FINAL
PHASE II REMEDIAL INVESTIGATION

GAMBELL, ALASKA

Prepared for:

U.S. Army Engineer District, Alaska (Alaska District)

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Prepared by:

Montgomery Watson
4100 Spenard Road
Anchorage, Alaska 99517

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AC&WS	Aircraft Control and Warning Station
ACHP	Advisory Council on Historic Preservation
ADEC	Alaska Department of Environmental Conservation
Alaska District	United States Army Corps of Engineers, Alaska District
ATV	all-terrain vehicle
BD/DR	building demolition/debris removal
bgs	below ground surface
BLM	Bureau of Land Management
BNA	base neutral and acid extractable compounds
BTEX	benzene, toluene, ethylbenzene, xylenes
CDAP	Chemical Data Acquisition Plan
CFR	Code of Federal Regulations
cm^2	centimeter squared
CON/HTRW	contaminated hazardous toxic or radiological waste
CQAR	Chemical Quality Assurance Report
DERP	Defense Environmental Restoration Program
DOD	United States Department of Defense
DRO	diesel range organics
E&E	E&E Environmental
EPA	United States Environmental Protection Agency
F	Fahrenheit
FUDS	Formerly Used Defense Sites
gpm/ft	gallons per minute per foot
GPR	ground penetrating radar
IDW	investigative-derived wastes
kW	kilowatt
LOAEL	lowest-observed-adverse-effect level
mg/kg	milligrams per kilogram
MSL	mean sea level
NHPA	National Historic Preservation Act of 1966
NPDL	North Pacific Division Laboratory
PCBs	polychlorinated biphenyls
PCDF	polychlorinated dibenzofurans
pg/g	picograms per gram
ppt	parts per trillion
QA	quality assurance
QA/QC	quality assurance/quality control
QC	quality control
RAATM	Remedial Action Alternatives Technical Memorandum
RfD	reference dose
RI	Remedial Investigation
SHPO	State Historic Preservation Office
SOW	scope of work

TCDD	tetrachlorodibenzodioxin
TRPH	total recoverable hydrocarbons
ug/dl	micrograms per deciliter
ug/kg	micrograms per kilogram
URS	URS Corporation
USGS	United States Geological Survey
VOCs	volatile organic compounds

EXECUTIVE SUMMARY

This report presents the results of the Phase II Remedial Investigation (RI) performed at the Gambell Site on St. Lawrence Island, Alaska, during July and August 1996. Gambell is located on the northwest tip of St. Lawrence Island in the western portion of the Bering Sea, approximately 200 air miles southwest from Nome, Alaska, and 39 air miles from the Siberian Chukchi Peninsula. The RI was performed as part of the United States Army Corps of Engineers, Alaska District (Alaska District) Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP-FUDS) Contract No. DACA85-93-D-0011. Originally, 18 sites were identified as part of the RI effort. As a result of a 1994 Phase I RI conducted by Montgomery Watson, five sites were identified as areas where additional data collection efforts were necessary to further quantify the extent of contamination.

The 18 sites identified as part of the RI, including the background site, are listed below. Sites retained as part of the Phase II RI are denoted with an asterisk; areas retained within sites are denoted in bold.

*Site 1	North Beach:
	Area 1A-Army Landing Area
	Area 1B-Air Force Landing Area
***Site 2**	**Former Military Housing/Operations Site**
***Site 3**	**Former Communications Site**
*Site 4	Sevuokuk Mountain:
	Area 4A-Quonset Hut Area
	Area 4B-Former Radar Station
	Area 4C-Stream Drainage at South End of Mountain
	Area 4D-Transformers in Mountainside Drainage
***Site 5**	**Former Tramway Site**
	[Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5," by Montgomery Watson in 1999.]
Site 6	Military Landfill
Site 7	Former Military Power Site/Former Motor Pool
Site 8	Army Landfill
Site 9	Asphalt Barrel Cache
Site 10	Sevuokuk Mountain Trail System
Site 11	Communications Cable Route
Site 12	Nayvaghaq Lake Disposal Site
Site 13	Former Radar Power Station
Site 15	Troutman Lake Ordnance Burial Site
Site 16	Gambell Municipal Building Site
Site 17	Army Landfills
Site 18	Former Main Camp
Background Site	

The site-specific reasons for concern and Phase II activities performed at the investigation areas are as follows:

Site	Reason for Concern	Phase II Activity Performed
Site 1	Partially exposed military debris, dangerous to ATV and snowmobile traffic.	All easily removed exposed debris collected, barged to Seattle for recycling.
Site 2	Elevated levels of lead and other metals detected in surface soils.	Additional surface soil sampling performed to delineate the areal extent of elevated lead.
Site 3	Diesel range organics (DROs), beryllium, and thallium found at a depth of 5 feet.	Surface soil sampling was performed to evaluate the presence of beryllium and thallium at the surface.
Site 4/Area 4B	Trace levels of dioxins and several priority pollutant metals were detected in surface soils.	Further surface soil sampling was performed to evaluate extent of contamination of priority pollutant metals.
Site 4/Area 4D	Trace levels of PCBs detected in sediments.	Wipe sampling was performed on three transformers for disposal characterization.

Results of the Phase II sampling program indicated no significant surface soil or groundwater contamination at Sites 2, 3, 4B and 4D. Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999).

This study indicates that only Site 4/Area 4B, investigated in the Phase I and Phase II RIs, warrants cleanup or removal of contaminated media. Contaminated soil removal at this site is planned to be completed during BD/DR removal activities. There is a significant amount of debris on the ground surface and subject to exposure by erosion along North Beach that has been identified for removal under the DERP-FUDS categories for removal action. These removal action categories include building demolition and debris removal (BD/DR) and containerized hazardous toxic or radiological waste (CON/HTRW). All visible surface debris on North Beach was removed or cut below the gravel surface and then barged during the 1997 field season to Seattle for recycling (Montgomery Watson, 1997a).

1. INTRODUCTION

Pursuant to Contract No. DACA85-93-D-0011, the United States Army Corps of Engineers, Alaska District (Alaska District), requested that Montgomery Watson address areas where further collection of data was necessary to resolve the extent of contamination at Gambell, St. Lawrence Island, Alaska. This Phase II RI has been prepared according to the guidelines of the DERP-FUDS of the United States Department of Defense (DOD).

A previous delivery order (DACA85-93-D-0011, Delivery Order No. 0003) provided for a Phase I RI. The objectives of the Phase I RI were to gather sufficient chemical, geophysical, and hydrogeological data to identify and characterize sites requiring remediation, and to develop remedial alternatives. Field work for the Phase I RI was completed in 1994; the Phase I RI report, completed in January 1995 (Montgomery Watson, 1995a), presented the results of the field investigations, chemical sampling and analysis, and quality assurance/quality control (QA/QC) activities performed during the investigation.

This Phase II RI report includes seven sections and four appendices describing remedial investigation activities, analytical results, data interpretation, and recommendations for closure. These sections are:

Section 1 Introduction - contains information on project objectives, site background, regional setting, and individual site descriptions.

Section 2 Investigation Approach and Procedures - explains investigation methods and procedures.

Section 3 Results of the Investigation - contains specific information on geophysical surveys conducted, laboratory analytical results, and possible sources of contamination

Section 4 Site Evaluation – describes a phased approach to evaluating areas of concern.

Section 5 Remedial Action – lists waste and debris eligible for removal from Gambell.

Section 6 Conclusions and Recommendations – presents conclusions based on Phase II RI efforts and recommendations for future activities on Gambell.

Section 7 References – documents sources of information used to complete this Phase II RI report.

Appendix A Field Forms – contains sampling field note forms, a residents' survey, and field surveys.

Appendix B Laboratory Analytical Results Summary – presents a summary of laboratory analytical results.

Appendix C Alaska District North Pacific Division Laboratory (NPDL) CQAR – includes a copy of the Chemical Data Quality Assurance Report (CQAR) done by the Alaska District on data from the Phase II RI.

Appendix D Summary of Applicable Regulatory Criteria – lists regulations pertinent to the Gambell site.

1.1 PROJECT OBJECTIVES

The objective of the Phase II RI activities was to collect additional environmental samples to fill data gaps from the Phase I RI.

1.2 PROJECT DESCRIPTION

The objective of project activities was to address the need for additional sampling information concerning contaminants in soil and groundwater at the site. The field activities included the following tasks:

- Wipe-sampling three transformers (which were subsequently transported to Seattle for recycling).
- Performing individual investigative site reconnaissance, North Beach debris exposure reconnaissance, and radiological surveys at all known landfill locations and the burn site at Site 4/Area 4B (Former Radar Site).
- Collecting surface soil samples to further delineate the extent of contamination at three sites (Sites 2, 3, and 4) for the purposes of assessing the extent of contamination.
- Mapping all sample locations using measurements from previously mapped features and current surveys.
- Collecting groundwater samples to determine potential groundwater impacts adjacent to Gambell's water supply.
- Investigating the geophysical anomalies identified during the 1996 geophysical survey at Site 5 (Montgomery Watson, 1997b).
- Collecting nine subsurface soil samples at Site 5 to further delineate any risk to the new village water well.
- Constructing and sampling five additional monitoring wells to further delineate any risk to the new village water well.

- Developing groundwater contours to help evaluate any possible impact to the new village water well.

The last five tasks are described in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999).

1.3 SITE DESCRIPTION/BACKGROUND INFORMATION

Site description and background information contained in this Phase II RI has been summarized from previous documents about the Gambell site and updated by current field conditions identified during the 1996 Phase II investigation. Further site description and background information can be found in the documents listed below:

- Site 5 Remedial Investigation, Gambell, St. Lawrence Island, Alaska, Montgomery Watson, 1999.
- Final Investigation of Geophysical Anomaly, Gambell, St. Lawrence Island, Alaska, Montgomery Watson, December 1997b.
- Remedial Action Alternatives Technical Memorandum, Gambell, St. Lawrence Island, Alaska, Montgomery Watson, November 1995b.
- Remedial Investigation, Gambell, St. Lawrence Island, Alaska, Montgomery Watson, January 1995a.
- Chemical Data Acquisition Plan, Site Inventory Update, Gambell, St. Lawrence Island, Alaska, E&E, February 1993.
- Site Inventory Report, Gambell Formerly Used Defense Site, St. Lawrence Island, Alaska, E&E, December 1992.

1.3.1 Location

Gambell is located off the coast of western Alaska (Figure 1-1) on the northwest tip of St. Lawrence Island (Figure 1-2) in the western portion of the Bering Sea, approximately 200 air miles southwest of Nome, Alaska. The island is accessible by boat or regularly scheduled commercial airline from the city of Nome. Gambell is 39 air miles from the Siberian Chukotsk Peninsula. The Village of Gambell is built on a gravel spit which projects northward and westward from the island. The location of the site is 63 degrees 47 minutes north latitude and 171 degrees 43 minutes west longitude, in Township 20 south, Range 67 west, Kateel River Meridian.

1.3.2 Site Description

The Gambell site encompasses approximately 2.7 square miles of the island, and it extends from the top of Sevuokuk Mountain (at an elevation of approximately 620 feet above mean sea level) to the sea. The area of the Village of Gambell is relatively flat, with an elevation range of sea level to approximately 15 feet mean sea level (MSL). There are no standing military structures present at the site.

1.3.3 Site History

The Gambell site was used by the U.S. Army, U.S. Navy, and U.S. Air Force from approximately 1948 until the late 1950s. Various facilities around the Village of Gambell were constructed to provide housing, communications, and other military functions. The U.S. Air Force operated an Aircraft Control and Warning Station (AC&WS) as early as 1948, but the site was abandoned about 1956 when a similar facility was constructed at Northeast Cape on the northeast end of St. Lawrence Island (E&E, 1992). The Army operated a base at Gambell that reportedly supported several hundred personnel. A search of historical record failed to yield base plans or site information for the Army installation (URS, 1986). However, according to Winfred James, a local Gambell resident, the army was active in Gambell from 1954 to 1957 (E&E, 1992). Extensive background research into Naval activities at Gambell yielded no pertinent information. The Air Force land was transferred to the Bureau of Land Management (BLM) in 1962, and the Army's land was transferred to BLM in 1963. All DOD structures were demolished, burned, or scavenged and the debris buried on-site.

St. Lawrence Island is currently owned jointly by Sivuqaq, Inc., in Gambell, Alaska, and Savoonga Native Corporation, in Savoonga, Alaska. Land not owned by Alaska Natives on St. Lawrence Island is limited to state lands used for airstrips and related facilities in Gambell (Montgomery Watson, 1995a). The area around the Village of Gambell is classified as a Formerly Used Defense Site (FUDS) under DERP.

The Village of Gambell is inhabited primarily by Alaska Native Yupik people who lead a subsistence-based lifestyle. The Gambell area supports habitat for a variety of seabirds, waterfowl, and mammals that either breed in or visit the area. The area surrounding the top of Sevuokuk Mountain supports a large bird rookery. The birds and bird eggs serve as a subsistence food source to the local inhabitants. The ocean surrounding the Gambell area is used extensively for subsistence hunting of walrus, seal, sea birds, polar bear, and whale.

1.3.4 Previous Investigations

In 1985, URS Corporation (URS) conducted a file search and preliminary reconnaissance of the Gambell site (URS, 1986). The site reconnaissance included an inventory of materials left by the military, and collection of a limited number of soil and water samples. The samples were analyzed for physical, biological, and chemical characteristics. Soil samples were analyzed for polychlorinated biphenyls (PCBs). Surface water and groundwater samples from six wells were analyzed for oil and grease, PCBs, volatile organic compounds (VOCs), metals, and secondary

water quality parameters. Sampling occurred at Sites 2,3,4/Area 4B, 4/Area 4D, 6, 7, and 13. No PCBs were detected in either soil or water. No contamination was found at Site 4/Area 4B and Site 4/Area 4D. The URS sample locations were not clearly defined and the validity of the data is unknown (it is unclear whether or not the metals samples were filtered). In general, elevated concentrations of metals in groundwater found by URS were not substantiated by the results of the Phase I RI performed by Montgomery Watson.

The Alaska District awarded a contract for overall cleanup work on St. Lawrence Island in the fiscal year 1986. This contract was terminated in April 1986, at a cost of over $1 million without any on-site construction. This contract termination reportedly occurred because the local Native Corporations were unwilling to provide a Letter of Non-Objection to the Alaska Department of Environmental Conservation (ADEC) agreeing to Solid Waste Disposal Permits as required in the construction contract. In February 1988, a formal Land Use Agreement and Letter of Agreement regarding access right-of-way and solid waste disposal for the island was developed by the Alaska District and the local Alaska Native Corporations (ADEC, 1991a).

In July 1991, ADEC, Nome District, visited Gambell in order to respond to concerned citizens' complaints about military hazardous waste at Gambell and to sample the water in Troutman Lake and Troutman Creek. The lake and creek water were analyzed for PCBs, VOCs, herbicides, pesticides, and metals. Analysis of the sample results concluded that Troutman Creek and Troutman Lake were not contaminated by chemicals (ADEC, 1991b).

