected in areas of discarded batteries to determine whether lead has leached to soils. Subsurface soil and groundwater samples should be collected within, and on the perimeter of the disposal area, to determine whether hazardous substances have been released from buried CON/HTW. Recommended analytical parameters for surface soils include TRPH and TCLP metals. Recommended analytical parameters for subsurface soils include GRO, DRO, TRPH, VOCs, and TCLP metals. Groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, and total metals.

3.13 SITE NO. 13: FORMER RADAR POWER STATION

The Former Radar Power Station was located east of the pond located south of Troutman Lake (see Figure 3-6). This site was a military radar installation and was probably the temporary AC&W site operated by the Air Force (URS 1986). The station contained two wooden quonset huts, one long wooden building, and a number of 150-foot towers that were reportedly demolished and buried on site (E & E 1992). The former locations of these structures are not known.

The potential burial area containing materials from the Former Radar Power Station is approximately 550 feet by 250 feet (E & E 1992). Electrical transformers and generators may also be buried on site (URS 1986). Little evidence of the installation remains beyond scattered surface debris and gravel mounds. Wire and pieces of ceramic material are scattered across the area. Guy wire laying on the north side of the site is suspected to be attached to buried materials, and there is a concentration of pipes and other wires. A 9-foot-square area of darkened gravel containing burned wood and rusted electrical equipment is visible on the surface along the west boundary near the center of the site (E & E 1992).

3.13.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous waste investigation and cleanup due to the presence of potential CON/HTW, potentially contaminated soil, and unsafe debris allegedly originating from DOD activities. All items have been categorized according to DERP guidelines and using the assumptions previously described in Section 3.

The BD/DR present at this site is eligible for DERP-funded cleanup because it is a potential physical hazard in a well-traveled area. The construction site for the new landfill is located south of the site. The metal piping and wire protrude from the ground surface but are unnoticeable except at very close range. Therefore, this debris is a potential hazard to ATV and snow machine riders.

The CON/HTW is eligible for DERP-funded investigation because it has been reportedly attributed to the military. Deterioration of the CON/HTW may cause subsurface contamination. The potential HTW will have to be sampled to determine if it is hazardous and whether it is attributable to the military.

3.13.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The BD/DR and HTW associated with this site include:

Item	Quantity	DERP Category
Metal piping	150 lbs.	BD/DR
Guy wire	150 lbs.	BD/DR
Soil	9 sq. ft.	HTW.

The potential CON/HTW (the reported buried transformers) could not be quantified.

3.13.2.1 Nature and Extent of Contamination

The nature of the 9-foot-square area of stained soil and the potential for subsurface soil and groundwater contamination must be determined through a sampling investigation.

3.13.2.2 Potential Sources of Contamination

Potential sources of contamination are the reported buried transformers and decaying metal.

3.13.2.3 Potential Routes of Migration

Potential routes for migration are groundwater and surface water. POLs and PCBs from deteriorating transformers may be released into the subsurface soils or groundwater. Infiltrating precipitation could leach contaminants sorbed onto soil particles and transport them to groundwater. The groundwater at this site may be hydraulically connected with an underlying aquifer. The aquifer may be hydraulically continuous with Troutman Lake.

Surface water is another potential route since there are potentially contaminated surface soils. As discussed previously in Section 3, precipitation infiltration is expected to be rapid due the nature of the soil; therefore, runoff is not expected to play a role in off-site migration.

3.13.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater include vegetation, fish, and wildlife of Troutman Lake, and the people who subsistence fish and hunt in the area.

Dermal contact with or ingestion of the stained soils, if they are hazardous, could present a risk to public health and could enter the food chain.

3.13.3 Recommended Sampling and Analytical Parameters

Recommended sampling includes surface and subsurface soil and groundwater. Due to the history of transformers in the area and the potential for POL contamination, surface soil samples should be collected in the 9-foot-square stained area and analyzed for TRPH, PCBs, and TCLP metals. Subsurface samples should be collected within, and on the perimeter of, the area where debris is reportedly buried. Due to the presence of transformers and possible generators, subsurface soil sample analytes should include GRO, DRO, TRPH, VOCs, PCBs, and TCLP metals. Groundwater should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and total metals.

3.14 SITE NO. 14: NAVY PLANE CRASH SITE

In 1955, a Navy plane crash landed 7 miles south of the Village of Gambell (location not shown in figures). The main body of the plane remains on the tundra (see Appendix A). Debris is largely confined to the immediate area surrounding the plane, but some is scattered as much as 100 feet away from the plane. Burned material is located near the engine area and along the interior of the fuselage. According to Mr. James, the airplane's belly gasoline tank exploded, and most fuels would have burned. There were no apparent stains or any stressed vegetation surrounding the crash site (E & E 1992).

3.14.1 DERP Eligibility

Site No. 14 is not eligible for DERP-funded cleanup. Although debris associated with the airplane contains sharp-edged aluminum, the area is only infrequently used because of its distance from town, and therefore, the potential physical hazard is significantly reduced. However, the site is visited as evidenced by the graffiti on the plane's tail section and is naturally a site of curiosity. Some residents said that the tail made a useful landmark.

3.14.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

No DERP-eligible BD/DR is located at this site.

3.14.2.1 Nature and Extent of Contamination

Neither visibly stained soil nor stressed vegetation was observed at the site. There is no reason to suspect subsurface contamination because fuels reportedly burned at the time of the crash.

3.14.2.2 Potential Sources of Contamination

Other than the miscellaneous aircraft debris, there appears to be no potential source of contamination at this site.

3.14.2.3 Potential Routes of Migration

Since no contamination is suspected, there is no potential route of migration.

3.14.2.4 Potential Receptors

Since no contamination is suspected, there are no potential receptors.

3.14.3 Recommended Sampling and Analytical Parameters

No samples are recommended for this site.

3.15 SITE NO. 15: TROUTMAN LAKE ORDNANCE BURIAL SITE

Mr. James identified the location of a suspected ordnance burial site at the north end of Troutman Lake (see Figure 3-1). Other residents confirmed that children found unexploded ordnance while swimming in the lake (E & E·1992). After a late summer storm in 1992, children found bullets along the shores of Troutman Lake (James 1992).

It is assumed that USACE will refer this problem to the Explosive Ordnance Demolition Division.

3.15.1 DERP Eligibility

This site is potentially eligible for DERP-funded investigation due to the presence of reportedly submerged ordnance.

3.15.2 Estimated quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The quantity of reported ordnance submerged in Troutman Lake is unknown.

3.15.2.1 Nature and Extent of Contamination

According to recent sampling performed by the Alaska Department of Environmental Conservation (ADEC), deterioration of the alleged ordnance has not affected Troutman Lake's water quality (Romenesko 1991). However, the analysis of Troutman Lake water samples did not include nitroaromatic or nitramine compounds, which may indicate the presence of explosive residues.

3.15.2.2 Potential Sources of Contamination

The potential source of contamination at this site is the ordnance in Troutman Lake. If the ordnance begins to deteriorate, it could affect the water quality.

3.15.2.3 Potential Routes of Migration

Ordnance is reportedly buried beneath the bottom of the lake or is resting on the lake bottom. Currently, ordnance could be in contact with groundwater or the water of Troutman Lake. Both are potential routes of migration.

3.15.2.4 Potential Receptors

Potential receptors from this site are users of fresh water aquifer, vegetation, fish, and wildlife of Troutman Lake, and people who subsistence fish and hunt at the lake.

3.15.3 Recommended Sampling and Analytical Parameters

No samples are recommended at this site due to inherent hazards associated with ordnance.

3.16 SITE NO. 16: GAMBELL MUNICIPAL BUILDING SITE

The Gambell Municipal Building site consists of a 35-foot by 55-foot area of stained gravel, located immediately west of the Municipal Building (see Figure 3-7 and Appendix A). Mr. James claims that there has been no spill at this location, but the stain becomes more

pronounced after a heavy rain. Residents suspect that something is buried in the area (E & E 1992). No OVA readings above background levels were noted.

3.16.1 DERP Eligibility

This site is eligible for DERP-funded investigation due to the presence of stained soil. A determination of DOD responsibility may be made by performing a sampling investigation.

3.16.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

The potential HTW associated with this site is a 35-foot by 55-foot area of stained gravel.

3.16.2.1 Nature and Extent of Contamination

The nature of the contamination must to be determined through a sampling investigation.

3.16.2.2 Potential Source of Contamination

Potential sources of contamination are the stained gravel and its unknown source.

3.16.2.3 Potential Routes of Migration

Potential routes of contaminant migration from this heavily traveled area include surface water, groundwater, and adherence of contaminants onto ATV tires and pedestrians' shoes. Given the hydrogeologic conditions present in the Gambell spit, infiltrating water may leach any contaminants sorbed onto surface soils and cause them to migrate to subsurface soils or groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer. This aquifer may be hydraulically connected to the Bering Sea and Troutman Lake.

Since there are potentially contaminated soils, surface water represents a potential pathway. As discussed previously, precipitation infiltration is expected to be rapid due to the nature of the soil; therefore, runoff is not expected to play a role in off-site migration.

3.16.2.4 Potential Receptors

Potential receptors of contaminant migration from this site include the users of the fresh water aquifer, vegetation, fish, and wildlife of Troutman Lake, and people who fish in the lake for subsistence.

Dermal contact with or ingestion of the stained soils, if they are hazardous, could present a risk to public health.

3.16.3 Recommended Sampling and Analytical Parameters

Surface and subsurface soil and groundwater sampling should be conducted at the stained soil area to determine the source, whether it is attributable to DOD, and whether it has entered the groundwater. Since the source of the staining is unknown, recommended analytical parameters for surface and subsurface soils include GRO, DRO, TRPH, and TCLP metals. Groundwater samples should be analyzed for GRO, DRO, TRPH, and total metals.