In 1991 and 1993, Ecology and Environment (E&E) conducted site reconnaissance visits and interviewed individuals living at Gambell during the period of DOD occupation. E&E completed a Site Inventory Report (E&E, 1992) as well as a Chemical Data Acquisition Plan (E&E, 1993). The Chemical Data Acquisition Plan (CDAP) by E&E served as a Work Plan for the Phase I RI performed by Montgomery Watson.

A Phase I RI was completed by Montgomery Watson in 1995 under contract to the Alaska District in accordance with the requirements of the Scope of Work (SOW) for Contract No. DACA85-93-D-0011, Delivery Order No. 003.

The objectives of the Phase I RI (Montgomery Watson, 1995a) were to gather sufficient chemical, geophysical, and hydrogeological data to identify and characterize sites requiring remediation, and to develop remedial alternatives for these sites. The RI report presented the results of the field investigations, chemical sampling and analysis, and QA/QC activities performed during the investigation. Eighteen sites, including the Background Site, were identified as part of this RI effort and were either sampled, or observed and photographed during a walk-through. Sites at which further evaluations were recommended are denoted in bold in the list below, and are also shown on Figure 1-3.

*Site 1 North Beach:
Area 1A-Army Landing Area
Area 1B-Air Force Landing Area
***Site 2 Former Military Housing/Operations Site**

***Site 3**	**Former Communications Site**
*Site 4	Sevuokuk Mountain:
	Area 4A-Quonset Hut Area
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In the Phase I RI, sampling results from the investigated sites were compared to conservative benchmark criteria in order to identify sites in which further evaluation was recommended. Many sites were removed from further consideration because contamination was not present, was present at concentrations below benchmark criteria, or site-specific criteria showed no risk to human health or the environment.

Further site description and background information can be found in Section 1 of Montgomery Watson's RI report (Montgomery Watson, 1995a) and the Remedial Action Alternatives Technical Memorandum (Montgomery Watson, 1995b).

1.4 REGIONAL SETTING

In Section 1.4, various aspects of the Gambell site regional setting are briefly described, including climate, topography, geology, hydrogeology, hydrology, demography, land use, ecology and archaeology.

1.4.1 Climate

St. Lawrence Island has a cool, moist, subarctic maritime climate with some continental influences during winter, when much of the Bering Sea is capped with pack ice. Winds and fog

are common; precipitation occurs approximately 300 days per year as light rain, mist or snow. Annual snowfall is about 80 inches per year. Annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 34° F and 48° F, with a record high of 65°F. Winter temperatures range from -2°F to 10°F, with an extreme low of -30°F (URS, 1985). Freeze-up normally occurs in October or November, and breakup normally occurs in June.

The wind is generally in a northerly to northeasterly direction from September to June, and southwesterly in July and August. Winds exceeding 10 knots occur 70 percent of the time, and winds average 20 knots in winter months. The average wind speed is 16 knots with winds exceeding 10 knots 70 percent of the time (USKH, 1993).

1.4.2 Topography

The Village of Gambell is located on a gravel spit which projects north and westward from the island into the Bering Sea (Figure 1-2). Gambell is relatively flat, with an elevation range of sea level to approximately 30 feet MSL (E&E, 1992). Sevuokuk Mountain forms the eastern boundary of the gravel spit and rises steeply to a height of approximately 619 feet (URS, 1985). The spit is relatively barren and is sparsely covered by beach grass. Tundra is present near moist areas at higher elevation, such as Sevuokuk Mountain.

1.4.3 Geology

A reconnaissance investigation of the geology of St. Lawrence Island was conducted by the U.S. Geological Survey (Patton and Csejtey, 1971, 1980). The island is composed of older sedimentary rocks (limestone, graywacke, and shale), granitic rocks (monzonite), and Quaternary basalt and unconsolidated surficial deposits.

The Gambell Village area is underlain by highly permeable, unconsolidated Quaternary gravels, with minor coarse sands, over continuous permafrost occurring at 3 to 15 feet below ground surface (bgs). The gravels have strong linear topographic expressions and were likely deposited as successive beach ridges. The gravels may be deposited on an underlying wave-cut terrace of the same bedrock which composes Sevuokuk Mountain (Patton and Csejtey, 1971). The boundary of relatively flat-lying gravel of the Gambell Village area and the granitic rocks of Sevuokuk Mountain consists of several colluvial aprons formed by erosion of bedrock highlands.

Sevuokuk Mountain is composed of Cretaceous quartz monzonite, a gray, coarsely crystalline granite rock rich in quartz and feldspars. The Cretaceous quartz monzonite of the Sevuokuk Mountain Pluton is exposed along the cliffs and higher elevations on the island. Exposed outcrops of quartz monzonite are coarsely crystalline and massive, with widely-spaced (1 foot to 3 feet) joints (Montgomery Watson, 1995a). A ground penetrating radar (GPR) survey conducted 80 feet west of the base of Sevuokuk Mountain, north of Site 5 (Former Tramway Site) located the contact between the gravel deposits and bedrock at a depth of approximately 20 feet. Radar signatures from the bedrock suggest it is fractured or jointed (Golder, 1994). This

is consistent with surface expressions of the quartz monzonite. The mountain is topped by a flat, wave-cut plateau.

Additional information on soils in the Gambell area is available in the following documents:

- Soil Investigation/Bering Straights Regional Housing Authority, Gambell, Alaska (Duane Miller & Associates, 1995).
- Analysis of Potable Water-Supply Options, Gambell, Alaska (Munter and Williams, 1992).
- Geotechnical, Geophysical & Soil Groundwater Quality Studies, Gambell, Alaska (RZA, 1985).

1.4.4 Hydrogeology

Groundwater occurs within the highly permeable gravels under much of the Gambell area and as shallow subsurface water recharged from the slopes of Sevuokuk Mountain. Groundwater has been encountered at depths ranging from 2 to 17 feet, and is postulated to perch above continuous permafrost. In several local areas, permafrost acts as an impermeable layer. Shallow groundwater beneath Gambell does not appear to be continuous because of the presence of shallow permafrost (Munter and Williams, 1992).

During the Phase I RI, permafrost was encountered as shallow as 3 feet bgs south of Troutman Lake, and as deep as 15 feet in the central Gambell area. Along the coastline, permafrost was not encountered. Thin lenses of gravels with an ice matrix occur at various depths above the permafrost horizon. These lenses are discontinuous and are several inches to 1 foot thick. This ice granulates and shatters easily during sampling. These thin layers are not likely to remain permanently frozen, and they are not considered year-round impermeable layers. The perched aquifer is thick in areas where the permafrost surface is deeper, and thin or not present in areas of shallow ice. Along the shorelines and the base of Sevuokuk Mountain, permafrost is encountered at deeper depths than in the central Gambell area.

Beyond the obvious role of climatic conditions, permafrost and groundwater distribution may be controlled by environmental conditions unique to the Gambell area, including tidal activity along the shoreline and surface water recharge.

The sandy-gravelly spit material in which the Gambell site is located consists of a selective depositional environment determined by the confluence of long-shore currents. These currents tend to transport sediments northward along the western side of St. Lawrence Island where, at the northernmost tip, a reduction in transfer energy permits the deposition of medium-coarse sands and fine gravels, forming the existing spit (URS, 1985).

Based on slug test data collected at the site, the hydraulic conductivity of the coarse sand and gravels underlying the Gambell spit are in the range of 30 to 1,500 feet/day (Montgomery

Watson, 1995a). Specific capacity measurements of 200, 86, and 100 gpm/ft taken at three monitoring wells during the Phase I RI also indicate a high transmissivity.

Additional information on groundwater dynamics in the Gambell area is available in the following documents:

- Remedial Investigation, Gambell, St. Lawrence Island (Montgomery Watson, 1995a)
- Evaluation of Ground Water at a Proposed Wastewater Disposal Site, Gambell, Alaska (Munter, 1994)
- Water Hydrological Data, Water-Resources Reconnaissance of Gambell and Savoonga Villages, St. Lawrence Island, Alaska (Alaska Department of Health, 1959)
- Presentation of Data from the Gambell, Alaska Well Project (Ireland, 1994)
- Aquifer Exploration, Exploitation and Dynamics at Gambell, St. Lawrence Island, Alaska (Munter and Knoll, 1993)
- Analysis of Potable Water-Supply Options, Gambell, Alaska (Munter and Williams, 1992)
- Geotechnical, Geophysical & Soil Groundwater Quality Studies, Gambell, Alaska (RZA, 1985)

1.4.5 Hydrology

Due to the highly permeable gravels over continuous permafrost on which Gambell is built, standing water is localized. Surface water features in the vicinity of Gambell consist of Troutman Lake and Nayvaghaq Lake. These lakes are similar in characteristics to lagoons. The acreage of these lakes is estimated as 574 and 93 acres, respectively; however, seasonal climactic changes may affect the water levels and extent of the lakes. Based on measurements of specific conductivity, both are brackish. Brackish water is caused by storm surges which are reported to break over the spit periodically (Munter and Williams, 1992).

Numerous small, ephemeral ponds and bogs are present on the tundra east of Troutman and Nayvaghaq Lakes. The plateau of Sevuokuk Mountain supports wet tundra and bogs; small stream channels drain the western slopes of Sevuokuk Mountain. Many of these stream channels reach the base of the mountain and turns north to discharge into the "cannon shape" aquifer whose gradient leads to the ocean along the western edge of Sevuokuk Mountain (Figure 1-4). The influence of warm recharge water from Sevuokuk Mountain has produced a throw bulb effect on the area permafrost, resulting in a deeper permeable aquifer. This aquifer is surrounded by shallow, impermeable permafrost (Ireland, 1994).

1.4.6 Demography and Land Use

According to the U.S. Census Bureau, the 1990 year-round population of Gambell was 525 persons, with 505 of Yupik descent (U.S. Census Bureau, 1996). There are 164 (1998) homes in the village, two stores, and municipal, community, and educational buildings.

1.4.7 Ecology and Sensitive Environments

The Gambell area supports habitat for a variety of seabirds, waterfowl, and mammals that either breed in or visit the area. The ocean surrounding the Gambell area is used extensively for subsistence hunting of walrus, seal, sea birds, polar bear, and whale.

Vegetation

Vegetation in the gravel spit areas of Gambell is rare. Where present in other areas at higher elevation, vegetation in the Gambell area is classified as moist tundra, and is dominated by heaths, grasses, sedges, mosses, and lichen with prostrate dwarf birch and willow. These plants are typically growing on 1 to 3 feet of undecayed organic mat over saturated and frozen soil. Wet tundra is found in the low marshy/bog areas, while alpine tundra (dwarf, prostrate plants including heaths and tundra species adapted to dry, thin soil conditions) is found on the slopes and exposed ridges primarily on Sevuokuk Mountain (USKH, 1993). Military activities, private all terrain vehicles (ATVs), and other community activities have ravaged most of the vegetation on the coarse gravels and sand around Gambell and Troutman Lake (URS, 1985).

Birds

Birds inhabiting the Gambell area include seabirds, waterfowl and geese, other water birds, raptors, and passerine species (USKH, 1993). St. Lawrence Island provides habitat for a majority of the seabirds in the northern Bering Sea. Seventeen breeding colonies of species, including auklets, murres, puffins, guillemots, gulls, and cormorants, occur on the perimeter of the island. Waterfowl and geese use the coastal waters, ponds, and moist tundra wetlands of the Gambell area for nesting, molting, feeding, and migration resting/staging. Natives report that they hunt and use as a food source many of these species of waterfowl and geese on the island (URS, 1985).

Mammals

Large mammals are generally not abundant on St. Lawrence Island. However, polar bears can be seen on the island year-round, especially when the ice pack is near shore. A population of about a thousand reindeer can also be found on the island. In addition, arctic fox, crossfox (less commonly), red fox and several small mammals (tundra shrew, Arctic ground squirrel, the Greenland collared lemming, the red-backed vole, and the tundra vole) can be seen on the island (URS, 1985).

Marine mammals are present in the vicinity of Gambell as seasonal migrants in the offshore and near-shore marine waters, at haul-out sites, and in association with the advancing and retreating pack ice. However, no haul-out areas exist within the Gambell area. During the summer, walrus, whales, sea lions, and spotted seals may be present in the offshore waters. During the ice season, ringed seals, bearded seals, walrus, and spotted seals can be found in near-shore and offshore leads and open water. Whales that can be seen near Gambell include bowhead, gray, minke, killer, and beluga whales (USKH, 1993).

Fish

Ten primary species of fish reside in the streams and tundra ponds of St. Lawrence Island. These include blackfish, nine-spined stickleback, grayling, Arctic char, and whitefish. Five species of Pacific Salmon occur around the island. The fisheries resources in Troutman Lake, which is the largest lake in northwest St. Lawrence Island, have not been determined (URS, 1985).

Endangered or Threatened Species

Endangered or threatened species of animals on St. Lawrence Island include the Spectacled Eider (endangered), the Steller's Eider (proposed threatened) and the Steller's sea lion (threatened). Polar bears are not an endangered or threatened species; however, they are protected under the Marine Mammal Protection Act. Alaska Natives are exempt from this act and are allowed to hunt polar bears for subsistence purposes or for handcrafts, as long as the population is not depleted and the takes are not wasteful. Vegetation that are proposed threatened on the island are *Rumex krause*; and *Primula tschuktschorum*.

1.4.8 Archaeological, Historical, and Cultural Resources

The Gambell site has the potential for significant archaeological, historical, and cultural resources. As such, excavation activities associated with the site should be undertaken only after the Section 106 process promulgated under the State Historic and Preservation Office (SHPO) has been completed. This process, although a federal regulation under 36 CFR 800 of the National Historic Preservation Act of 1966 (NHPA), is administered by SHPO. The process entails the identification and evaluation of potential historical properties and federal review through the Advisory Council on Historic Preservation (ACHP).

If, at any time during activities conducted at the Gambell site, there is a question as to the eligibility or identification of items or areas which may be of archaeological, cultural, or historical importance, the guidelines set forth under Section 106 should be observed. Any activities that may affect the area or item in question will cease until the nature of the area or item is discerned.

An archaeological and historical survey will need to be performed and completed prior to any contractor work beginning at the site. The Alaska District should have an archaeologist on site during any construction activities to provide preconstruction briefings regarding the potential for archaeological artifacts to be found at the site.

1.5 INVESTIGATIVE SITE DESCRIPTIONS

The identified investigation sites retained for further investigation ("areas of concern"), as listed in Section 1.3.4, are described in detail below, as well as other sites visited during the Phase I RI. After site descriptions, contaminants of concern and recommended remedial actions for containerized hazardous toxic or radiological waste (CON/HTRW), building demolition and debris removal (BD/DR), and soil and water are listed. A summary of analytical data from the areas of concern prior to the Phase II investigation is shown on Table 1-2. The investigative site description information is derived from E&E's Site Inventory (E&E, 1993) as well as observations made during Montgomery Watson's 1994 through 1998 RIs.

1.5.1 Site 1 - North Beach

North Beach is the coastline strand which extends approximately 7,000 feet along the north shoreline of Gambell, from the base of Sevuokuk Mountain to West Beach (Figure 1-3). North Beach is largely undeveloped, except for the area immediately surrounding the Village of Gambell where there is a human waste landfill, a drum dump with discarded aboveground tanks and household refuse, and a fenced solid waste landfill. In addition, there is a barge landing area at a location on North Beach and at West Beach (Figure 1-3). Residents use North Beach to fish and ride ATVs.

Area 1A, the former Army Landing Area, is located in the central portion of North Beach where two well-established ATV roads intersect. It is located east of the barge landing area.

Area 1B, the Former Air Force Landing Area, is located adjacent to a beach berm approximately 1,900 feet east of the southeast corner of Site 1/Area 1A. Near the northeast corner of the site is a decaying drum. Rust-stained gravel and a 5-foot by 4-foot patch of tar-stained gravel suggests a former roadbed near the center of the area.

Investigations completed at Site 1 during the Phase I RI included geophysical surveys, drilling and installing eight monitoring wells (five at Area 1A and three at Area 1B), and collecting subsurface soil at each monitoring well location, two surface soil samples (one at each area), and eight groundwater samples for chemical analysis. Analytical results indicated no significant contaminants of concern at Site 1 (Montgomery Watson, 1995a).

As a result of significant landfill debris being exposed by wind and wave erosion, a debris reconnaissance was performed during the 1996 Phase II investigation to determine the rate at which landfill materials have been uncovered since 1994.

Partially exposed military debris continued to cause a danger to ATV and snowmobile traffic through the Gambell area, especially on North Beach and near ATV trails. In 1997, all easily removable exposed debris on North Beach was collected and barged to Seattle for recycling. This also included the exposed portions of the large buried debris, i.e., crane tower and pulley

systems, which were cut off just below the gravel surface and covered with gravel (Montgomery Watson, 1997a).

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: Remove buried debris

Soil and Water: No further action

1.5.2 Site 2 - Former Military Housing/Operations Site

Site 2, the Former Military Housing/Operations Site, is located approximately 600 feet south of Area 1B, the Former Air Force Landing Area (Figure 1-3). This site includes: a former Military Housing/Operations Burial Site, a Power Plant Burial Site, and an Ordnance Burial Site, all reportedly located in the southeast portion of the Gambell area. All of the facilities associated with these areas were allegedly demolished and buried on-site. Exposed debris observed during the 1994 and 1996 investigations from the Former Military Housing/Operations Site included: remnants of an apparent fireplace and a concrete pad, pieces of burned wood, scattered metal debris, and two locations of discolored gravel. Remaining debris from the Former Power Plant includes a large gear, rectangular metal boxes, part of a tiltdozer blade which protruded from the ground, a portion of weasel track, and rusted metal fragments.

Investigations completed at Site 2 during the Phase I RI included a geophysical survey (EM-31 conductivity and GSM-19 magnetometry), drilling and installation of three monitoring wells, collection of subsurface soil at each monitoring well location, two surface soil samples, and three groundwater samples for chemical analysis. In addition, fibrous materials observed on-site were collected for asbestos analysis. Site 2 was retained for further investigation following the **1994 RI** due to elevated concentrations of lead and other metals in surface soils. Most notable was a lead concentration of 749 mg/kg detected in surface soil sample 27 (SS27) during the **1994 RI** (Montgomery Watson, 1995a). Concentrations of metals from a second surface soil sample at the site were not elevated, and the aerial extent of metal contamination was unknown. It was believed that the elevated metals concentrations were most likely caused by the debris contained in the Former Housing/Operations Burial Area.

Additional surface soil samples for lead analysis were collected during the 1996 Phase II investigation surrounding the location of elevated metals concentration (SS27). Eight surface soil samples were collected at 5-foot and 10-foot intervals from SS27. The 5-foot samples were collected in the four cardinal directions, and the 10-foot samples were taken at 45 degrees from the cardinal directions.

Contaminants of Concern: Lead

Recommended Remedial Action:

CON/HTRW: Remove metal debris and large gear

BD/DR: Remove empty drums

Soil and Water: No further action

1.5.3 Site 3 - Former Communications Site

Site 3, the Former Communications Site, is located approximately 700 feet southeast of Area 1B, and 750 feet northeast of Site 2 (Figure 1-3). Items that were reportedly buried in this area (E&E, 1993) include: two Jamesway huts, a 10- to 15- kilowatt (kW) power plant containing auxiliary generators, transformers, oils, fuels, and batteries, and approximately 5 to 10 glass carboys of sulfuric acid. Exposed aboveground debris observed during the 1994 and 1996 RIs includes metal debris, pipe, and anchors for guy wire.

Investigations completed at Site 3 during the Phase I RI included a geophysical survey, drilling and installation of two monitoring wells, and collection of subsurface soil and groundwater samples. Priority pollutant metals, including beryllium, cadmium, mercury, selenium, silver, and thallium, were detected above regulatory benchmark criteria (see Table 1-2) in soils collected at a depth of 2.5 feet. Beryllium and thallium are unlikely to occur naturally at these concentrations. Petroleum hydrocarbons were also detected at depths of up to 5 feet at a maximum concentration of 533 mg/kg. Because of the shallow depth of the contaminated soil, it was hypothesized that a surface source which is no longer present was responsible for the contamination (Montgomery Watson, 1995a).

Further investigations were performed at Site 3 during the 1996 Phase II RI. In order to assess the risk of the contamination, additional surface soil samples for beryllium and thallium analysis were collected 120 degrees apart at 5-foot intervals from MW9. Additionally, one sample was collected directly adjacent to the monitoring well.

Contaminants of Concern: Beryllium and thallium

Recommended Remedial Action:

CON/HTRW: Remove drums

BD/DR: Remove buried debris

Soil and Water: No further action

1.5.4 Site 4 - Sevuokuk Mountain

This site has been broken up into four separate areas for purposes of the investigation. These are shown on Figure 1-3 and include:

- Area 4A - the remains of two Quonset huts and the surrounding area;
- Area 4B - the Former Air Force Radar Station Area;
- Area 4C - the area at the southern end of the mountain where drums were found in a stream drainage; and
- Area 4D - the area which contains three transformers in a mountainside drainage above the Village of Gambell water supply pump house.

Site 4/Area 4A - Quonset Hut Area

Area 4A, the Quonset Hut Area, contains the frames of two fallen Quonset huts. In addition to the two transformers indicated in the CDAP (E&E, 1993), an additional transformer was located in the vicinity by the Montgomery Watson field team. The additional transformer located by Montgomery Watson field personnel was empty, with some apparent rust. Surface soil samples for total recoverable hydrocarbons (TRPH), PCB, base neutral and acid extractable compounds (BNA), and dioxin analysis were collected during the 1994 Phase I RI. All results were below detection limits.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove drums, transformers, and generator

BD/DR: Remove buried debris

Soil and Water: No further action

Site 4/Area 4B - Former Radar Station

Area 4B, the Air Force Radar Station Area, covers an approximately 375-foot by 500-foot area where buildings burned down, causing ordnance to explode and, in turn, scattering debris. Remains of the site include a 30-square foot area of stained soil that contains scattered rusted debris and burned timbers, a standing steel pole (useful in locating the site), and a fallen transformer pole (no transformer present).

The area surrounding Site 4/Area B was formerly used for animal trapping. However, residents rarely trap animals to the extent historically trapped.

The topography of Site 4/Area B consists of large cobbles and boulders that have staining in certain areas. The site has approximately 50% vegetative cover, with the majority being mainly lichen, with some sedges and grasses. The remainder of the site consists of silty sands and cobbles having very little moisture and high fetch. There are no drainages or standing water on the site. The predominant wind direction is northwest or northeast (Apatiki and Tungiyen, 1996).

Three surface soil samples were collected at a burned area and analyzed for TRPH, PCBs, priority pollutant metals, BNA, dioxins, and furans during the 1994 investigation. Lead, antimony, arsenic, cadmium, and copper were present at concentrations above EPA Region III risk-based levels (EPA, 1996a) and normal background concentrations (Montgomery Watson, 1995a). Dioxins, represented in terms of 2,3,7,8-TCDD equivalence also exceeded EPA Region III risk-based criteria. Contaminant concentrations, benchmark, and risk-based criteria are shown in Table 1-2.

To assess the maximum concentration of metals contamination and the potential risks to human health and the environment, a total of four samples were collected within the boundary of the stained area during the Phase II investigation. The samples were analyzed for antimony, arsenic, cadmium, copper, and lead.

Contaminants of Concern: Antimony, arsenic, cadmium, copper, lead

Recommended Remedial Action:

CON/HTRW: Remove drums, tank, generator, engine block

BD/DR: Remove buried debris

Soil and Water: Remove soils

Site 4/Area 4C - Stream Drainage at South End of Mountain

Discarded drums were located in Area 4C in a stream drainage at the southern end of Sevuokuk Mountain along the Site 10-Mountain Trail System. Seen at this site during the Phase I RI were a wooden frame and scattered drums, some of which were located directly in the stream drainage which passes through a culvert underneath the mountain trail system.

It was reported by a local resident, Winnie James, Sr., that transformers were located in the wooden framed building at the site. A drainage leads through the area including the wooden frame building; this was the location area of three sediment samples taken for PCB analysis during the Phase I RI. No PCBs were detected at Site 4/Area 4C.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: None

Soil and Water: No further action

Site 4/Area 4D - Transformers in Mountainside Drainage

Area 4D is located where three transformers were observed in a mountainside drainage on top of Sevuokuk Mountain above the Village of Gambell water supply during the 1994 investigation. Exposed debris at this location includes three empty electrical transformer casings, rusted support structures for a Quonset hut, drums, sonar cable and wire, sheet metal, and a guy wire anchor.

Four sediment samples and one hand-augered soil sample were collected during the 1994 investigation and analyzed for PCBs. Three of these sediment samples were taken adjacent to the three transformers, and one was taken upslope of the transformers for background results. Aroclor® 1254 was detected at a concentration of 194 micrograms per kilogram (µg/kg) at the upslope (background) location (SE162). The concentration detected is below regulatory criteria for soils (1 mg/kg), although a criterion has not been established for sediments (Table 1-2).

The three transformers were wipe-sampled during a preliminary Phase II visit in order to adequately characterize the transformers for future disposal. Results of the wipe samples allowed the transformers to be transported to Anchorage for recycling (Montgomery Watson, 1997b).

Contaminants of Concern: PCBs

Recommended Remedial Action:

CON/HTRW: Transformers removed in 1997; no further action

BD/DR: Remove metal debris

Soil and Water: No further action

1.5.5 Site 5 - Former Tramway Site

Site 5 is located approximately 1,920 feet southeast of the Former Military Power Site/Former Motor Pool (Site 7). This site includes two disposal areas, the Cable Burial Area and the Secondary Transformer Burial Area (E&E, 1993).

Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999).

Contaminants of Concern: DRO

Recommended Remedial Action:

CON/HTRW: No further action

BD/DR: Remove debris

Soil and Water: No further action

1.5.6 Site 6 - Military Landfill

This site is located north of the Gambell High School. During the 1994 Phase I RI, extensive construction was being done for an expansion of the high school. While excavating the foundation on June 15 through 17, 1994, Neeser Construction uncovered a debris burial pile approximately 50 feet in diameter and 15 feet high, an apparent portion of a military landfill.

The buried debris uncovered by Neeser Construction in 1994 is not eligible for cleanup under the DERP-FUDS program since the debris, an apparent military landfill, was safely covered in-place until excavated up by Neeser Construction. Other exposed debris remaining at Site 6 includes numerous partially-exposed drum remnants and weasel tracks.

URS reported the presence of 3,000 drums filled with human waste that were buried at Site 6 during military activities at Gambell (E&E, 1992). The barrels containing human waste were reportedly treated with lime prior to final sealing, and then buried underneath a thin soil covering (URS, 1985a). During the **1994 RI**, Montgomery Watson field personnel noted that several barrels were visible throughout the area.

The Village of Gambell reburied the unearthed debris near the North Beach City Landfill.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove exposed drums

BD/DR: Remove debris

Soil and Water: No further action

1.5.7 Site 7 - Former Military Power Facility

This facility was reportedly buried north of the municipal building in an estimated 375-foot by 85-foot area. Remaining surface debris includes protruding power cable, copper wire, and rusted metal. This debris marks the area where the primary transformers were allegedly buried (E&E, 1993). The debris excavated from the 1994 high school expansion was piled in the center of Site 7.

There are several areas of stained gravel on the west side of a diesel/gasoline pipeline which runs south from North Beach and branches east and west near the center of the site. Also, burned wood, sonar cable, and landing mat are located near a concrete pad at the east end of the site. A former motor pool was reportedly located near this concrete pad.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: Remove debris

Soil and Water: No further action

1.5.8 Site 8 - West Beach/Army Landfill

The Army Landfill at Site 8 is located near West Beach, which extends for approximately three miles from the southwest end of North Beach to Nayvaghaq Lake along the western shore. Remaining surface debris includes scattered metal, small quantities of wood and concrete, and an exposed 25- to 30-foot wide layer of landing mat which reportedly underlies the existing runway and the road south of the runway for 4,500 feet. The Army Landfill is located on the northwest side of Nayvaghaq Lake.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove drums

BD/DR: Remove debris

Soil and Water: No further action

1.5.9 Site 9 - Asphalt Barrel Cache

Remaining surface debris from the Former Asphalt Barrel Cache located east of the runway includes two areas having up to six apparently empty 55-gallon drums with associated tar-like

soil stains that are approximately 100 square feet in area. According to E&E (1993), these drums are not of DOD origin.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: None

Soil and Water: No further action

1.5.10 Site 10 - Sevuokuk Mountain Trail System

This trail system originates at the southeast end of Troutman Lake and separates to form individual trails to the north, south, and east. Two of these trails, the Army Trail and the Air Force Trail, lead to the top of Sevuokuk Mountain. These trails are marked by approximately 157 empty 55-gallon barrels located approximately 200 feet apart. Other noticeable debris includes landing mat and weasel track.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove exposed drums

BD/DR: Remove debris

Soil and Water: No further action

1.5.11 Site 11 - Communication Cable Route

This site extends eastward approximately 2,700 feet from the Former Military Power Facility (Site 7) across the Former Tramway Site (Site 5) to the base of Sevuokuk Mountain. Four sonar cables extend from the base of the mountain to a destroyed Jamesway building that served as the Navy Sonar Pick-up Station (E&E, 1993). This station was located approximately 300 feet west of the Army Trail at Site 10. During the **1994 RI**, the only evidence of sonar cables observed by the field team were some cable spools near Site 4/Area 4D.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove exposed drums

BD/DR: Remove debris

Soil and Water: No further action

1.5.12 Site 12 - Nayvaghaq Lake Disposal Site

This site is located south of Site 13 and north of Nayvaghaq Lake, on the southwest side of an ATV trail which extends south from the runway. This site includes a north area at the intersection of the ATV trails, and another area approximately 470 feet further south. The north area contains approximately 120 drums, battery remnants, and household refuse. The southern area contains approximately 50 drums, about 18 of which contain garbage.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove exposed drums and batteries

BD/DR: Remove debris

Soil and Water: No further action

1.5.13 Site 13 - Former Radar Power Station

This area is located east of the pond located south of Troutman Lake. The radar power station consisted of 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, 1993). Remaining surficial debris and stains include wire and pieces of ceramic material, guy wire, pipes, and a 9-square-foot area of darkened gravel containing burned wood and rusted electrical equipment.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: Remove debris

Soil and Water: No further action

1.5.14 Site 14 - Navy Plane Crash Site

This site is located approximately 7 miles south of the Village of Gambell. The main body of the plane, which crashed in 1955, remains on the tundra with debris largely confined to the

immediate area surrounding the plane. According to E&E (1992), the belly gasoline tank exploded and most of the fuels burned, leaving no apparent stains or any stressed vegetation surrounding the crash site. Per the SOW for the **1994 RI**, no samples were to be collected from this site.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: None

Soil and Water: No further action

1.5.15 Site 15 - Troutman Lake Ordnance Burial Site

A suspected ordnance burial site is located at the north end of Troutman Lake. This site is reportedly submerged and no traces of this site are visible along the shores of Troutman Lake.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: None

Soil and Water: No further action

1.5.16 Site 16 - Gambell Municipal Building Site

This site consists of a 35-foot by 55-foot area of stained gravel located immediately west of the Municipal Building. Staining is most visible immediately after rainfall, or if the top 6 inches of gravel is removed. The origin of the stain is unknown. It could be the result of spills occurring during the construction of the Municipal Building or local motor vehicle traffic. An area immediately to the west of Site 16 is a house with about a dozen motor vehicles (snowmobiles, ATVs, dirt bikes) in disrepair. Shortly after Montgomery Watson collected the samples from this area, parts of Site 16 were excavated by the Village Electric Cooperative as part of general construction work conducted to lay power cables.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: None

BD/DR: None

Soil and Water: No further action

1.5.17 Site 17 - Army Landfills

This site is located immediately south of Site 1A, and immediately north of Site 6. There are two landfills in this area which contain materials that were regularly burned and covered (E&E, 1993). Surface debris exposed in this area observed during the **1994 RI** includes: drums, landing mat, scrap metal, and exposed drum tops.