3.17 SITE NO. 17: ARMY LANDFILLS

The Army Landfills site is located between Site No: 7, Site No. 6, and the landing areas in Site No. 1 (see Figure 3-7). Materials in both landfills reportedly were regularly burned and covered. Landfill No. 1 is located west of Landfill No. 2, and it is approximately 240 feet by 130 feet in size. From 1951 to 1953, household refuse was reportedly buried to the depth of the water table (approximately 15 feet bgs). Local residents claim that human waste, tar paper, and flat fuel containers are also buried in the landfills. The surface is characterized by mounds. Currently, debris on the surface includes drums, landing mat, and scrap metal. There was not apparent stained soil (E & E 1992).

Landfill No. 2 is approximately 235 feet by 245 feet and operated from 1951 to 1953. Debris on the surface was similar to the debris at Landfill No. 1. There were several buried drum tops exposed on the surface. Soil did not appear to be stained with anything except rust (E & E 1992).

3.17.1 DERP Eligibility

This site is potentially eligible for DERP-funded hazardous investigation and cleanup due to the presence of potential CON/HTW and unsafe debris that are reportedly attributable

to DOD activities. All items have been categorized according to DERP guidelines and the assumptions previously described in Section 3.

The BD/DR located at the Army Landfills is included as potentially eligible for DERP-funded cleanup due to the possible physical hazard to Gambell residents. The area is well traveled. Surficial and protruding debris is a result of inadequate military disposal. Debris such as nodwell tracks, metal cable, scrap metal, and landing mat protrudes from the ground and have sharp metal edges which could injure an ATV or snow machine rider if they were obscured by snow or fog.

The CON/HTW and potential HTW at the site are reportedly attributable to Army activities and could cause surface or subsurface contamination.

3.17.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

BD/DR and CON/HTW at Army Landfill No. 1 include:

Item	Quantity	DERP Category
Nodwell track	50 lbs.	BD/DR
Drum	1	CON/HTW
Landing mat	80 lbs.	BD/DR
Braided and electrical steel cable	65 lbs.	BD/DR
Scrap metal	5 lbs.	BD/DR.

BD/DR and HTW at Army Landfill No. 2 include:

Item	Quantity	DERP Category
Scrap metal	35 lbs.	BD/DR
Drum remnants associated with potential HTW	15 lbs.	HTW
Landing mat	50 lbs.	BD/DR
Nodwell track	200 lbs.	BD/DR.

The quantity of buried refuse in each landfill is unknown.

3.17.2.1 Nature and Extent of Contamination

There is no visibly stained soil at either landfill.

3.17.2.2 Potential Source of Contamination

The potential source of contamination from both landfills is the unknown quantity of refuse buried in each. The presence of drum remnants on the landfill surface suggests that drums may be buried within the landfills. These drums potentially contained POLs, PCBs, or metals.

3.17.2.3 Potential Routes of Migration

The primary route for contaminant migration is groundwater. However, several drums were protruding from the ground surface and could cause previously buried contaminants to migrate to the surface soils. Given the hydrogeologic conditions present in the Gambell spit, any hazardous or toxic substance buried in the landfill may adsorb onto subsurface soils or migrate into groundwater. Infiltrating water may leach any contaminants sorbed onto surface soils and cause them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer which may be hydraulically connected to the Bering Sea and Troutman Lake.

3.17.2.4 Potential Receptors

Potential receptors of contaminant migration from this site include users of the fresh-water aquifer, vegetation, fish, and wildlife of the Bering Sea and Troutman Lake, and the people who subsistence fish and hunt in the area.

3.17.3 Recommended Sampling and Analytical Parameters

Subsurface soil and groundwater samples should be collected within, and on the perimeter of, both landfills to determine whether leachate is being produced and whether it is migrating from the landfills. Since the contents of the landfills is uncertain, subsurface soil samples should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and TCLP metals. Groundwater samples should be analyzed for GRO, DRO, TRPH, VOCs, PCBs, and total metals.

3.18 SITE NO. 18: MAIN CAMP

The Main Camp was adjacent to the northeast end of Troutman Lake (see Figure 3-7). The camp extended from the location of the current Municipal Building east to the high school. The mess hall was located where the Sivuqaq, Inc., building now stands. A boiler room was connected to the mess hall, and there was a water pumphouse near the lake edge. Cardboard boxes containing approximately 500 pounds of white material were found near the former pumphouse location at the edge of Troutman Lake (see Appendix A; E & E 1992). The white material in the cardboard boxes has been tentatively identified as diatomaceous earth, previously used for water filtration by the Army (USGS 1957). Recent analyses of the material by ADEC indicate that minerals such as aluminum, calcium, magnesium, and sodium were present (ADEC 1991). Based on these sample results, it does not appear that the white material is hazardous, therefore, it is not eligible for DERP-funded investigation or cleanup.

When it was in operation, there were 10 25,000-gallon fuel tanks at the Main Camp. It is unknown whether the tanks were aboveground or underground or whether they were disposed of on site. There were also six flat fuel tanks for the boiler room and pumphouse. Gambell residents did not know whether these were buried in the area.

3.18.1 DERP Eligibility

This site is potentially eligible for DERP-funded investigation due to the potential presence of buried CON/HTW (fuel tanks); however, the disposition of these tanks is very uncertain.

3.18.2 Estimated Quantity of Potentially DERP-Eligible BD/DR, HTW, and CON/HTW

No unsafe BD/DR is present at this site. The potential CON/HTW reportedly located at this site is not quantifiable without further investigation.

3.18.2.1 Nature and Extent of Contamination

There is no visibly stained soil at the site.

3.18.2.2 Potential Sources of Contamination

Potential sources of contamination are potentially buried fuel tanks and the liquid or residues still containerized within them.

3.18.2.3 Potential Routes of Migration

If the fuel tanks were buried at this site, then groundwater is a potential migration route. Given the hydrogeologic conditions present in the Gambell spit, POLs in the potentially buried tanks may adsorb onto subsurface soils or migrate into groundwater. Infiltrating water may leach any contaminants sorbed onto surface soils causing them to migrate to groundwater. Groundwater at the site may be hydraulically continuous with the underlying unconsolidated gravel aquifer. This aquifer which may be hydraulically connected to the Bering Sea and Troutman Lake.

3.18.2.4 Potential Receptors

Potential receptors of contaminant migration from this site through groundwater are users of the fresh water aquifer, vegetation, fish, and wildlife of Troutman Lake, and the people who fish for subsistence in the lake.

3.18.3 Recommended Sampling and Analytical Parameters

No sampling is recommended at this location until the disposition of the fuel tanks is known.

Table 3-1

MATERIALS POTENTALLY ELIGIBLE FOR DERP-FUNDED CLEANUP OR INVESTIGATION AT THE GAMBELL SITE ST. LAWRENCE ISLAND, ALASKA

Category	Waste
BD/DR	Landing mat, sheet metal, cable (metal), corrugated roofing material, electrical equipment, weasel and nodwell track, wire, quonset hut frames, pipes, and potential ACM.
Ordnance	20-mm ammunition, 30- and 50-calibre ammunition, hand grenades, and explosives.
Containerized Hazardous or Toxic Waste (CON/HTW)	Aboveground storage tanks (ASTs), transformers, drums, glass carboys, batteries, generators, engine blocks, crane, tiltdozer, and drums of human waste.
HTW	Areas adjacent to battery remains and stained soil and drum remnants associated with potential HTW.

Source: Ecology and Environment, Inc. 1992.

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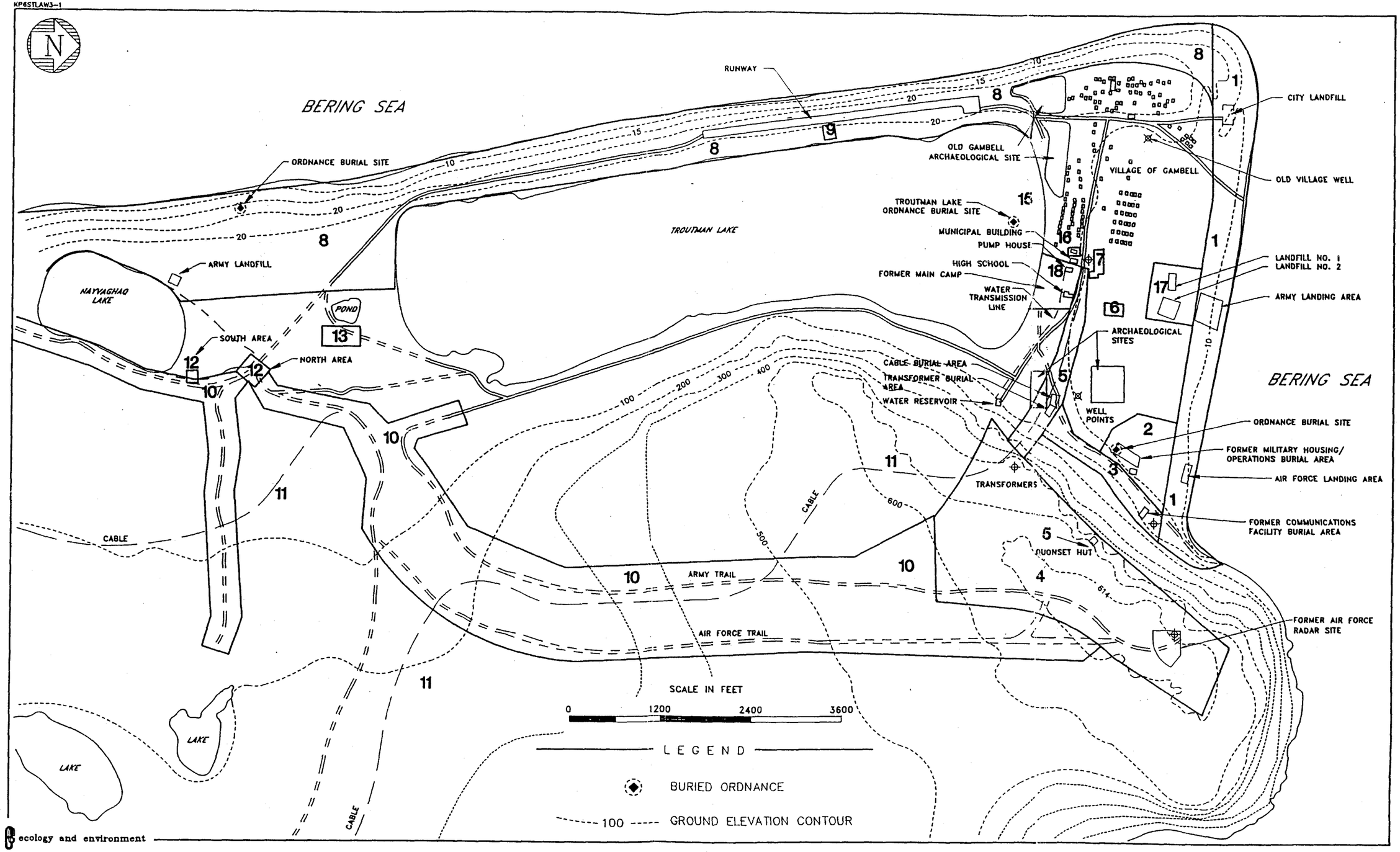