Contaminants of Concern: None

Recommended Remedial Action:

CON/HTRW: Remove waste

BD/DR: Remove debris

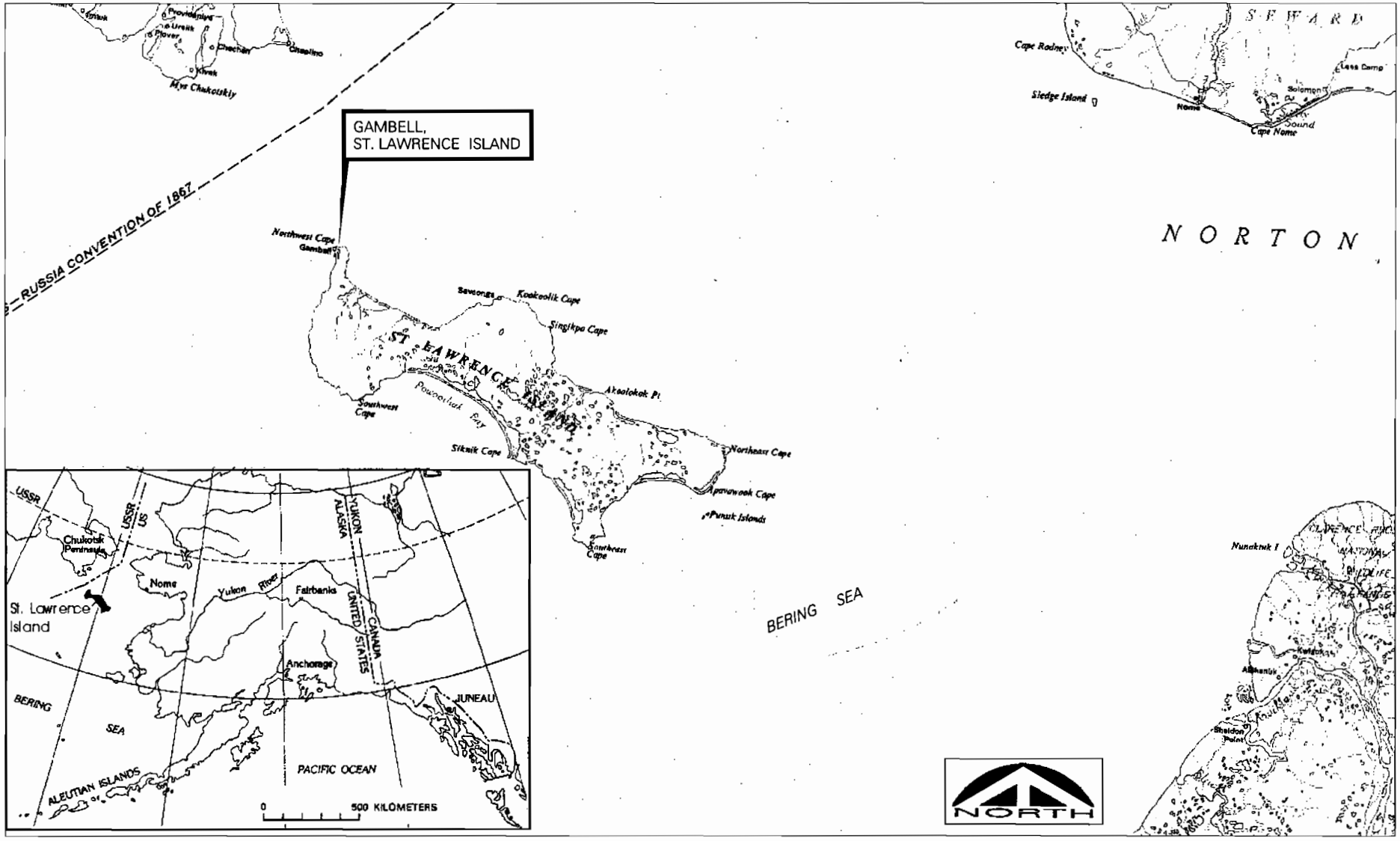
Soil and Water: No further action

1.5.18 Site 18 - Former Main Camp

This area is adjacent to the northeast end of Troutman Lake and extends from the location of the current Municipal Building east to the high school. There were reportedly ten 25,000 gallon fuel tanks present on the site. The disposition of these tanks, including whether or not they were aboveground, underground or disposed of, is not known (E&E, 1993). White powdery material can be seen along the berm which borders Troutman Lake. The material has been tentatively identified as diatomaceous earth, previously used for water filtration by the Army (Waller, 1959). According to E&E (1993), this material contained minerals such as aluminum, calcium, magnesium, and sodium and was determined to be non-hazardous.

1.5.19 Background Site

This area is located northeast of Site 5 and consists of one monitoring well location (MW14). This site was identified during the **1994 RI** to provide representative background soil and groundwater concentrations for the entire Gambell site.



MONTGOMERY WATSON

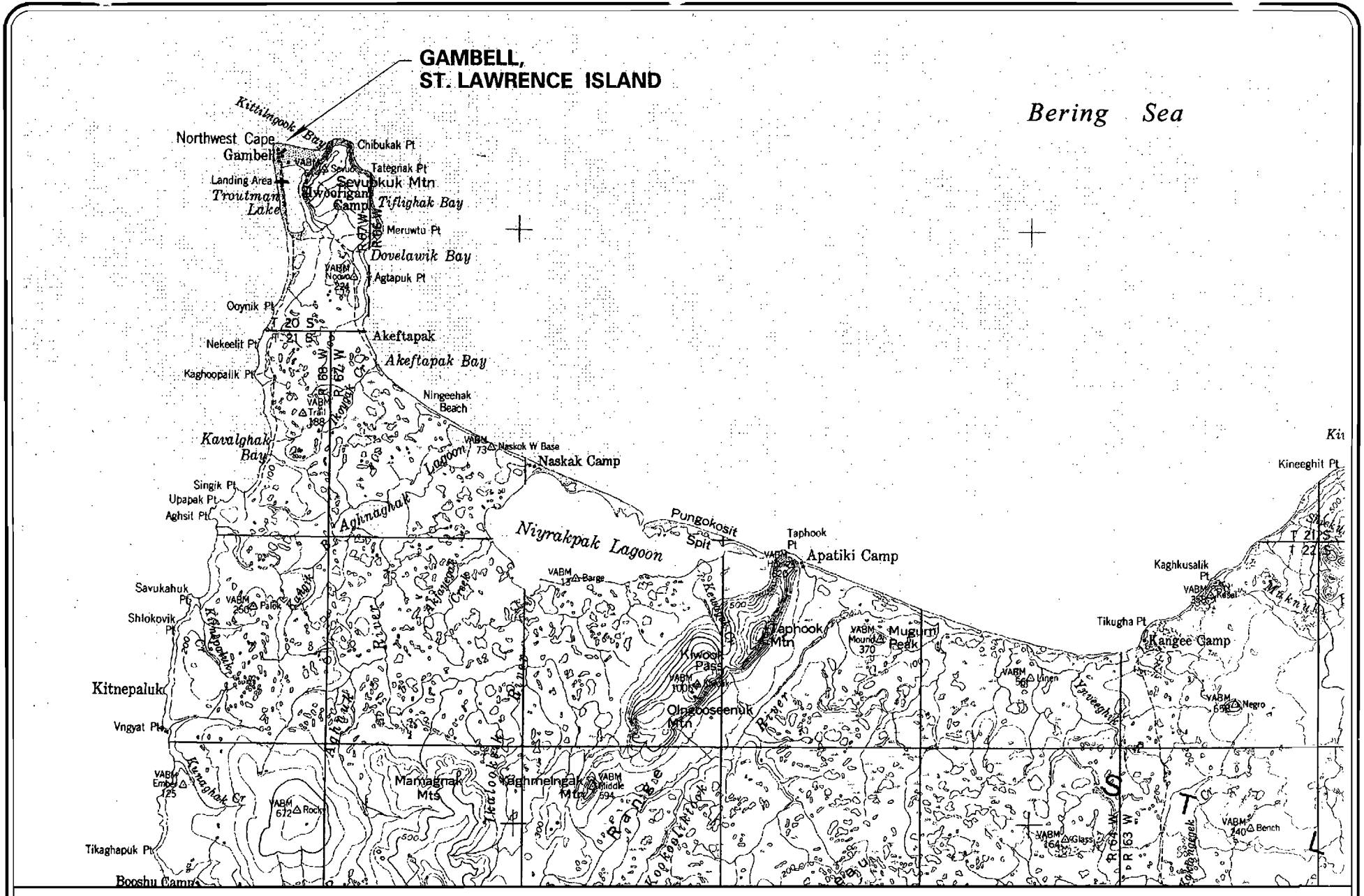
Anchorage, Alaska

SOURCE: U.S. Geological Survey
Reston, Virginia 22092, 1976
St. Lawrence, Alaska
N6265 – W16830 /60x210
Surveyed 1948, Compiled 1957
Minor Revisions 1974
Scale 1:250,000 Contour Interval 100'

FIGURE 1–1

ALASKA DISTRICT – CORPS OF ENGINEERS
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

VICINITY MAP
GAMBELL



MONTGOMERY WATSON

Anchorage, Alaska

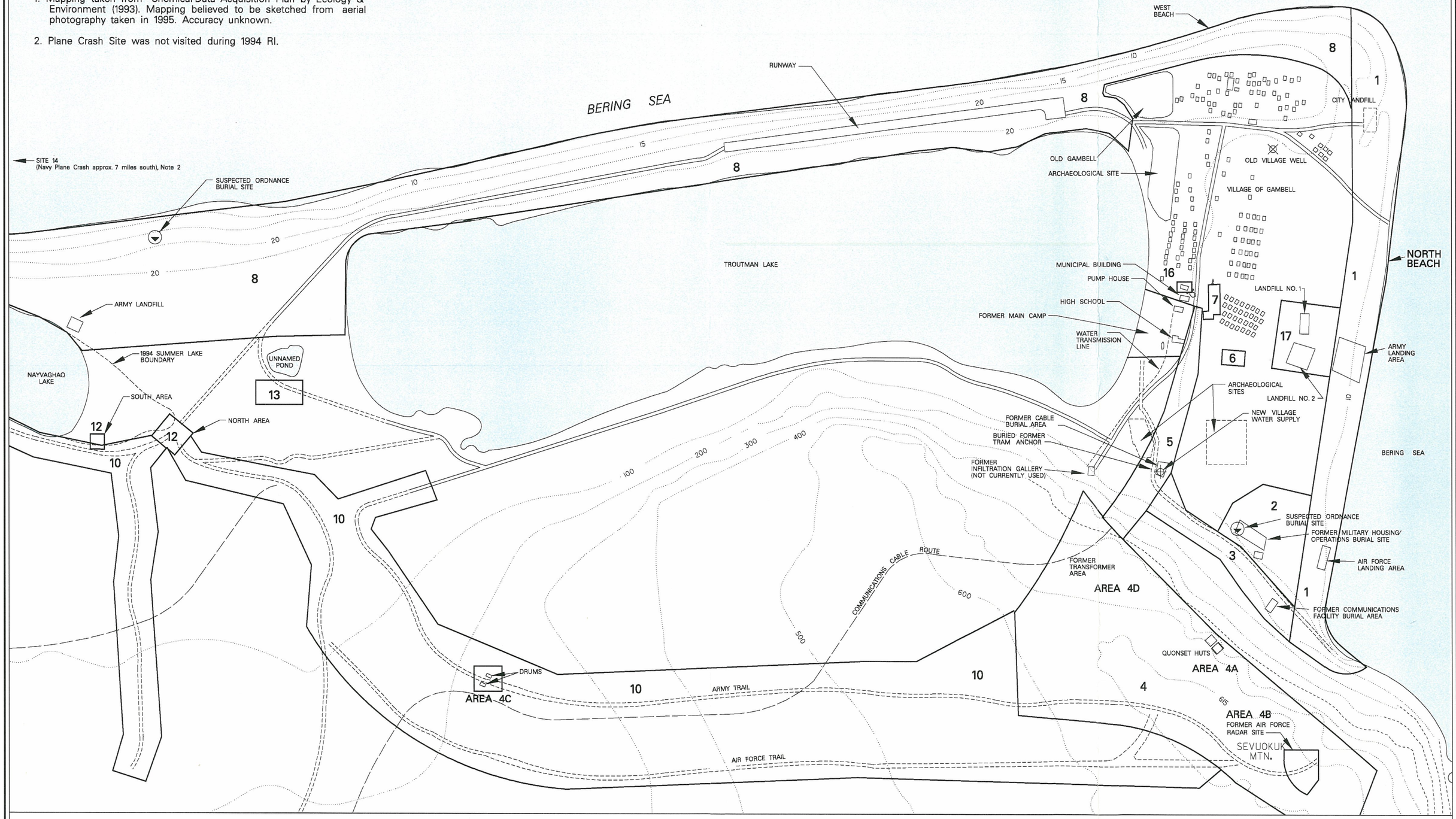
FIGURE 1–2

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

LOCATION MAP
GAMBELL

NOTES:

1. Mapping taken from Chemical Data Acquisition Plan by Ecology & Environment (1993). Mapping believed to be sketched from aerial photography taken in 1995. Accuracy unknown.
2. Plane Crash Site was not visited during 1994 RI.



LEGEND:

Boundary of Site

SCALE IN FEET
0 1200

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 1-3
U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA
GAMBELL REMEDIAL INVESTIGATION SITES

JOB No. 189010.161601 TIME: 21-DEC-1998 11:14 FILE: e:\cad\proj\usace\gambell\wrkpln\site4\fgl-3.dgn

ELEVATED LEVEL OF LEAD IN SS27 (749 mg/kg)

SITE 2

SITE 3

ELEVATED LEVELS OF BERYLLIUM AND THALLIUM AT 2.5 FEET DEPTH

ELEVATED CONCENTRATIONS OF DRO (430–522 mg/kg) TO A DEPTH OF 5.0 FEET AND ELEVATED THALLIUM CONCENTRATIONS AT 5.0 FEET

ELEVATED CONCENTRATIONS OF DIOXINS IN SURFACE SOILS

AREA 4B

ELEVATED CONCENTRATIONS OF METALS IN SURFACE SOILS

SEVUOKUK MOUNTAIN (Auklet rookery located on mountain cliffs)

SITE 4

AREA 4A

SITE 5

INFORMATION CONCERNING GAMBELL SITE 5 IS CONTAINED IN A SEPARATE REPORT REMEDIAL INVESTIGATION, GAMBELL SITE 5, APRIL 1999, MONTGOMERY WATSON

ELEVATED CONCENTRATIONS OF DRO IN SOIL (1,160–1,800 mg/kg) AT A DEPTH OF 5 FEET. TRPH IN GROUNDWATER AT CONCENTRATIONS OF 0.5 mg/l IN MW15 AND 0.4 mg/l IN MW16

AREA 4D

ELEVATED CONCENTRATIONS OF PCB'S IN SEDIMENT (0.194 mg/kg)

AREA 4C

NOTE: AREA 4C LOCATED APPROXIMATELY 2 MILES SOUTH OF AREA 4B ON ARMY TRAIL (FIGURE 1–3)

NOTE:
MAPPING IS FOR REPRESENTATIVE PURPOSES ONLY AND SHOULD NOT BE USED FOR ENGINEERING ESTIMATES.

1.0 — Groundwater Elevation Contour
Contour Interval = 0.5 Ft.

Direction of Groundwater Flow

Bounday of Site Geophysical Survey

- Soil Boring
- Monitoring Well
- Surface Soil Sample
- Hand Augered Sample
- Sediment Sample
- X Asbestos Sample
- Drum
- Metal Debris
- Transformer
- Landing Mat
- Geophysical Anomaly
- Area of Stained Soil
- Area of Concern

NOTES:

1. Mapping taken from Chemical Data Aquisition Plan by Ecology & Environment (1993). Mapping believed to be sketched from aerial photography taken in 1985. Accuracy unknown.
2. Mapping taken from CRW Engineering Group, prepared by North Pacific Aerial Surveys, Inc., date of photography 10–22–85.

SCALE IN FEET
0 300

FILE: E:\use\ce\gambell\site4\fg1-4.dgn TIME: 21-DEC-1998 11:13 JOB No. 189900.161601

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 1–4

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

AREAS OF CONCERN SITES 2, 3, & 4 GAMBELL

Table 1-1
Investigative Sites and Historic Functions
Gambell, St. Lawrence Island, Alaska

		Phase I RI Activities									Phase II RI Activities						Removal Activities		Phae II RI Activities			
		1995									1996						1997		1998			
Site	Description	CON/HTW Inventory	Surface Soil Sampling	Subsurface/Boring Soil Sampling	Groundwater Sampling	Surface Water Sampling	Sediment Sampling	Geophysical Survey	Site Control & Survey	Asbestos Sampling	Building Demolition & Debris Inventory	Radiation Reconnaissance	Surface Soil Sampling	Groundwater Sampling	Geophysical Survey	Wipe Samples	Debris Removal	Groundwater Sampling	Subsurface/Boring Soil Sample	Monitoring Well Installation	Groundwater Sampling	Site Control & Survey
1A	North Beach/Army Landing Area	X	X	X	X			X	X		X						X					
1B	North Beach/Air Force Landing Area	X	X	X	X			X	X		X						X					
2	Former Military Housing/Operations Site	X	X	X	X			X	X	X	X		X				X					
3	Former Communications Site	X		X	X			X	X		X		X				X					
4A	Sevuokuk Mt./Quonset Hut Area	X	X						X	X	X		X				X					
4B	Sevuokuk Mt./Former Radar Station	X	X						X		X	X					X					
4C	Sevuokuk Mt./Stream Drainage at South End of Mountain	X					X		X		X											
4D	Sevuokuk Mt./Transformers in Mountainside Drainage	X		X			X		X		X					X	X					
5*	Former Tramway Site	X		X	X			X	X		X			X	X		X		X	X	X	
6	West Beach/Military Landfill	X		X				X	X		X	X					X					
7	Former Military Power Site/Former Motor Pool	X	X	X		X		X	X		X						X					
8	Army Landfill	X		X		X		X	X		X						X					
9	Asphalt Barrel Cache	X									X											
10	Sevuokuk Mountain Trail System	X									X											
11	Communications Cable Route	X									X						X					
12	Nayvaghaq Land Disposal Site	X	X	X		X			X		X						X					
13	Former Radar Power Station	X	X	X		X		X	X		X						X					
15	Troutman Lake Ordnance Burial Site	X									X											
16	Gambell Municipal Building Site	X	X	X				X	X		X						X					
17	Army Landfills	X	X	X				X	X		X						X					
18	Former Main Camp	X		X				X	X													

Key: Mt. - Mountain

*Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999).

Table 1-2 Summary of 1994 Analytical Data for Areas of Concern

Site	Matrix	Contaminant of Concern	Sample Location/ (Depth in feet)	Units	Concentration	Applicable Regulatory Benchmark Criteria	Risk Based Criteria	Estimated Volume (cubic yards) (6)	Comments (6)
Site ·	Soil	Lead	SS27	mg/kg	749	9.6 (4); 12 (3)	400(5)	?	Areal extent of lead contamination unknown
Site 3	Soil	DRO	MW10 (2.5), MW10 (5.0)	mg/kg	430 to 522 (Ju)	100 (2)	8,760 (8)	5.2	ADEC matrix Score=35; ADEC Level B
		Thallium	MW9 (2.5), MW10 (2.5)	mg/kg	**9** to **15**	<1 (4)	6.3-7.0 (1)	?	Low levels but not naturally occurring
		Beryllium	MW9 (2.5)	mg/kg	**6**	<1 (4); 0.15 (3)	0.15 (1)	?	Low levels but not naturally occurring
Site 4/Area 4B	Soil	Antimony	SS33 (0.5)	mg/kg	**130**	<10 (4)	31 (1)	?	
		Arsenic	SS32, SS33, SS34, SS270	mg/kg	1.3 to **38** (Ju), (J)	18 (4); 6.7 (3)	0.36-23 (1)	186	
		Cadmium	SS32	mg/kg	**52**	<1 (4)	39 (1)	?	
		Copper	SS32, SS33	mg/kg	**21,200** to **26,600**	24 (3); 2.3 (4)	2,900 (1)	?	
		Lead	SS32, SS33	mg/kg	**1,056** to **3,249**	400 (5); 9.6 (4); 12 (3)	2,000	?	
		2,3,7,8-TCDD equivalence	SS32, SS33, SS34	µg/kg (ppt)	0.84 to **51.2**		4.1 (1)	186	
Site 4/Area 4D	Sediment	PCBs	SE162	mg/kg	0.194	1 (7)	1.6 (soil) (1)	1	

Key:
? - volume unknown
DRO - diesel range organics
Jo - data qualifier; estimated value, data biased high
Ju - data qualifier; estimated value, data biased low
mg/kg - milligrams per kilogram
MW - monitoring well
PCBs - polychlorinated biphenyls
ppt - parts per trillion
QA - quality assurance
QC - quality control
SE - sediment
SS - surface soil
TCDD - tetrachlorodibenzo-p-dioxin
µg/kg - micrograms per kilogram
Bold numbers indicate exceedances of risk-based criteria

1 - Risk-based Concentration for residential soils tap water, "Risk Based Concentration Table," February 1996, EPA Region III
2 - Guidance on Cleanup Standards Equation and Input Parameters, 9/16/98, ADEC
3 - "Elemental Concentrations in Soils and Other Surficial Material of Alaska," 1988 U.S. Geological Survey
4 - Background levels found at the Gambell Site, shown on Table 4-4 of the RI report (Montgomery Watson 1995a)
5 - Lead-Based Hazard Reduction Act of 1992, EPA Title X
6 - Assumptions for volume calculations and ADEC matrices are shown in Appendix E of the RI report (Montgomery Watson 1995a)
7 - PCB action level for residential soil and 1% organic carbon sediments, indentified in the EPA publication 9353.4-01FS, "A Guide to Remedial Action at Superfund Sites with PCB Contamination," August 1990.
8 - Calculated risk-based concentration for diesel in residential soil using the reference dose (RfD) identified for JP-4 in the EPA Region X Memorandum entitled "Toxicity of Fuels," April 9, 1992 and the equations for risk-based calculations in the EPA Region III Memorandum entitled "Risk-Based Concentration Table," July 11, 1994.

2. INVESTIGATION APPROACH AND PROCEDURES

The purpose of this section is to describe the specific methods and protocols used to quantify and characterize the extent of contamination, and to assess the risk to human health and the environment at the Gambell Site.

2.1 GENERAL FIELD OPERATIONS

Field work included general site reconnaissance, site radiation reconnaissance, North Beach debris exposure reconnaissance, surface soil sampling, groundwater sampling and wipe sampling. A summary of site investigation activities and associated rationale are listed on Table 2-1. A site summary of sampling matrix and analytical parameters is shown on Table 2-2.

Individual Phase II site activities are described below. Photographs of selected site activities are shown on Figure 2-1.

2.1.1 Site Reconnaissance

Site reconnaissance was used to confirm the current use and site conditions at all field locations. This activity was performed to ensure that all proposed field activities were appropriate, given present field conditions.

The following reconnaissance activities were completed at Sites 2, 3, 4, and 5. These activities included:

- Visual observation
- Photographic documentation
- Qualitative assessment of potential exposure pathways
- Documentation of any site obstacles that would impede remediation
- Estimation of contamination volume using field observations and available data

Also, coils of wire identified during site reconnaissance activities which were found to be physically hazardous to ATV travel were cut and moved off the trail by the field team. Additional reconnaissance was completed for North Beach, as described in Section 2.1.3.

2.1.2 Radiation Reconnaissance

Radiological monitoring was completed using a Geiger-Muller counter at all known and suspected landfill locations, as well as the burned area at the former radar station at Site 4/Area 4B. The background and range of readings was recorded for each monitored area in a field notebook. Background radiation was established from readings collected at a location along West Beach between the northwest corner of the runway and the Old Village of Gambell. The background level of radiation for the Gambell site was 0.06 millirems per hour. Any area where

radiation exceeded twice the background levels was to be marked on a map. However, none of the areas investigated exceeded 0.09 millirems per hour.

2.1.3 North Beach Debris Exposure Reconnaissance

A site exposure reconnaissance was completed on the eastern portion of North Beach to ascertain the degree to which landfill materials have been uncovered since 1994. The field team traveled from the northeast corner of North Beach toward the Barge Landing Area which marks the western boundary of Site 1. Very little exposed debris was observed at Area 1B and the terrain between Area 1A and Area 1B. However, a significant amount of exposed debris was observed within the boundaries of Area 1A. Exposed debris included: empty drums, landing mat, metal cable, miscellaneous steel heavy machinery parts, steel weasel tracks, corrugated sheet metal roofing material, and piping. Photographs of debris exposure at North Beach are shown on Figure 2-2.

In general, landfilled materials have not been significantly exposed compared to observations during the 1994 inventory and 1996 North Beach reconnaissance. As shown on Figure 2-1, the exposed crane has instead submerged over time. However, the exposed debris still presents a significant physical hazard to residents riding ATVs and snowmobiles in this highly traveled area.

2.1.4 Sampling Procedures

All samples were collected in accordance with the Gambell Phase II Work Plan (Montgomery Watson, 1996a), as well as the Chemical Data Acquisition Plan (E&E, 1993).

2.2 QUALITY ASSURANCE/QUALITY CONTROL

Remedial investigation activities were performed as prescribed in the Gambell CDAP (E&E, 1993) and the Phase I RI report (Montgomery Watson, 1995a), which were prepared to establish general guidelines for QA associated with all work conducted as part of the Gambell RI.

All quality control (QC) samples for this project were submitted blind to the project laboratory, Multichem Analytical Services (formerly Analytical Technologies, Inc.). The quality assurance (QA) samples were submitted to the NPDL in Troutdale, Oregon, for analysis. QA/QC sample numbers and their associated primary environmental sample are listed on Table 2-3.

Analytical data for samples and Quality Assurance/Quality Control (QA/QC) samples analyzed as part of the RI were reviewed for conformity with the QC criteria defined in the CDAP. Anomalies noted in the USACE Chemical Quality Assurance Report (CQAR) are presented in Appendix C. An independent review of the CQAR, laboratory data, and QC results was performed by Montgomery Watson. Qualifiers which were not already supplied with the data by either the project lab or QA lab were added accordingly. Data qualification guidance contained in National Functional Guidelines for Inorganic Data Review (EPA, 1994a) and National Functional Guidelines for Organic Data Review (EPA, 1994b) were followed. Those anomalies

which required qualification are noted in the tables presented in the text and the full listing of analytical data in Appendix B.

2.3 INVESTIGATION-DERIVED WASTE

Investigation-derived wastes (IDW) consisted of groundwater from purge water and sampling activities and disposable protective clothing and supplies. The plan for IDW was based on procedures outlined in the Phase I report (Montgomery Watson, 1995a).

Purge water was observed for the presence of free product or petroleum sheen to determine the appropriate disposal method. No IDW water showed evidence of free product or sheen. Accordingly, all of the fluids were discharged on-site without additional treatment.

Non-hazardous disposable protective clothing and supplies (including sampling spoons, sampling gloves, and disposable Teflon bailers) were bagged and shipped to Anchorage for disposal as solid waste.