Figure 3-1 ST. LAWRENCE ISLAND, ALASKA
SITE LOCATION MAP

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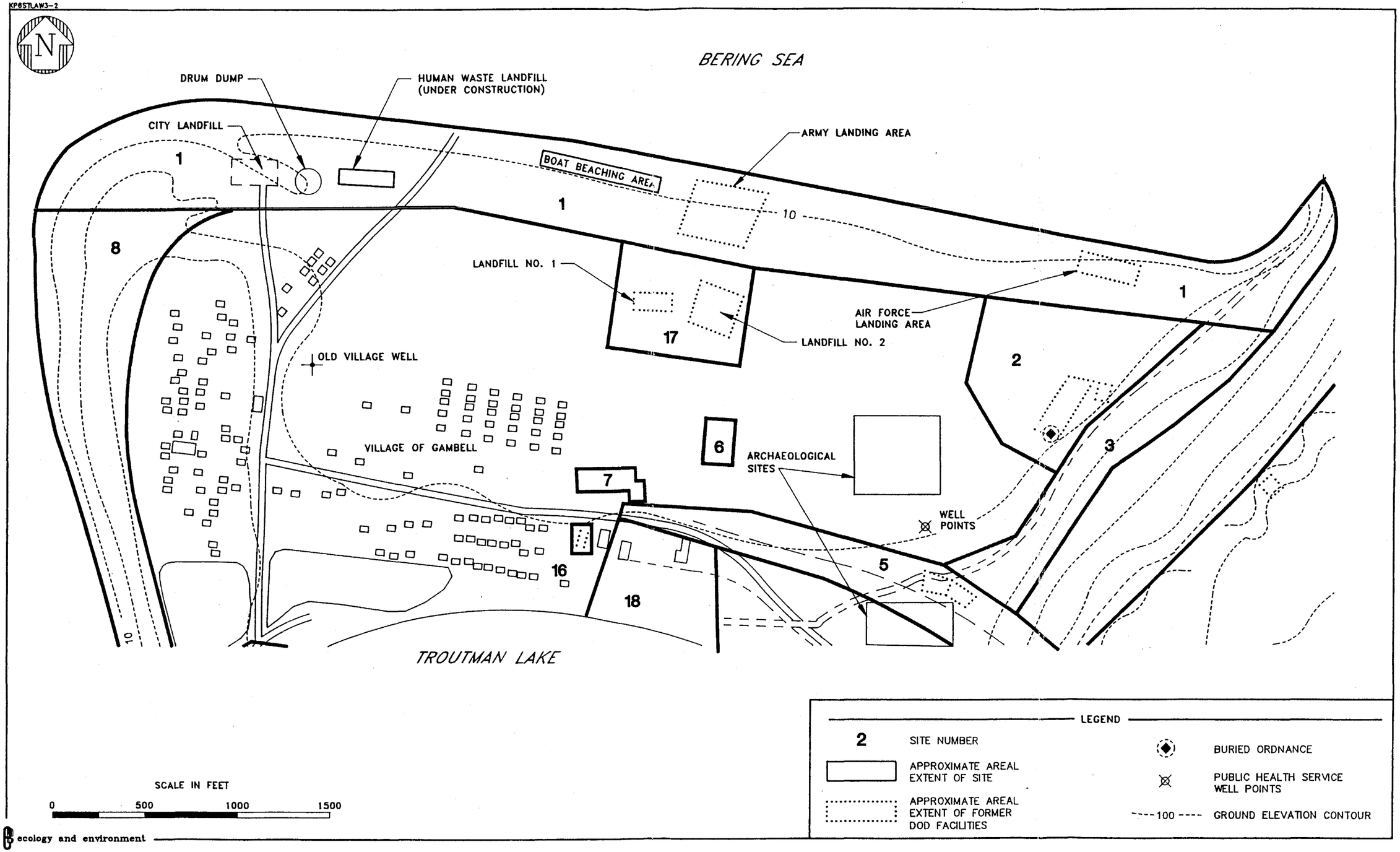

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Figure 3-2 SITE 1, NORTH BEACH
LOCATION MAP

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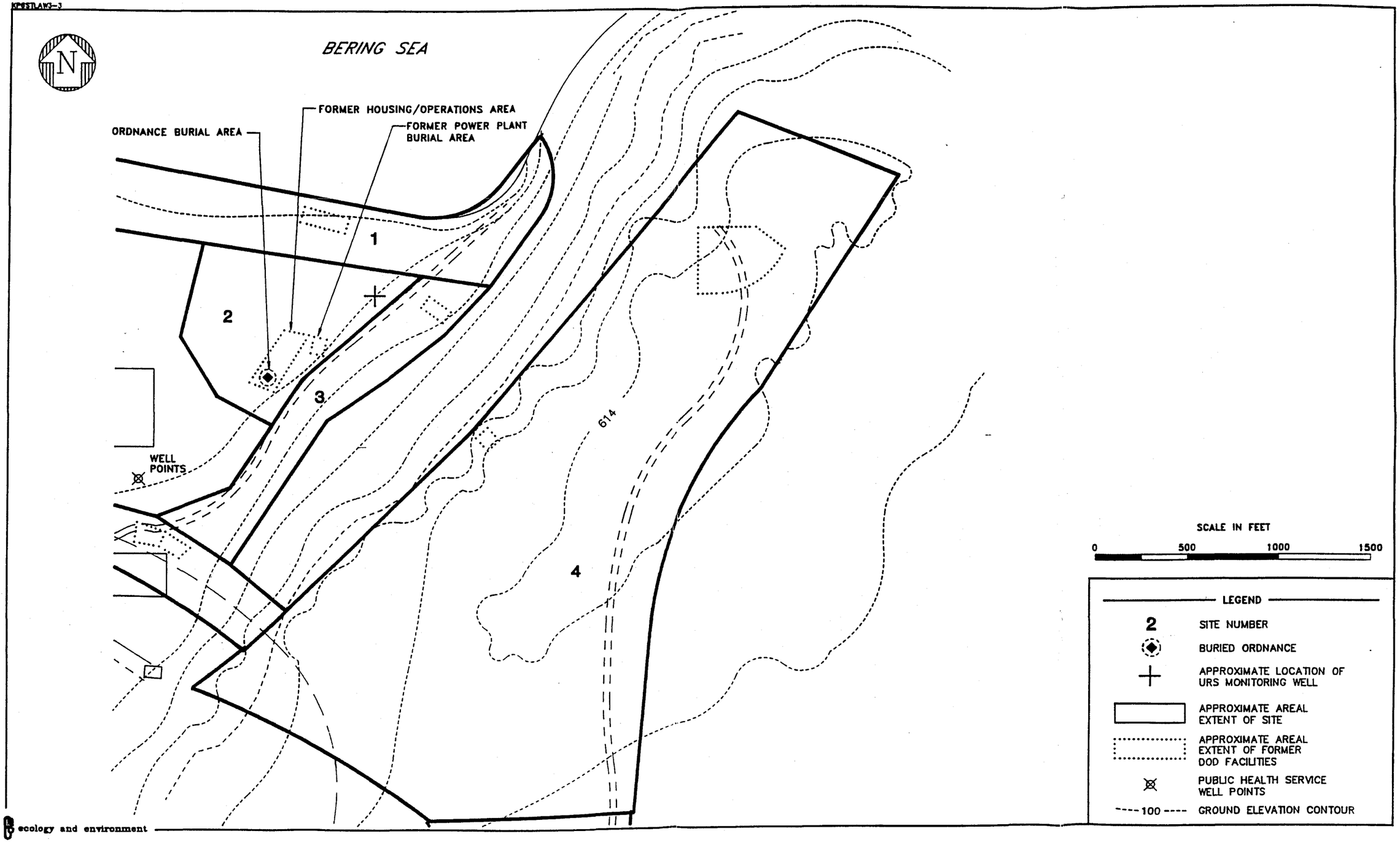

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Figure 3-3 SITE 2, FORMER MILITARY HOUSING/OPERATIONS SITE LOCATION MAP