City of Gambell, Alaska

Former Location of Transformers on Sevuokuk Mtn., Site 4 /4D

Transformers From Site 4 /4D Removed and Recycled

JOB No. 11 .040101

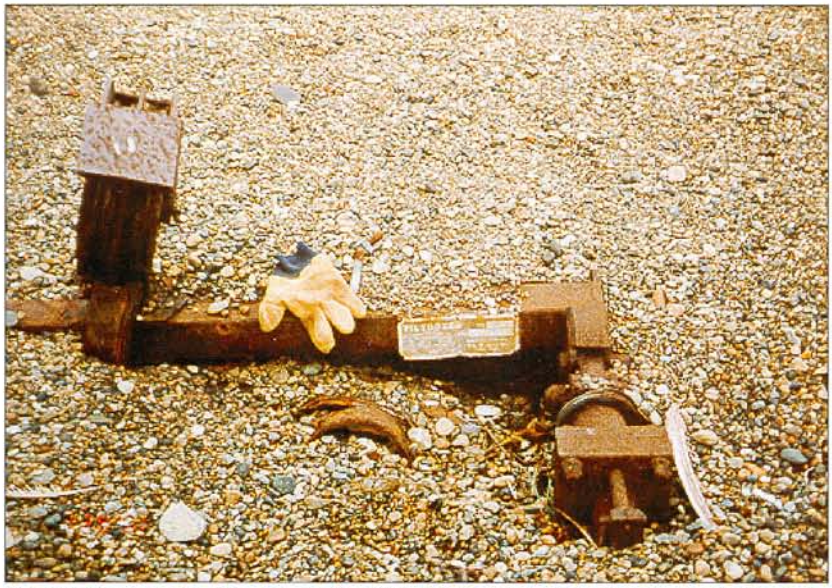
MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 2-1

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

PHOTOGRAPHS OF SELECTED SITES AND ACTIVITIES



Protruding Crane Head, Part of the Hazardous Debris at North Beach

Cutting Crane Head Below the Ground Surface

Recovering Crane

JOB No. 118...040101

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 2-2

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

PHOTOGRAPHS OF SELECTED SITES AND ACTIVITIES

Table 2-1 Summary of Site Investigation Activities

Site Name	Number of Surface Soil Samples	Number of Groundwater Samples	Number of Wipe Samples	Geophysical Survey	Rationale
Site 2 - Former Military Housing/Operations Site	8 (001SS02 - 008SS02)	None	None	None	Determine the extent and associated risks of the contamination, potential receptors, and possible development of alternative cleanup levels
Site 3 - Former Communications Site	4 (001SS03 - 004SS03)	None	None	None	Determine the extent and associated risks of the contamination, potential receptors, and possible development of alternative cleanup levels
Site 4/Area 4B - Former Radar Station	4 (001SS4B - 004SS4B)	None	None	None	Determine the extent and associated risks of the contamination, potential receptors, and possible development of alternative cleanup levels
Site 4/Area 4D - Transformers in Mountainside Drainage	None	None	3 (001WI - 003WI)	None	Further sampling or sediment removal is not warranted because soil PCB regulatory levels are appropriate given this type of exposure; wipe sampling is for transformer disposal characterization; transformers were removed 1997
Site 5 - Former Tramway Site	Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5," March 1999, Montgomery Watson.				

Key:
PCB = Polychlorinated Biphenyls
QA = Quality assurance
QC = Quality control
SS = Surface soil
WI = Wipe sample

Table 2-2 Site Summary of Sampling Matrix and Analytical Parameters

		Groundwater				Surface Soil				Wipe	
Sample Number	Type of Sample	Diesel Range Organics, EPA8100M	VOC, EPA 8260A	Polychlorinated Biphenyls, EPA8080	BTEX, SW 8020A	Beryllium and Thallium, SW 6010A	Lead, SW 6010A	Antimony, Arsenic, Cadmium, Copper, Lead, SW 6010A	Polychlorinated Biphenyls, EPA8080	Polychlorinated Biphenyls, EPA8080	Wipe
Site 2,3,4B,4D Surface Soil and Wipe Sampling											
96 GAM 001 SS 02	MS/MSD						X				
96 GAM 201 SS 02	Duplicate						X				
96 GAM 301 SS 02	Split	X					X		X		
96 GAM 002 SS 02	Primary	X			X		X		X		
96 GAM 003 SS 02	Primary	X		X	X		X		X		
96 GAM 004 SS 02	Primary	X		X	X		X		X		
96 GAM 005 SS 02	Primary	X		X	X		X		X		
96 GAM 006 SS 02	Primary	X		X	X		X		X		
96 GAM 007 SS 02	Primary	X		X	X		X		X		
96 GAM 008 SS 02	Primary	X		X	X		X		X		
96 GAM 001 SS 03	MS/MSD	X		X	X	X			X		
96 GAM 201 SS 03	Duplicate	X		X	X	X			X		
96 GAM 301 SS 03	Split	X		X	X	X			X		
96 GAM 002 SS 03	Primary	X		X	X	X			X		
96 GAM 003 SS 03	Primary	X		X	X	X			X		
96 GAM 004 SS 03	Primary	X		X		X			X		
96 GAM 001 SS 4B	MS/MSD	X		X				X	X		
96 GAM 201 SS 4B	Duplicate	X		X				X	X		
96 GAM 301 SS 4B	Split	X		X				X	X		
96 GAM 002 SS 4B	Primary	X		X				X	X		
96 GAM 003 SS 4B	Primary			X				X	X		
96 GAM 004 SS 4B	Primary							X	X		
96 GAM 001 WI 4D	Primary								X	X	
96 GAM 011 WI 4D	Duplicate								X	X	
96 GAM 002 WI 4D	Primary								X	X	
96 GAM 003 WI 4D	Primary								X	X	
96 GAM 100 WI 4D	Blank									X	
Trip Blanks											
96 GAM TB 803	Primary		X								
96 GAM TB 803	Split		X								

BTEX = benzene, toluene, ethylbenzene, xylene
MS/MSD = Matrix Spike/Matrix Spike Duplicate
PCB = polychlorinated biphenyls
SW = Solid Waste Test Methods (EPA, 1995a)
TB = trip blank
VOC = volatile organic compound

Table 2-3 QA/QC Listing

Primary	Replicate	Split	Parameters
Surface Soil Samples (Sites 2, Site 3, and Site 4/Area 4B)			
96GAM001SS02	96GAM201SS02	96GAM301SS02	lead
96GAM001SS03	96GAM201SS03	96GAM301SS03	beryllium, thallium
96GAM001SS4B	96GAM201SS4B	96GAM301SS4B	antimony, arsenic, cadmium, copper, lead
Wipe Samples (Site 4/Area 4D)			
96GAM001WI	96GAM011WI	96GAM021WI	PCBs
Trip Blanks			
96GAMTB		96GAMTB	VOCs

Key:

PCBs - polychlorinated biphenyls
VOCs - volatile organic compounds

3. RESULTS OF THE INVESTIGATION

Surface soil, groundwater, and wipe samples were collected during the 1996 investigation. The analytical data produced by the project and QA laboratories and information gathered during the RI are summarized in the following sections. The data is organized and presented by investigation area and type of samples collected. The four areas where samples were collected for chemical analyses [Site 2, Site 3, and Site 4 (Areas 4B and 4D)] are discussed in Sections 3.1 through 3.3. Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999). A complete listing of analytical results is provided in Appendix B.

3.1 SITE 2 - FORMER MILITARY HOUSING/OPERATIONS SITE

Investigations completed at Site 2 include surface soil sampling to delineate the extent of lead contamination surrounding the 1994 surface soil sample 27 (SS27). Site characteristics of Site 2 are outlined in the Phase I RI report, Section 4.2.2 (Montgomery Watson, 1995a). Site 2 sample locations are shown on Figure 3-1.

Eight primary surface soil samples (001SS02 through 008SS02), and their associated QA/QC samples (201SS02, 301SS02), were collected at a location 50 feet west of a concrete slab. The samples were aligned radially from SS27 with four samples taken in the four cardinal directions at 5-foot distances, and four samples taken 45 degrees from the cardinal directions at 10 foot distances. The surface soil was analyzed for lead only.

Analytical results ranged from 3.6 to 63 mg/kg in the samples surrounding the location of the 1994 surface soil sample 27. These results indicate that the 1994 sample was an isolated location with an elevated lead concentration of 750 mg/kg. The risk-based concentration for residential soils is determined to be 500-1,000 mg/kg (EPA, 1989a). Since Site 2 is located at a significant distance away from residential homes and public buildings, and the site is normally driven over by ATVs rather than walked through, Site 2 is not considered a fully residential area. Accordingly, the uppermost limit of the risk-based concentration for soil was accepted for risk evaluation at Site 2. Therefore, Site 2 is not considered to be an area which warrants further analysis.

3.2 SITE 3 - FORMER COMMUNICATIONS FACILITY BURIAL AREA

Investigations completed at Site 3 include surface soil samples surrounding the location where beryllium and thallium were detected at a depth of 5 feet during the Phase I RI. The surface soil samples were collected in order to determine the risk of dermal contact at the contaminated area. Site characteristics of Site 3 are outlined in the Phase I RI report, Section 4.2.3 (Montgomery Watson, 1995a). Site 3 sample locations are shown on Figure 3-1.

Four surface soil samples (001SS03, 002SS03, 003SS03, and 004SS03), and their associated QA/QC samples (201SS02, 301SS03), were collected at locations adjacent to monitoring well 9

(MW9). Three of the samples were spaced 120 degrees apart and collected at 5-foot intervals from MW9, and the fourth sample was taken directly adjacent to the monitoring well. The samples were collected for beryllium and thallium analysis.

Analytical results for beryllium and thallium were below detection limits (which ranged from 0.27 to 2.52 mg/kg and 0.05 to 0.28 mg/kg, respectively). These results are significantly below the United States Geological Survey (USGS) reported background level for beryllium of 1.5 mg/kg, and the risk-based concentration (EPA, 1996a) for thallium of 6.3 to 7.0 mg/kg. Based on these data, Site 3 is not considered to warrant further analysis.

3.3 SITE 4 - SEVUOKUK MOUNTAIN

Site 4 has four subareas (Area 4A, Area 4B, Area 4C, and Area 4D) which comprise the Sevuokuk Mountain investigative site. Area 4B and Area 4D were the only two sites to be retained for further investigation from the 1994 RI (Montgomery Watson, 1995a) and the Remedial Action Alternatives Technical Memorandum (RAATM) (Montgomery Watson, 1995b). Investigations completed at Site 4 include surface soil samples and wipe samples of transformers. Site characteristics of Site 4 are outlined in the Phase I RI report, Section 4.3 (Montgomery Watson, 1995a). Site 4 sample locations are shown on Figure 3-2.

3.3.1 Area 4B - Former Air Force Radar Site

Additional surface soil samples were collected from the stained area identified during the Phase I RI at Site 4/Area 4B. The samples were collected in order to assess the maximum concentrations of metal contamination.

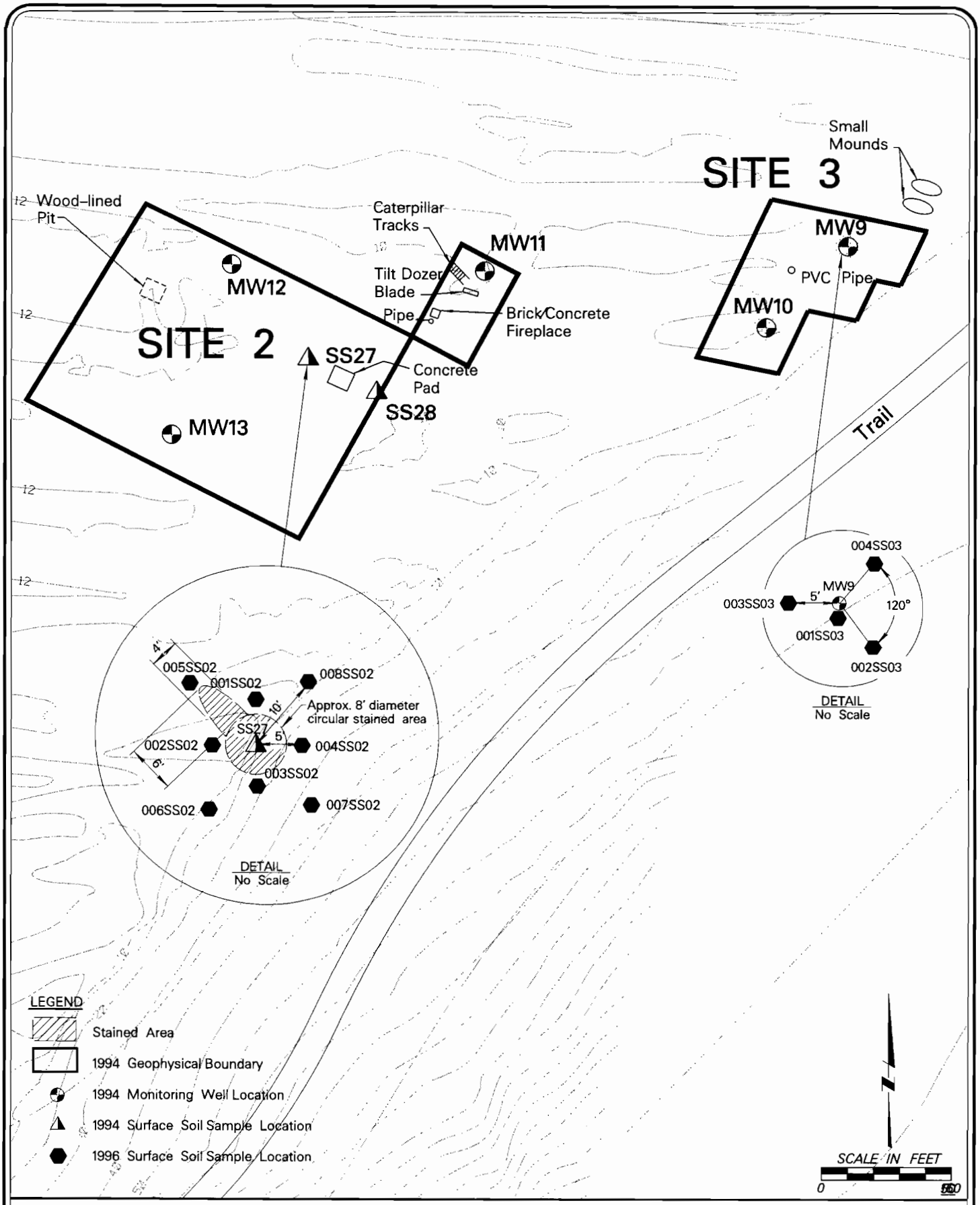
Three primary samples (001SS4B, 002SS4B, 003SS4B, and 004SS4B), and associated QA/QC samples (201SS4B, 301SS4B), were collected at the limits of the burned area in the four cardinal directions. The samples were analyzed for antimony, arsenic, cadmium, copper, and lead. The analytical results for these five metals are presented in Table 3-1.

All 1996 results which were taken at the limits of the stained area were found to be below risk-based concentrations (EPA, 1996a). These sampling locations more clearly delineate the extent of contamination at Site 4/Area 4B. However, the 1994 results were significantly above the risk-based concentrations. Therefore, soil removal at Site 4/Area 4B is proposed, and no further analysis is warranted.