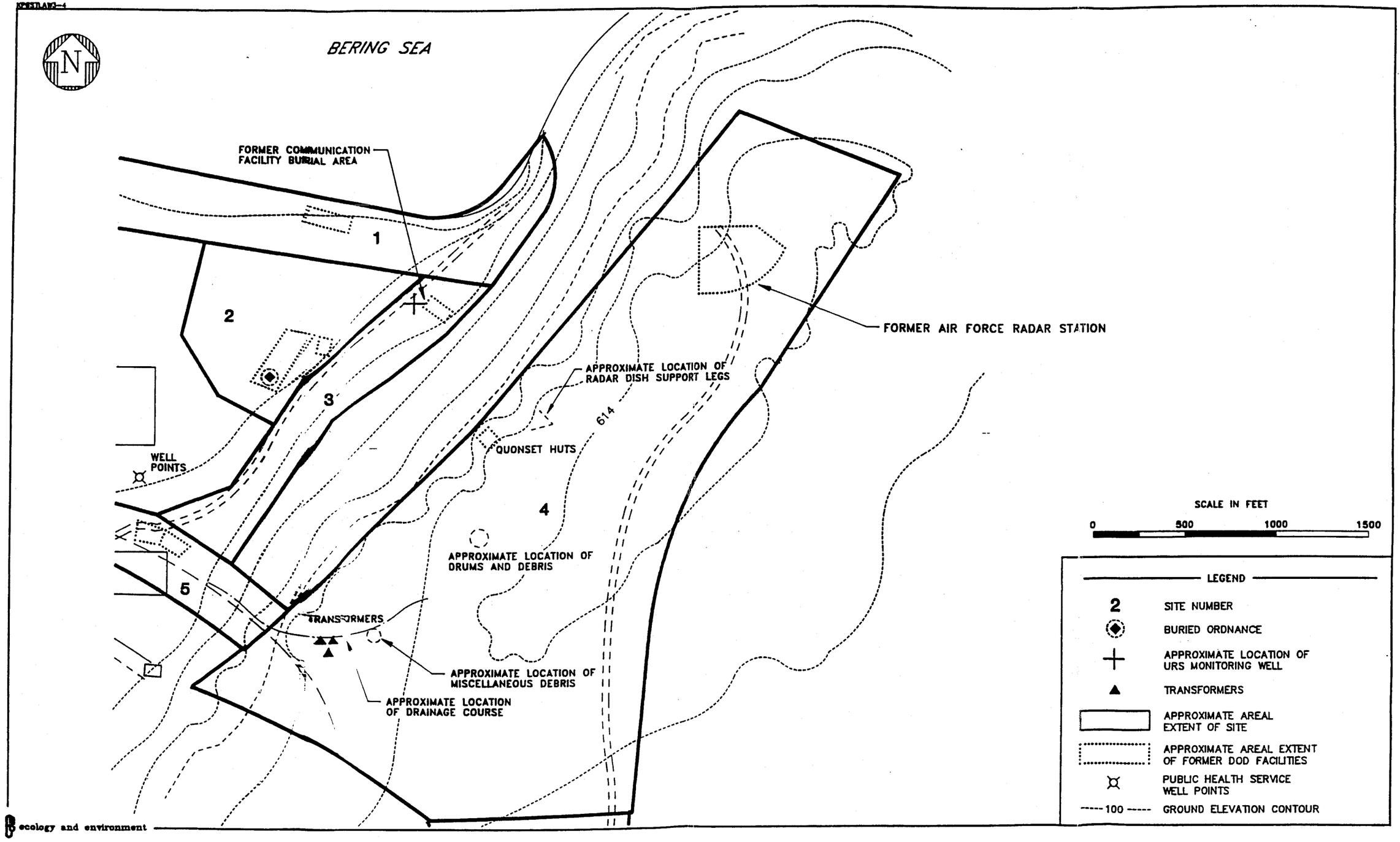

Figure 3-4 SITE 3, FORMER COMMUNICATION FACILITY AND SITE 4, SEVUOKUK MOUNTAIN LOCATION MAP

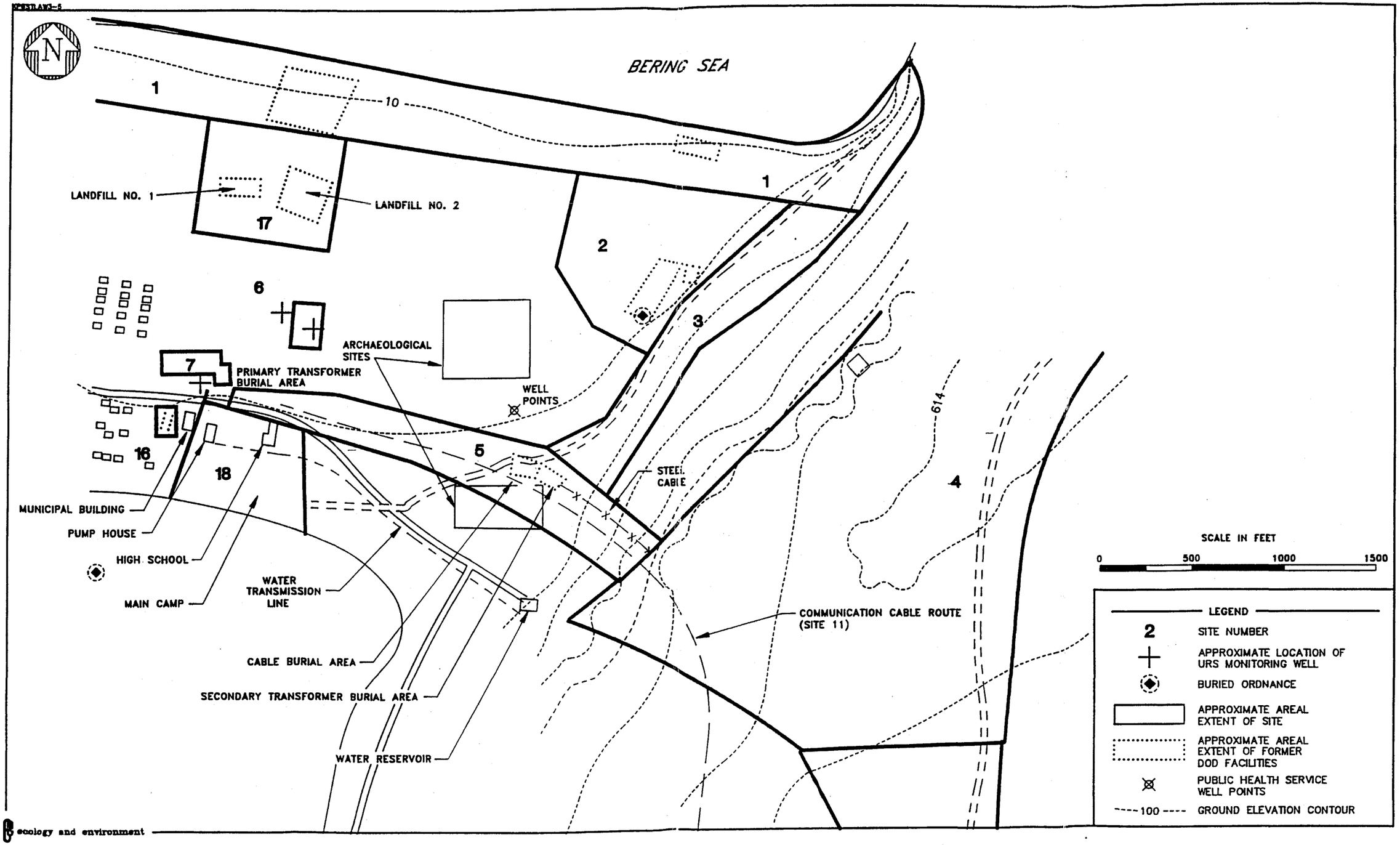

Figure 3-5 SITE 5, FORMER TRAMWAY SITE
SITE 6, MILITARY LANDFILL SITE
SITE 7, FORMER MILITARY POWER FACILITY
LOCATION MAP

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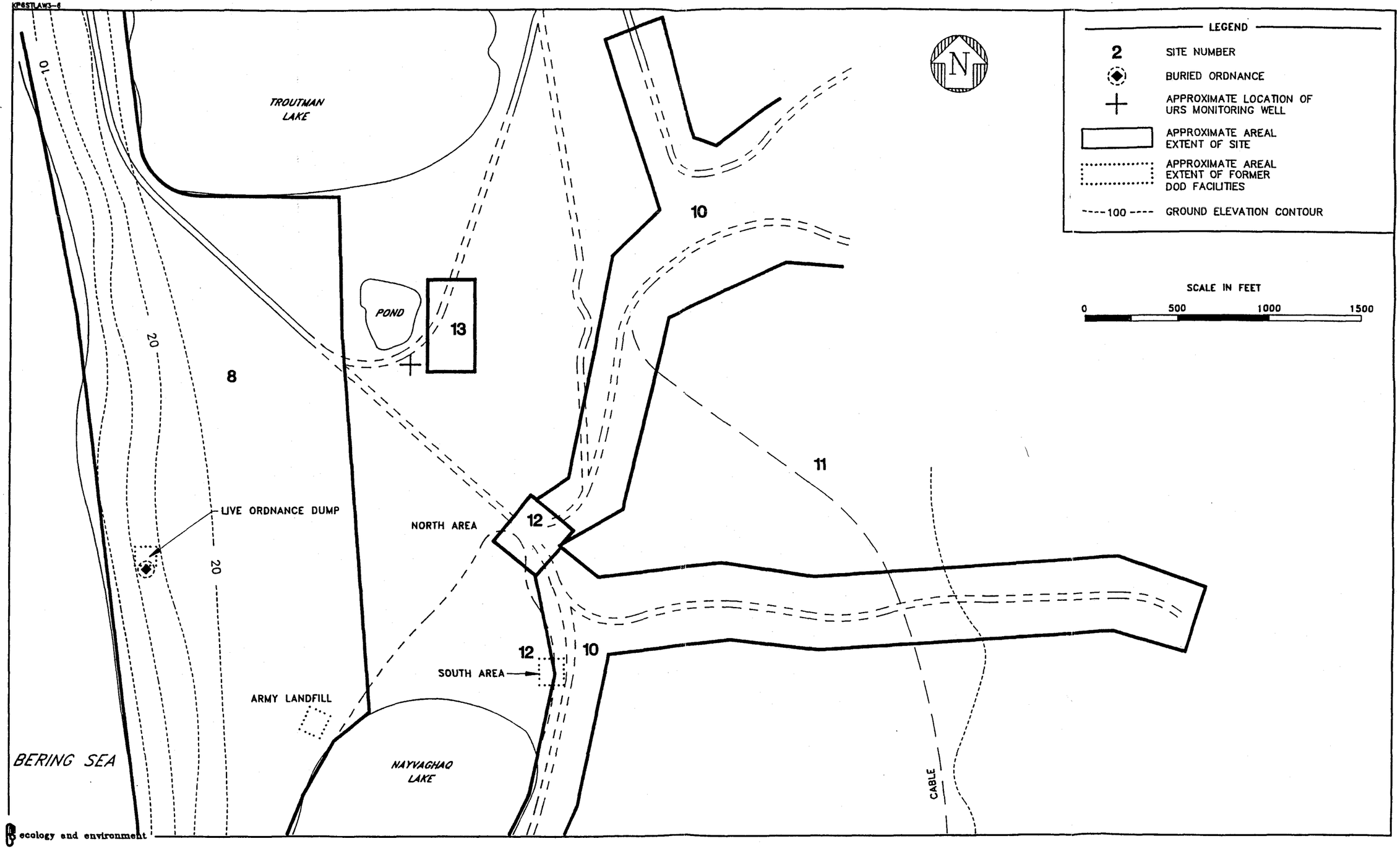

Figure 3-6 SITE 8, ARMY LANDFILL AREA OF WEST BEACH
SITE 12, NAYVAGHAQ LAKE DISPOSAL SITE
AND SITE 13, FORMER RADAR POWER STATION
LOCATION MAP

KP6STLAW3-7

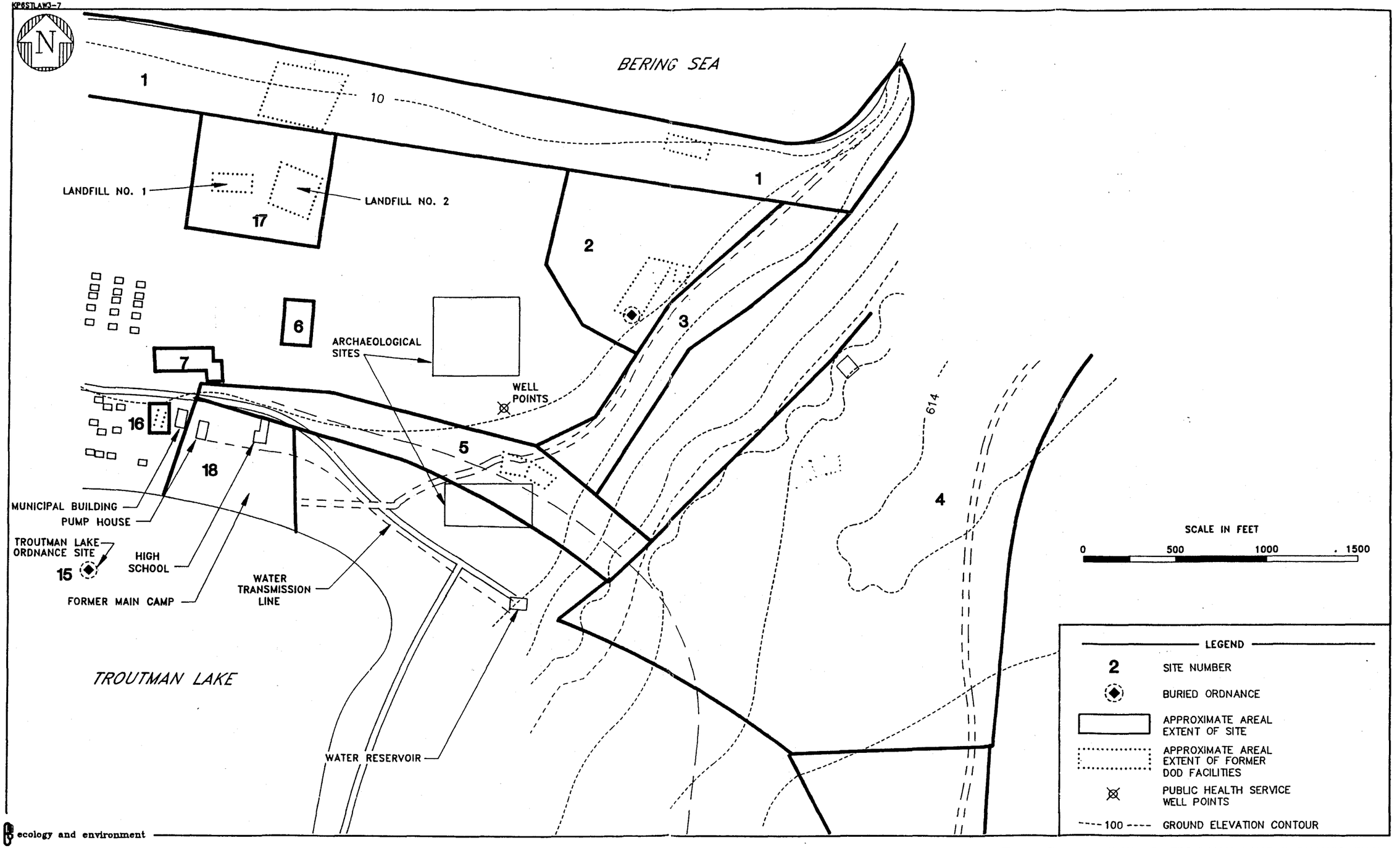

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Figure 3-7 SITE 15, TROUTMAN LAKE ORDNANCE SITE,
SITE 16, GAMBELL MUNICIPAL BUILDING SITE,
SITE 17, ARMY LANFILLS,
SITE 18, FORMER MAIN CAMP
LOCATION MAP

4. SUMMARY AND CONCLUSIONS

4.1 SUMMARY

The materials eligible for DERP-funded cleanup or hazardous waste investigation inventoried at 18 FUDS at Gambell, St. Lawrence Island, are summarized in Table 4-1. The total estimates of eligible materials are:

- 3,501 items characterized as containerized hazardous or toxic waste;
- 1,997 square feet of potentially contaminated soil;
- 85 pounds of other potential hazardous waste;
- 142,613 pounds of unsafe surficial debris;
- 7,105 linear feet of unsafe surficial debris;
- Three areas of buried or submerged ordnance; and
- Two areas of an unknown quantity of exposed potential ACM.

In addition, there are many sites with reportedly buried CON/HTW and other potentially hazardous materials which were not able to be quantified.

4.2 CONCLUSIONS

The surface debris, potentially contaminated surface soils, buried ordnance, buried materials present in areas considered for housing expansion, and buried materials that may affect the groundwater quality are the primary concerns for the residents of Gambell. As

discussed in Section 3, the surface debris represents potential hazards to ATV and snow machine drivers. The potentially contaminated soils are accessible to the general population.

The residents of Gambell are particularly concerned about the dangers inherent in ordnance, especially since the exact burial locations are unknown. The Village of Gambell would like to expand eastward near the Military Landfill (Site No. 6), but it can only do so after the buried material is excavated. However, under DERP guidelines, DOD would only consider excavating buried materials if the results of a sampling investigation indicate a hazard exists. Of particular concern with respect to groundwater are the buried secondary transformers in Site No. 5 because they are located near the planned location of future potable water supply wells.

The following sections provide specific recommendations for sampling to determine the nature and extent of potential contamination of surface staining and from the buried materials.

4.2.1 Recommendations for Future Gambell FUDS Investigation

No sampling was included as part of the Gambell Site Inventory and only limited sampling was performed previously; therefore, a sampling investigation is recommended for Gambell. This investigation should be performed to identify contaminants of concern and the extent of buried materials. To accomplish this task, the sampling investigation should include geophysical surveys at 11 of the 18 FUDS to determine the presence or absence of the reported buried material, in conjunction with soil borings and the installation of monitoring wells to determine the presence or absence of hazardous waste. It is recommended that surface and subsurface soil samples and groundwater samples be collected and submitted to perform analyses for the parameters identified in this report and for modifications recommended during on-site field monitoring (soil-gas headspace).

4.2.2 Recommended Site Characterization Objectives to Support Remedial Action

There are four objectives in characterizing the Gambell FUDS for future remedial action. These objectives are to:

- Characterize the source(s) of potential site contamination and delineate the extent of contamination at each FUDS;

- Characterize the potential surface water and/or groundwater contamination present as a result of the identified sources;
- Assess the potential impact of contamination on identified receptor populations; and
- Assess the logistics of the project area in reference to the potential viable remedial alternatives for this remote location.

Information required for remedial action include the following:

- Soil characteristics relevant to possible incineration,
- Aquifer characteristics relevant to support design of a groundwater remediation system; and
- The viability of a local site for use as secure solid or hazardous waste landfill.

If these objectives are considered, a well-planned sampling investigation should support remedial action without the need for extensive design phase investigation.