3.3.2 Area 4D - Transformers in Mountainside Drainage

Wipe sampling of the three transformers (Figure 3-3) was completed during a preliminary visit to Gambell approximately one month prior to the Phase II Investigation. Wipe sampling was performed in order to adequately characterize the transformers for potential disposal during Phase II activities. The results allowed the transformers to be removed and do not present a risk to human health or the environment.

The transformers were removed during the 1997 Phase II RI, and no continuing source of contamination is present.



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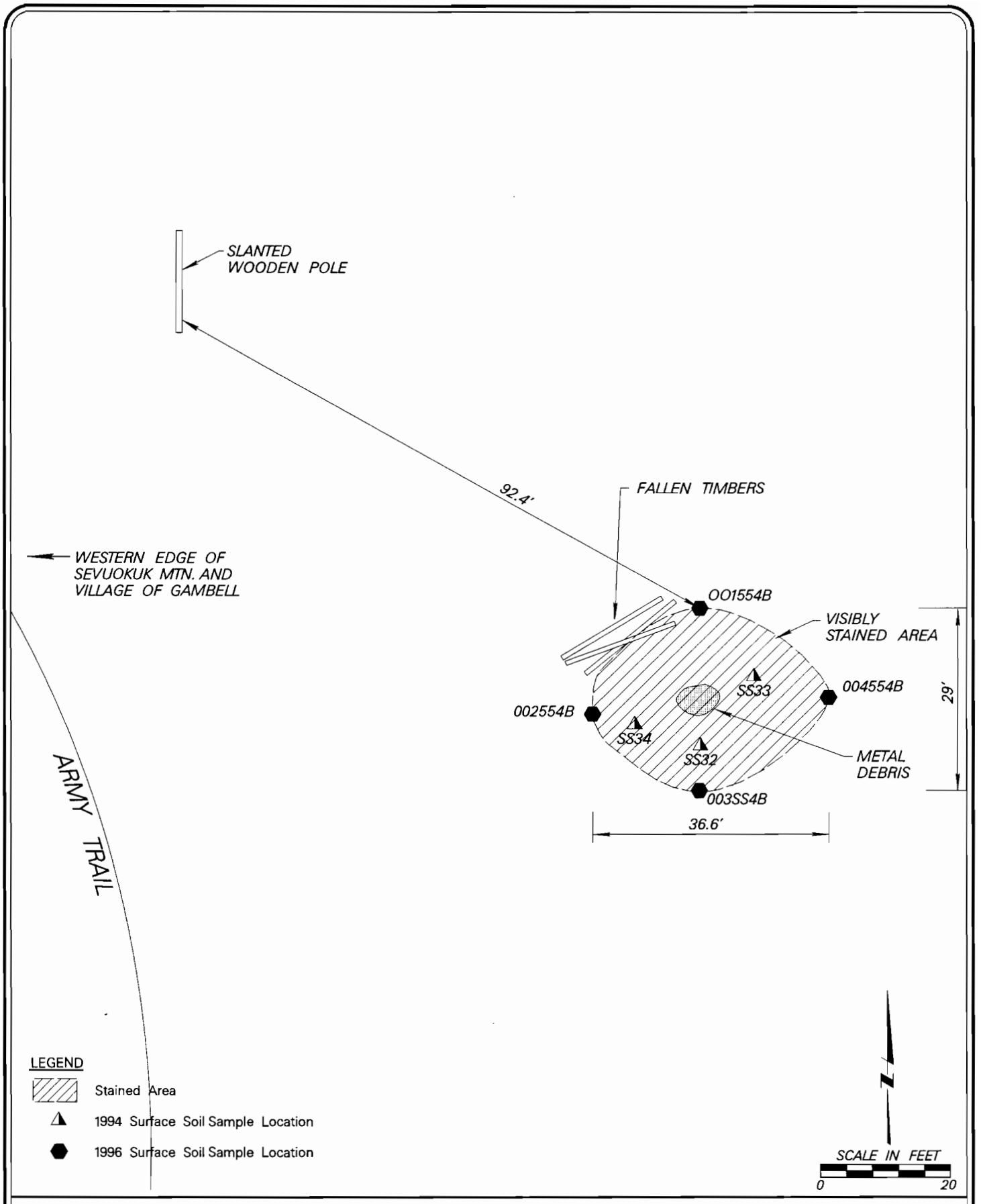
MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 3-1

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

SITE 2 AND SITE 3 SAMPLE LOCATIONS



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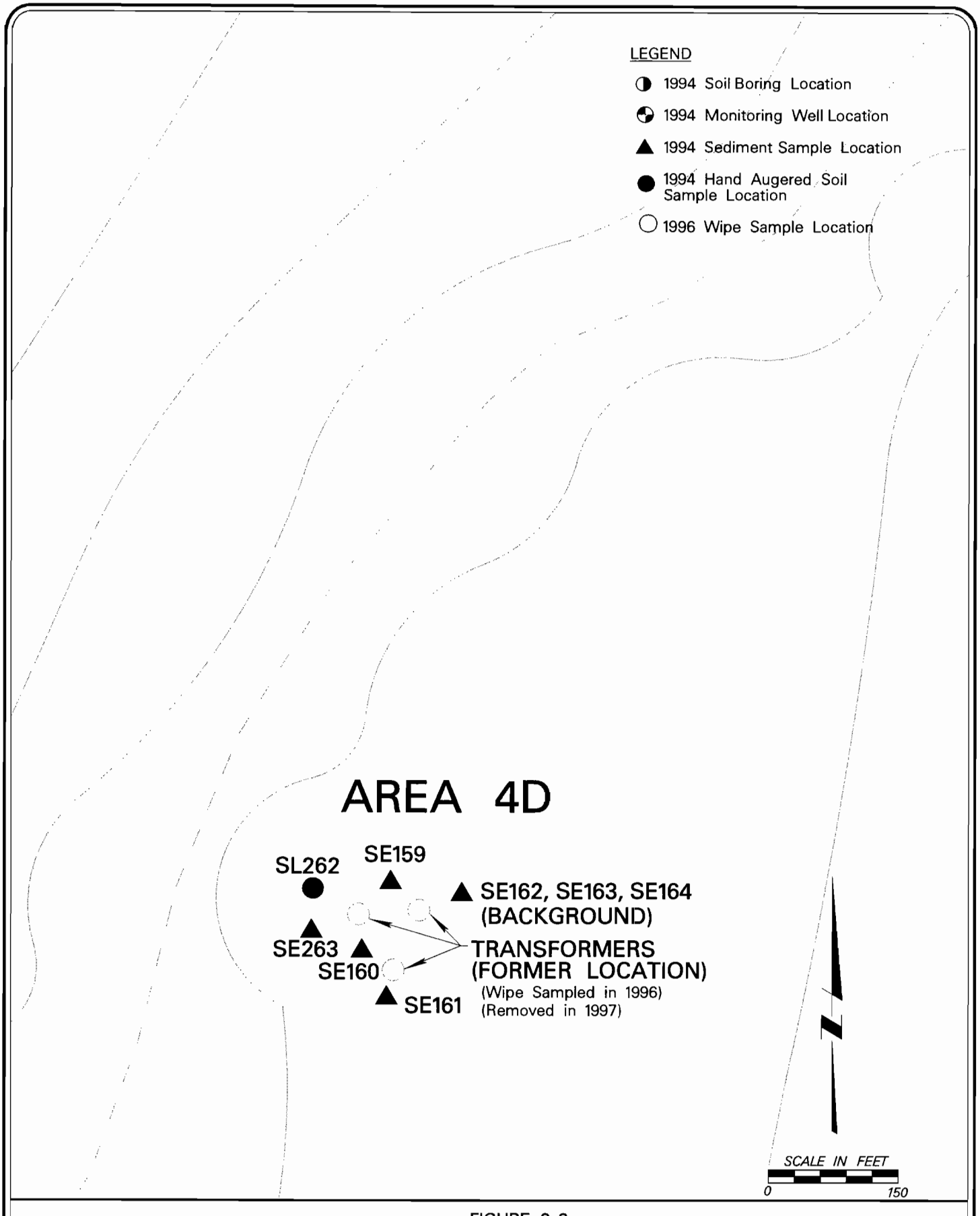
Anchorage, Alaska

FIGURE 3–2

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

SITE 4 AREA 4B SAMPLE LOCATIONS



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Anchorage, Alaska

FIGURE 3–3

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

SITE 4 (AREA 4D) SAMPLE LOCATIONS

Table 3-1 Summary of 1996 Analytical Data Background Criteria

Site	Matrix	Contaminant of Concern	# of Samples	Units	Range of Concentrations	Applicable Regulatory Benchmark Criteria	Risk Based Criteria
Site 2	Soil	Lead	8	mg/kg	3.6-63		400 [4]
Site 3	Soil	Thallium	4	mg/kg	ND (2.52)	<1 [3]	5.5 [1]
		Beryllium	4	mg/kg	ND (0.28)	<1 [3]; 0.15 [2]	160 [1]
Site 4/Area 4B	Soil	Antimony	4	mg/kg	ND (15)	<10 [3]	31 [1]
		Arsenic	4	mg/kg	ND (30)-17	18 [3]; 6.7 [2]	43 [1]
		Cadmium	4	mg/kg	ND (.28)-6	<1 [3]	39 [1]
		Copper	4	mg/kg	20-1900	24 [2]; 2.3 [3]	3,100 [1]
		Lead	4	mg/kg	14.5-840	9.6 [3]; 12 [2]	400 (4)

Key:
mg/kg - milligrams per kilogram
ND - non detect at given PQL (maximum of PQLs for contaminant)
PCBs - polychlorinated biphenyls
PQL - practical quantitation limit

1 - Risk-based Concentration for residential soils tap water, "Risk Based Concentration Table," 10/1/98, EPA Region III
2 - "Elemental Concentrations in Soils and Other Surficial Material of Alaska," 1988 U.S. Geological Survey
3 - Background levels found at the Gambell Site, shown on Table 4-4 of the RI report (Montgomery Watson 1995a)
4 - "Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities, OSWER Directive #9355.4-12, IEUBK Model (EPA 1989)

4. SITE EVALUATION

A phased site evaluation was conducted for each site to determine whether further assessment was warranted. The phased site evaluation approach is as follows:

1. Gather information about the site, including analytical data.

2. Compare analytical results to benchmark criteria.

3. If benchmark criteria are exceeded, determine whether a complete exposure pathway exists.

4. If a complete exposure pathway exists, determine further action.

4.1 GATHER INFORMATION

Information was gathered for each area of concern during the Phase I and Phase II investigations. This information and their respective locations include:

- residential surveys (Appendix A)
- field site surveys (Appendix A)
- field sampling forms (Appendix A)
- Phase I RI laboratory results (Table 1-1)
- Phase II RI laboratory results (Appendix B)

4.2 COMPARE RESULTS TO BENCHMARK

A screening risk assessment was conducted as part of the Phase I RI report (Montgomery Watson, 1995a) in which all of the site-specific analytical data were compared against risk-based concentration limits (EPA, 1996a). Based on results exceeding the risk-based criteria, four sites were retained for further investigation. (A fifth site, Site 5, was also retained. Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999)).

Sampling at these four sites (2, 3, 4B, and 4D) during the Phase II RI yielded results that did not exceed the risk-based criteria. These results are discussed in Sections 3.1 through 3.3.

4.3 DETERMINE WHETHER EXPOSURE PATHWAY EXISTS

To evaluate whether a site should proceed to further assessment, a completed exposure pathway must be identified.

A complete exposure pathway consists of:

1. Source and mechanism for chemical release
2. A retention or transport medium
3. A point of potential contact with contaminated medium (exposure point)
4. An exposure route at the contact point

All four elements must be present in order to have a complete exposure pathway.

The four sites which were retained for further investigation in the Phase II RI were evaluated against these criteria to determine if additional assessment is required, as shown in Table 4-1.

An environmental fate and transport assessment was performed for contaminated surface soil at Site 4/Area 4B as shown on Figure 4-1. Potential exposures at Site 4/Area 4B would be due to direct exposure which historically is remote (Apatiki and Tungiyen, 1996). These soils are to be removed in 1999 during the planned BD/DR removal action.

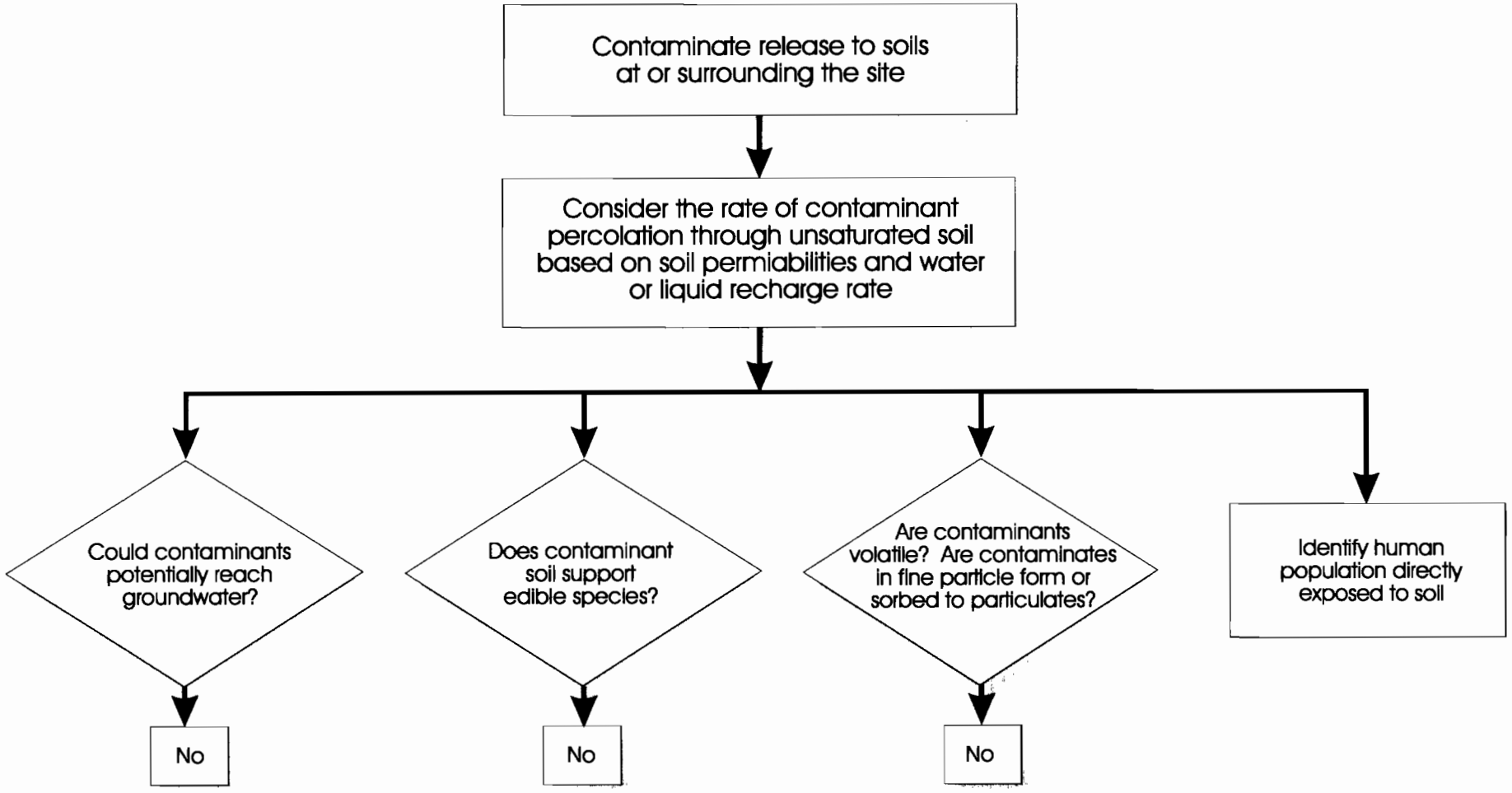
Table 4-1
Site Evaluation

Site	1995 levels above benchmark criteria?	1996 levels above regulatory criteria?	Potential Source/ Mechanism of Chemical Release[1]	Potential Transport Media	Potential Exposure Point	Potential Exposure Route	Advance to Baseline?
Site 2	Yes	No	contaminated surface soil/surface runoff, tracking	soil	Lead contamination found in one isolated location	Dermal contact; incidental ingestion	No – no potential source
Site 3	Yes	No	buried debris/ leaching	water	Contaminants are below the surface	No exposure route	No – no exposure point
Site 4/ Area 4B	Yes	No	contaminated surface soil/surface runoff, tracking	soil	Human and ecological receptors present	Dermal contact; incidental ingestion	No – no potential source (after soils have been removed)
Site 4/ Area 4D	No	No	transformers/ surface runoff	sediment	None, transformers removed in 1997	Dermal contact; incidental ingestion	No – no potential source

[1] Fugitive dust is an unlikely release mechanism at Gambell because of high humidity and the extent of snow cover throughout the year.