Table 4-1

SITE INVENTORY SUMMARY OF POTENTIALLY DERP-ELIGIBLE MATERIALS
ELIGIBLE MATERIALS CLASSIFICATION
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

Site Number	Site Name	CON/HTW (drums, fuel tanks, generators, transformers, and batteries)	HTW (Contaminated Soil) (ft^2)	HTW (Other) (lbs)	Weight of BD/DR (lbs)	Linear Extent of BD/DR (ft)	Ordnance (lbs)	Asbestos (ft^2)
1	North Beach	16	20	40	6,835	360	--	--
2	Former Military Housing/Operations Site	1	2	--	130	--	Unknown	Unknown
3	Former Communication Facility	20	--	--	720	--	--	--
4	Sevuokuk Mountain	51	30	--	6,405	3,805	--	Unknown
5	Former Tramway Site	1	--	--	105	535	--	--
6	Military Landfill	3,000*	--	30	--	--	--	--
7	Former Military Power Facility	--	7		25	70	--	--
8	West Beach	74	--		126,280	2,335	2,000[a]	--
10	Sevuokuk Mountain Trail System	157	4		1,300	--	--	--
11	Communication Cable Route	--	--		--	--	--	--
12	Nayvaghaq Lake Disposal Site	180	--		--	--	--	--
13	Former Radar Power Station	--	9		300	--	--	--
14	Navy Plane Crash Site	--	--		--	--	--	--
15	Troutman Lake Ordnance Burial Site	--	--		--	--	Unknown	--
16	Gambell Municipal Building Site	--	1,925		--	--	--	--
17	Army Landfills	1	--	15	513	--	--	--

Table 4-1

SITE INVENTORY SUMMARY OF POTENTIALLY DERP-ELIGIBLE MATERIALS
ELIGIBLE MATERIALS CLASSIFICATION
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

Site Number	Site Name	CON/HTW (drums, fuel tanks, generators, transformers, and batteries)	HTW (Contaminated Soil) (ft^2)	HTW (Other) (lbs)	Weight of BD/DR (lbs)	Linear Extent of BD/DR (ft)	Ordnance (lbs)	Asbestos (ft^2)
18	Former Main Camp	--	--		--	--	--	--
Totals		3501 items	1,997	85	142,613	7,105	2,000	Unknown

Key:

[a] = Quantity is an estimate reported by Mr. James. These numbers are included because quantities were provided for these sites.

Source: Ecology and Environment, Inc. 1992.

5. REFERENCES

Ackerman, R. E. 1961, *Archaeological Investigations Into the Prehistory of St. Lawrence Island*, Alaska, unpublished Ph. D. Dissertation, University of Pennsylvania, University Microfilms International, Ann Arbor, Michigan.

Alaska Department of Environmental Conservation, January 28, 1991, *Environmental Quality Monitoring and Laboratory Analytical Report*, Laboratory Number 90DEC101703.

Bandi, H. G. 1969, *Eskimo Prehistory*, University of Alaska Press.

Bowers, P. M. 1975, *Preliminary Archaeological Survey of the Proposed State School at Gambell, St. Lawrence Island*, Prepared for the Alaska Division of Buildings and the Gambell Village School Board.

Code of Federal Regulations (CFR), Title 50, Part 17, Endangered and Threatened Wildlife and Plants, 1991, Washington, D.C.

Collins, H. B. 1937, *Archaeology of St. Lawrence Island Alaska*, Smithsonian Miscellaneous Collections, 96 (1).

Crowell, A. L. 1985, *Archaeological Survey and Site Condition Assessment of St. Lawrence Island, Alaska* prepared for the Smithsonian Institution, Washington, D.C. and Sivuqaq, Inc., Gambell, Alaska.

DeChristofaro, A., July 1992, personal communication, Alaska Village Safe Water, conversation with Greg Horner (E & E) during Gambell site inventory (conversation recorded in E & E site logbooks).

Driscoll, F. G., 1986, *Groundwater and Wells*, second Edition, Johnson Filtration Systems.

Ecology and Environment, Inc., (E & E), July 1992, personal communication with Winfred James, Village of Gambell Resident, during Gambell Site Inventories (conversations are included in E & E site logbooks).

Georgette, S., September 15, 1992, personal communication, Subsistence Resource Specialist, Alaska Department of Fish and Game, conversation with S. Wolfe (E & E).

Giddings, J. L. 1960, The Archeology of Bering Strait, Current Anthropology, 1 (2): 121-138.

Holmes, C. E. and R. O. Stern, 1983, *Cultural Resources Survey: Gambell Evacuation Route, St. Lawrence Island* prepared for Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys, Anchorage, Alaska.

James, W., December 16, 1992, telephone conversation with S. Wolfe (E & E).

Patton, W.W., and B. Csejtey, 1980, Geological Map of St. Lawrence Island, Alaska, USGS Miscellaneous Investigation Map No. I-1203.

_____, 1971, *Preliminary Geologic Investigations of Western St. Lawrence Island*, Alaska, USGS Professional Paper No. 684-C.

Romenesko, R., September 1991, N.W. District Engineer, ADEC letter to Merlin Koonooka, Mayor, Gambell, Alaska.

Tobish, T., August 1992, National Audubon Society, personal communication with Susan Wolfe, E & E.

URS Corporation, 1986, *Defense Environmental Restoration Account, City of Gambell and Northeast Cape, St. Lawrence Island, Alaska*, Contract Addendum No. 1, Sampling Plan, Contract No. DACA85-85-C-0036.

_____, 1985, *Defense Environmental Restoration Account, City of Gambell and Northeast Cape, St. Lawrence Island, Alaska*, Volume II, Final Environmental Assessment, Contract No. DACA85-85-C-0036.

Waller, 1959, *Water-Resources Reconnaissance of Gambell and Savoonga Villages, St. Lawrence Island, Alaska*, Prepared In Cooperation With Alaska Department of Health and the Alaska Rural Development Board.

Williams, G., 1992, Gerald Williams, Private Consultant, personal communication with Greg Horner, E & E.

Williams, J., 1970, *Groundwater In The Permafrost Regions of Alaska*, Geologic Survey Professional Paper No. 696, United States Department of The Interior.

Yesner, D. R. 1976, *Archeological Reconnaissance of the Proposed Public Health Service Water System at Gambell, St. Lawrence Island, Alaska, July - August 1976*, prepared for Office of Environmental Health, Public Health Service, Anchorage, Alaska.

APPENDIX A
PHOTOGRAPHIC LOG

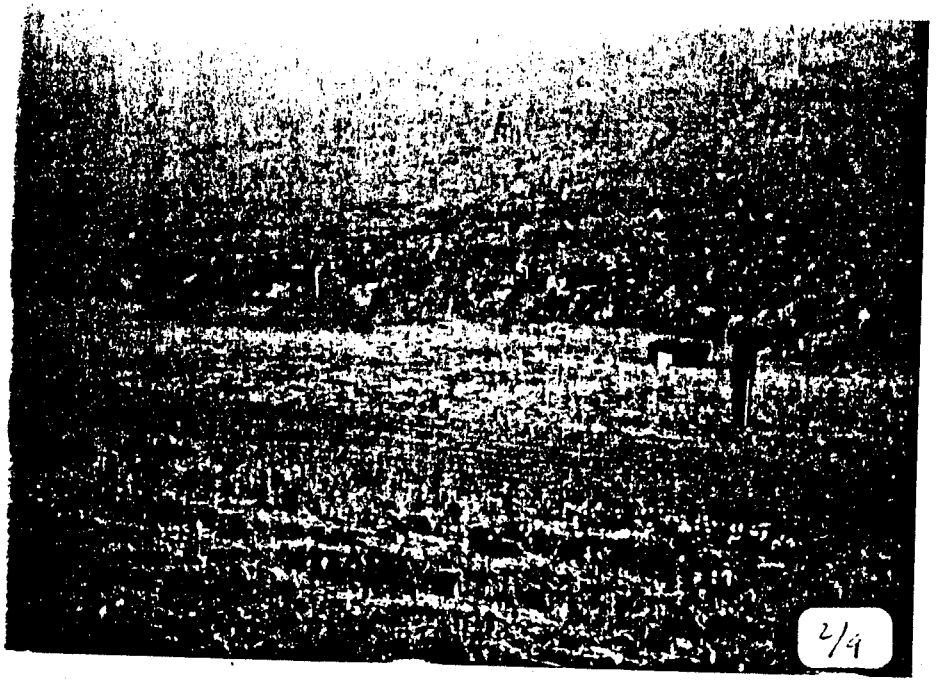
Table A-1

PHOTOGRAPHIC LOG
GAMBELL SITE INVENTORY
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

SITE	ROLL	FRAME	DATE	TIME	DESCRIPTION
1	2	17	7/21/92	1215	Barrels and landing mat located in depression (Army Landing Craft Area).
2	2	8	7/20/92	1645	Half buried apparent fireplace used for benchmark on Site No. 2.
3	2	9	7/21/92	1000	Communications Area.
4	1	7	7/19/92	1350	Southwest, quonset hut location, on ridge over looking Gambell.
4	1	10	7/19/92	1455	Generator and barrels near quonset hut.
4	1	12	7/19/92	1500	Transformer east of quonset hut. Inside tubing surfaces coated with unknown oily substance.
4	1	13	7/19/92	1550	Three transformers located in natural drainage channel southwest of quonset huts (transformer site).
4	1	14	7/19/92	1555	Cable spools at transformer site.
5	1	31	7/20/92	1430	Sonar cable on Sevuokuk Mountain.
6	1	28	7/20/92	1345	Drums on surface.
7	1	26	7/20/92	1122	Concrete pad on Site No. 7, remnants of former power facility.
7	1	27	7/20/92	1215	Cables from transformer burial area.
8	2	23	7/21/92	1640	Landing mat, still in original place, protruding from sand on east side of runway.
8	2	24	7/21/92	1735	Large pile of landing mat debris on east side of runway.
10	3	25	9/14/91	--	Barrels marking Army trail.
11	2	29	7/22/92	1620	Navy sonar pick-up station on Sevuokuk Mountain.
12	1	19	7/19/92	1750	Barrels and batteries.
12	1	20	7/19/92	1810	Barrel dump, south area of Site No. 12.
14	3	12	9/13/91	--	Navy plane crash debris.
14	3	19	9/13/91	--	Navy plane crash debris.
16	1	22	7/20/92	1051	North, boundaries of Site No. 16.
18	1	23	7/20/92	1055	Unknown white solid material and barrels on north end of Troutman Lake.

Key:
-- = Not applicable.

Source: Ecology and Environment, Inc. 1992.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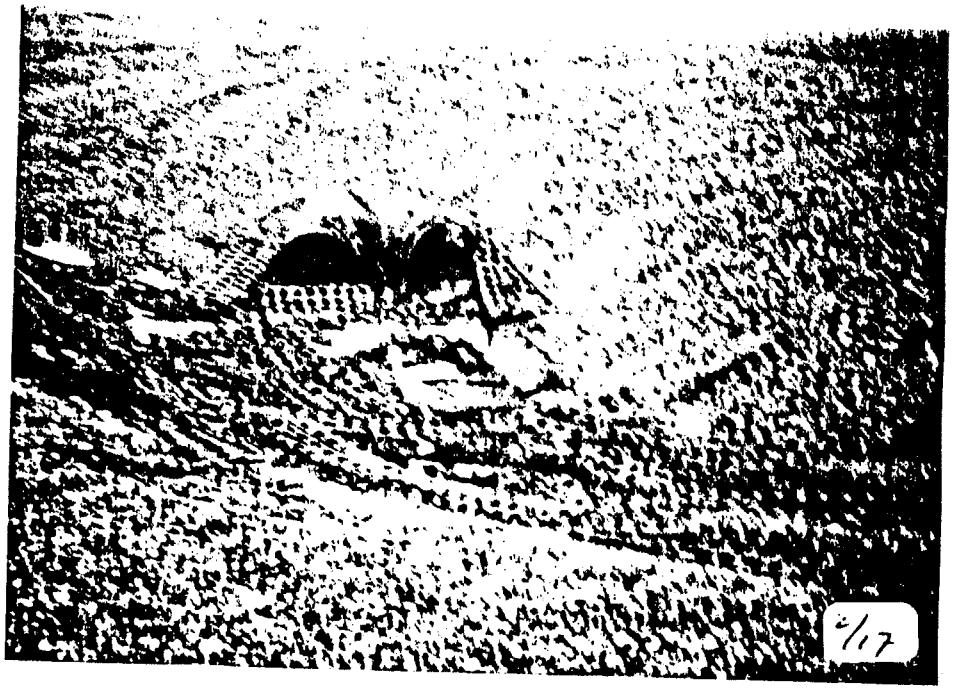
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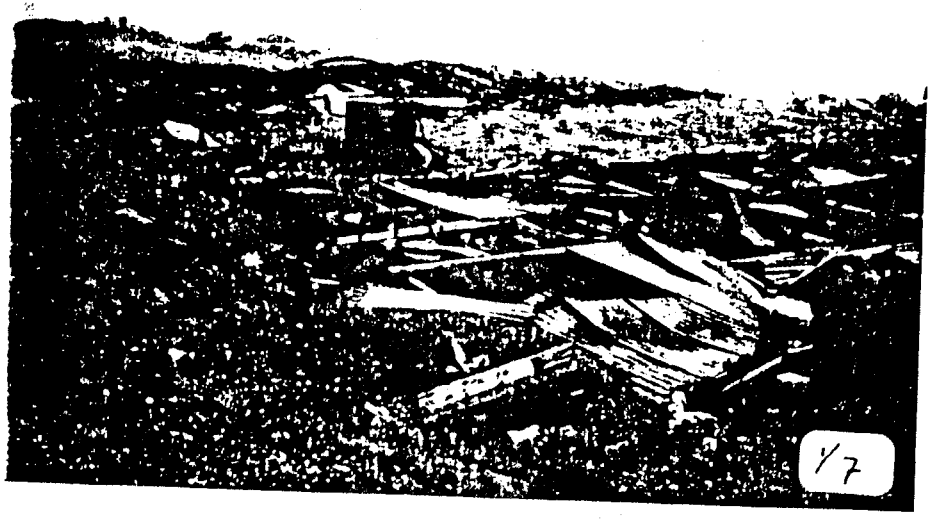
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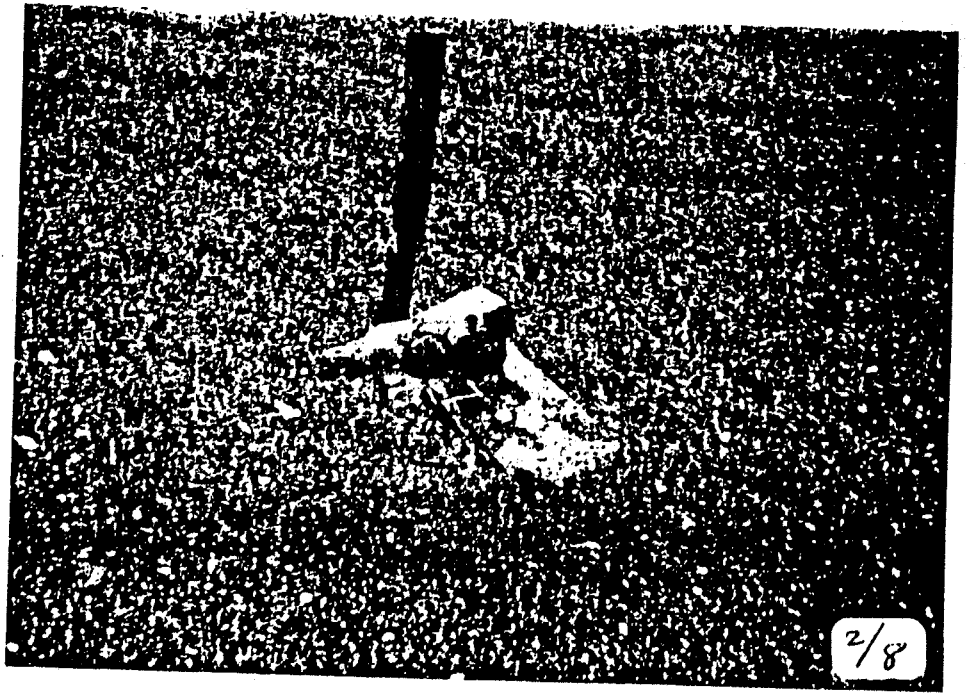
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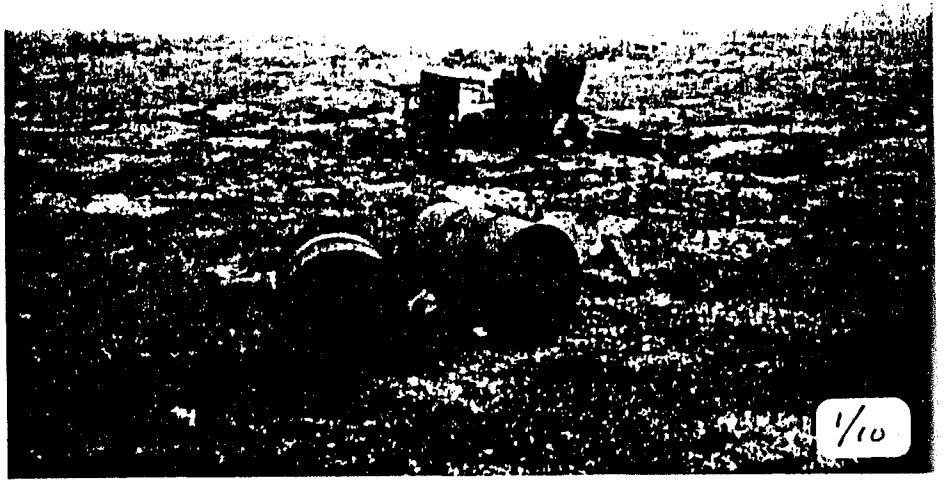
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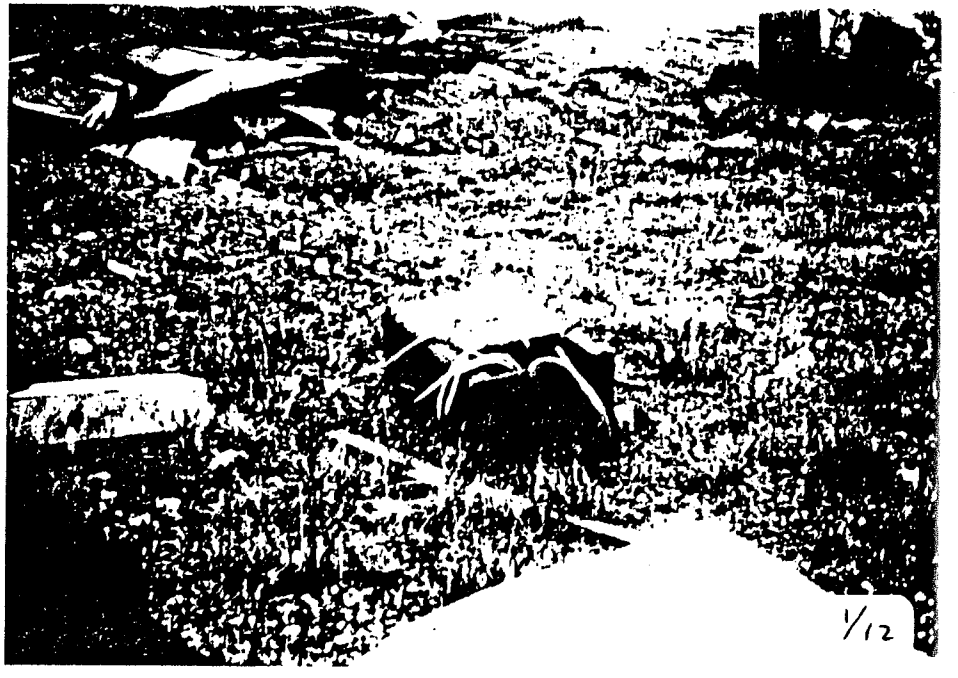
1/14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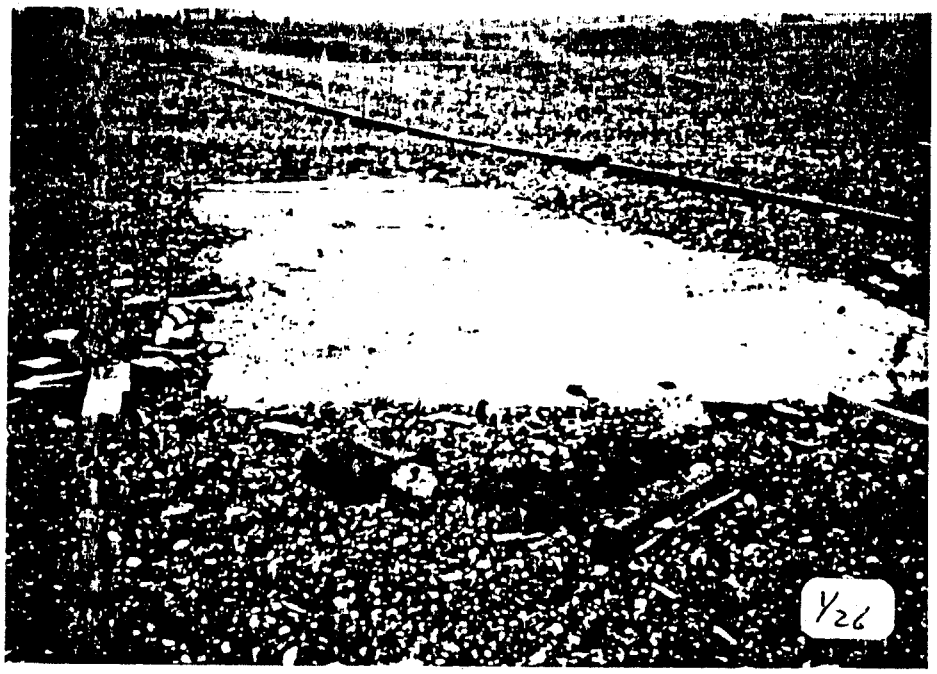
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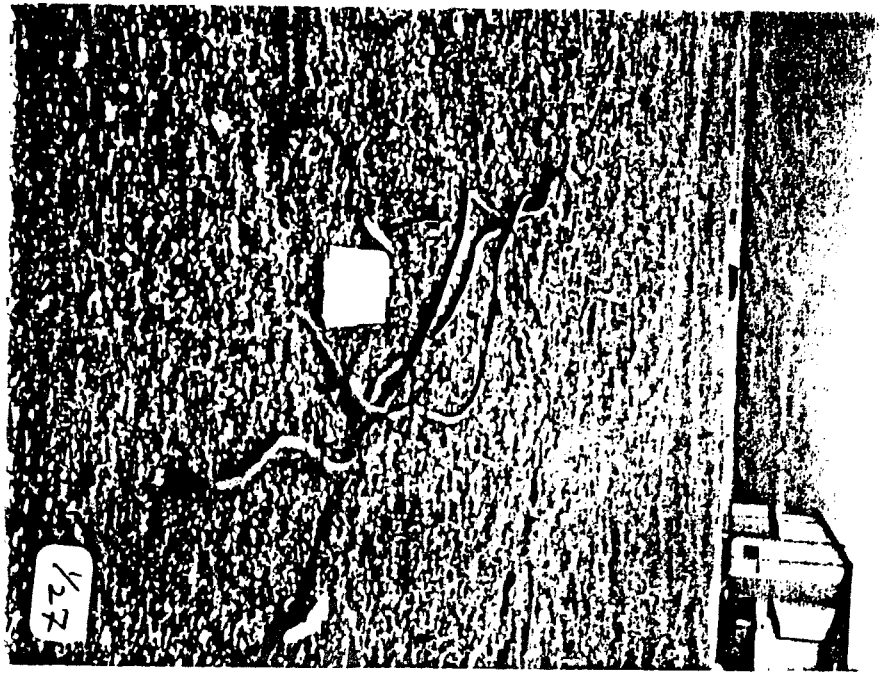
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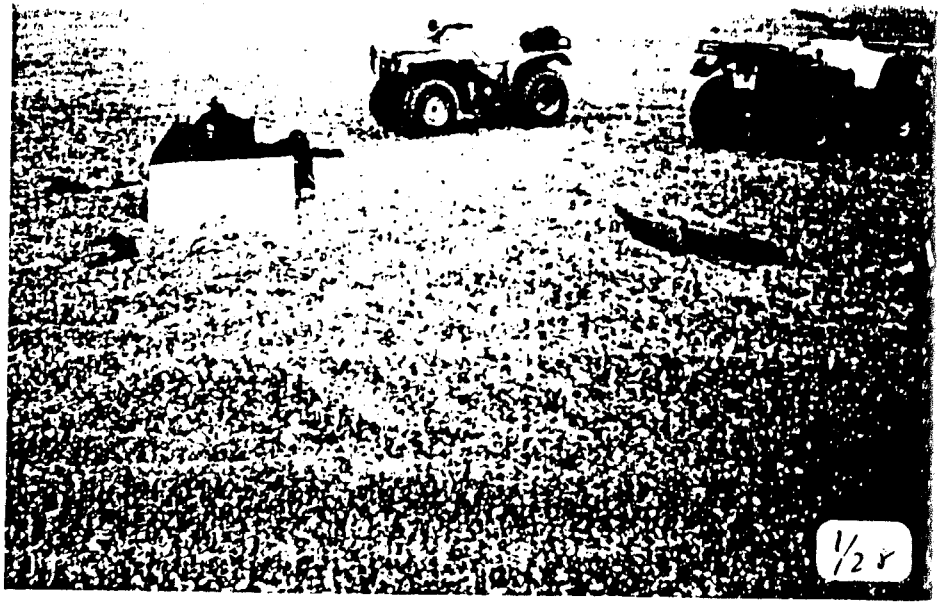
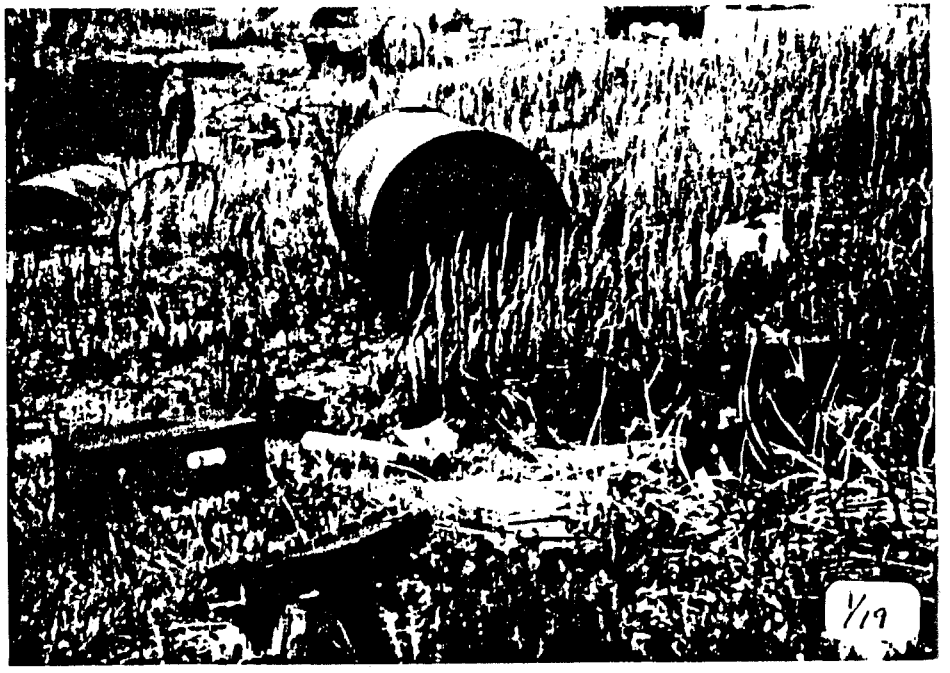
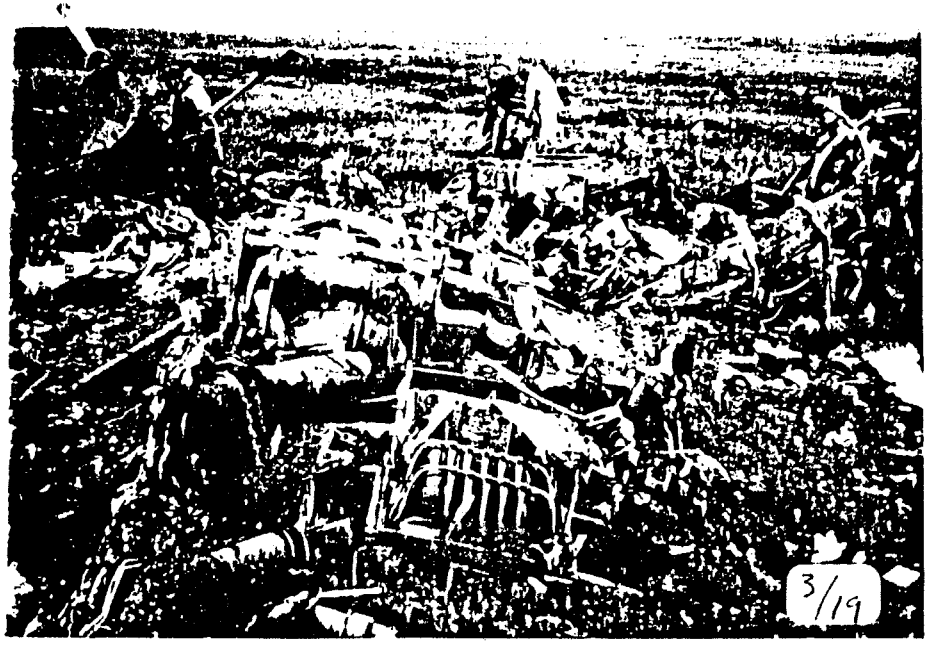

1/28

recycled paper






1/22


1/23