4.4 FURTHER ACTION

No completed exposure pathways were present at Sites 2, 3, and 4/Area 4D. Soil removal is proposed at Site 4/Area 4B, so no completed exposure pathway will be present. Therefore, further assessment is not warranted for any of these sites.



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 4-1

U.S. ARMY ENGINEER DISTRICT, ALASKA
GAMBELL, ST. LAWRENCE ISLAND, ALASKA

ENVIRONMENTAL FATE AND TRANSPORT

5. REMEDIAL ACTION

Remedial action is triggered by exceedance of regulatory criteria and is guided by regulatory cleanup levels. This section describes the applicable regulatory criteria and actions necessary for meeting these requirements.

5.1 APPLICABLE REGULATORY CRITERIA

Applicable regulatory criteria, including federal, state, and local regulations, as well as the benchmark screening criteria utilized in the Phase I and Phase II RI are summarized in Appendix D. A more complete discussion can be found in Section 6 of the Phase I RI report as well as the Engineering Evaluation/Cost Analysis (EE/CA) (Montgomery Watson, 1996b).

5.2 AREAS RECOMMENDED FOR CLEANUP

Analytical results and field data, supplemented by site evaluation, show that there are no significant environmental risks exhibited by the contamination at any of the Gambell sites. No remedial responses are recommended except for soil removal at Site 4/Area 4B. However, there are several Gambell sites identified as having debris characterized for removal under the DERP-FUDS categories for removal action. Removal action categories include CON/HTRW or BD/DR. An itemized list of Gambell's site-specific CON/HTRW and BD/DR items is shown on Table 5-1.

5.3 RECOMMENDED ALTERNATIVE FOR THE INTERIM REMOVAL ACTION OF CON/HTRW

The Montgomery Watson field team compiled an inventory of military containerized toxic and hazardous waste in Gambell. In accordance with the FUDS program, CON/HTRW can include underground storage tanks, aboveground storage tanks, transformers, hydraulic systems, investigative-derived waste drums, abandoned inactive monitoring wells, and contaminated soils from a leaking container.

Because landfilling is not acceptable to local residents, off-site removal and disposal is considered the sole alternative for managing the CON/HTRW at the Gambell site. This alternative involves removing the hazardous or toxic wastes from containers and containerizing, packaging, and labeling them for off-site transport and disposal at an appropriate permitted facility (i.e., non-hazardous waste landfill, recycling facility, or Toxic Substances Control Act waste facility). The Gambell EE/CA (Montgomery Watson, 1996b), details the disposal options for CON/HTRW and incidental CON/HTRW items.

Once the hazardous or toxic wastes have been removed from the containers, the containers themselves must be disposed of in a manner that reduces their potential for adverse affect on human health or the environment. Off-site disposal recycling is recommended for managing the scrap metal incidental to CON/HTRW at the Gambell site. This alternative will mitigate the

physical hazard risk associated with the empty containers and provides a reliable solution over the long-term. Recycling conserves metal from the site and reprocesses it into useful material as well as eliminating it from the waste stream. Recycling the scrap metal is likely to meet with regulatory and community acceptance, is easier to implement, can be accomplished over a shorter time span than having an on-site inert monofill, and has the added advantage of monetary returns.

During the 1996 site reconnaissance, a deposit of white powder was found about 20 feet from the eastern shore of Troutman Lake at Site 18 (Former Main Camp). The white powder is eroding from the lakeshore berm and covers an approximately 3-foot square area. Microscopic analysis of the powder by Robert Sanders of the Alaska District suggests that the powder is diatomaceous earth, probably associated with water filtering. Although the powder is believed to be inert, it should be removed because of the possibility that it may cause lung damage if dried and inhaled.

5.4 RECOMMENDED ALTERNATIVE FOR THE REMOVAL ACTION OF BD/DR

Several items of debris at the Gambell site have been identified as physically hazardous to someone exercising ordinary and reasonable care and, therefore, can be removed as part of the BD/DR design. The identified debris has been defined as being non-hazardous for the purposes of disposal, because there is no suspected lead-based paint or asbestos-containing material.

Under FUDS, BD/DR action applies to conditions that are hazardous as a result of DOD usage and are inherently hazardous when DOD divested interest in the property. Inherently dangerous BD/DR must present a clear danger likely to cause or already having caused death or serious injury to a person exercising ordinary or reasonable care.

The following is a list of hazardous structures and debris as defined by the DERP/FUDS Program Manual (USACE, 1993).

1. Structural hazards (excluding structures or debris less than 6 feet above the surrounding grade)
   - Leaning or weakened load-bearing walls or supports
   - Sagging roofs or floors
   - Unprotected openings in roof or elevated floor which are larger than 8 inches by 8 inches
   - Broken or missing stairs or railings
   - Deteriorated mortar or loss of bricks on chimneys and stacks
   - Weakened load-bearing wood frame members through natural processes such as termites or weathering

2. Cave-in or engulfment hazards
   - Evidence of falling rocks from tunnel ceilings or walls
   - Excavations which resulted in unstable or soft material deeper (or higher) than five feet
   - Deteriorating or collapsing tunnel linings

3. Falling hazards
   - Open pits, manholes, silos wells, or shafts which are larger than 8 inches by 8 inches or deeper than 6 feet
   - Open-sided platforms or floors 6 feet above the next lower level

4. Climbing hazards
   - Any structure 10 feet or higher, which is readily climbable through any internal parts of the structure

5. Drowning hazard
   - Any pit, depression or tank which can collect or contain standing water

6. Other hazards
   - Exposed nails, broken timbers, sharp metal, unstable concrete block piles
   - Openings large enough for a child to enter (i.e., 8 inches by 8 inches) and be trapped or be exposed to other hazards

Table 5-1 presents the inventory of BD/DR at Gambell. The quantity of BD/DR should be considered a best-guess estimate. The construction contractor for the removal should be contacted to make a more accurate assessment of the quantity of material, impediments to demolition and removal and disposal options.

5.5 RECOMMEND ALTERNATIVE FOR SOIL REMOVAL AT SITE 4/AREA 4B

To eliminate any remaining potential source of metals contamination, 186 cubic yards of soil are recommended for removal during debris removal activities (Montgomery Watson, 1995a, 1995b). Off-site disposal can be accomplished during the removal of CON/HTRW materials.

Table 5-1
Summary of DERP-FUDS Eligible Debris and Physical Hazards
Gambell, St. Lawrence Island, Alaska

Site Location	Debris	FUDS categorization/ eligibility	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Quantity Removed in 1997
NOTE: ~~Strikeout text~~ indicates that debris was removed (or partially removed) in 1997						
Area between Site 1/Area 1A and West Beach (Site 8)				**3,630**	**pounds**	**3,630**
	~~corrugated roofing material~~	~~BD/DR~~	~~inadequate burial; hazard to ATV travel~~	~~15~~	pounds	15
	~~piping(a)~~	~~BD/DR~~	~~protruding debris due to inadequate burial, increases potential for ATV or snowmobile collisions~~	~~75~~	pounds	75
	~~landing mat~~	~~BD/DR~~	~~edges, increases potential for collisions~~	~~2,280~~	pounds	2,280
	~~1-inch-diameter braided metal cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~100~~	pounds	100
	~~1.5-inch-diameter steel cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~50~~	pounds	50
	~~miscellaneous steel heavy machinery parts~~	~~BD/DR~~	~~protruding debris due to inadequate burial; hazard to ATV travel~~	~~790~~	pounds	790
	~~empty drums(a)~~	~~CON/HTW~~	~~N/A~~	~~320~~	pounds	320
Site 1/Area 1A				**5,545**	**pounds**	**5,245**
	~~engines formerly used to run pulley systems~~	~~BD/DR~~	~~protruding debris due to inadequate disposal (burial); hazard to ATV travel~~	~~1,100~~	~~pounds~~	1,100
	~~2-inch diameter steel cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~40~~	~~pounds~~	40
	~~3-inch diameter steel cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~225~~	~~pounds~~	225
	~~landing mat~~	~~BD/DR~~	~~protruding sharp metal edges located near junction of two ATV roads~~	~~2,160~~	~~pounds~~	2,160
	~~corrugated sheet metal roofing material~~	~~BD/DR~~	~~edges, increases potential for collisions~~	~~20~~	~~pounds~~	20
	~~steel weasel tracks~~	~~BD/DR~~	~~near junction of two ATV roads~~	~~500~~	~~pounds~~	500
Cut off protruding parts (1997)	~~partially buried (100 foot?) crane(a)~~	~~BD/DR~~	~~protruding debris due to inadequate disposal (burial); hazard to ATV travel~~	~~1,500~~	~~pounds~~	1,200
Area between Site 1/Area 1A and Site 1/Area 1B				**1,125**	**pounds**	**1,125**
	~~sheet metal~~	~~BD/DR~~	~~protruding sharp metal edges; hazard to ATV travel~~	~~40~~	~~pounds~~	40
	~~landing mat~~	~~BD/DR~~	~~protruding sharp metal edges; hazard to ATV travel~~	~~965~~	~~pounds~~	965
	~~2-inch diameter steel cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~100~~	~~pounds~~	100
	~~1-inch diameter steel cable(a)~~	~~BD/DR~~	~~entanglement; hazard to ATV travel~~	~~20~~	~~pounds~~	20
Site 1/Area 1B				**105**	**pounds**	**105**
	~~sheets of landing mat~~	~~BD/DR~~	~~protruding sharp metal edges due to inadequate burial~~	~~60~~	~~pounds~~	60
	~~strips of sheet metal~~	~~BD/DR~~	~~protruding sharp metal edges due to inadequate burial~~	~~5~~	~~pounds~~	5
	~~drum remnants~~	~~BD/DR~~	~~protruding debris; hazard to ATV travel~~	~~40~~	~~pounds~~	40

Table 5-1
Summary of DERP-FUDS Eligible Debris and Physical Hazards
Gambell, St. Lawrence Island, Alaska

Site Location	Debris	FUDS categorization/ eligibility	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Quantity Removed in 1997
NOTE: ~~Strikeout text~~ indicates that debris was removed (or partially removed) in 1997						
Site 2				**870**	**pounds**	**100**
	miscellaneous metal	BD/DR	sharp metal edges; hazard to ATV travel	30	pounds	0
Moved gear aside to edge of mountain (1997)	large gear	BD/DR	protruding debris due to inadequate burial, increases collision potential	200	pounds	0
	rectangular metal boxes	BD/DR	collision hazard	200	pounds	0
	~~part of a tiltdozer blade(a)~~	~~BD/DR~~	~~protruding debris due to inadequate burial, increases collision potential~~	~~100~~	~~pounds~~	100
	weasel track	BD/DR	protruding debris due to inadequate burial, increases collision potential	200	pounds	0
	metal piping	BD/DR	collision hazard due to inadequate burial	100	pounds	0
	wire mesh	BD/DR	protruding debris due to inadequate burial, increases collision potential	20	pounds	0
	empty drums(a)	CON/HTW	N/A	20	pounds	0
Site 3				**1,370**	**pounds**	**0**
	weasel tracks	BD/DR	protruding debris, increases hazard to vehicle operators	200	pounds	0
	miscellaneous metal	BD/DR	sharp metal edges, hazard to vehicle operators and children playing	500	pounds	0
	landing mat	BD/DR	sharp metal edges, hazard to vehicle operators and children playing	50	pounds	0
	drum remnants	BD/DR	protruding debris; hazard to ATV travel	20	pounds	0
	empty drums(a)	CON/HTW	N/A	380	pounds	0
	empty fuel 275-gallon storage tank(a)	CON/HTW	N/A	220	pounds	0
Area between Site 3 and Site 1/Area 1B				**1,740**	**pounds**	**1,740**
	~~cable spools(a)~~	~~BD/DR~~	~~collision hazard in a frequently traveled area~~	~~1,500~~	~~pounds~~	1,500
	~~corrugated metal~~	~~BD/DR~~	~~sharp metal edges present a hazard to children playing in the vicinity~~	~~40~~	~~pounds~~	40
	~~landing mat~~	~~BD/DR~~	~~sharp metal edges present a hazard to children playing in the vicinity~~	~~100~~	~~pounds~~	100
	~~cable wire(a)~~	~~BD/DR~~	~~entanglement hazard to ATV travel~~	~~100~~	~~pounds~~	100
Site 4/Area 4B				**3,135**	**pounds**	**0**
	miscellaneous metal debris	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity; fog is common on mountaintop which increases chance of collision	890	pounds	0
	metal sheeting	BD/DR	sharp metal edges hazardous to villagers who hunt, or children explorir ... vicinity	15	pounds	0
	metal gas tank(a)	CON/HTW	N/A	50	pounds	0
	empty drums(a)	CON/HTW	N/A	80	pounds	0

Table 5-1
Summary of DERP-FUDS Eligible Debris and Physical Hazards
Gambell, St. Lawrence Island, Alaska

Site Location	Debris	FUDS categorization/ eligibility	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Quantity Removed in 1997
NOTE: ~~Strikeout text~~ indicates that debris was removed (or partially removed) in 1997						
	10 kW generators(a)	CON/HTW	N/A	1,700	pounds	0
	2 engine blocks	CON/HTW	N/A	400	pounds	0
Site 4/Area 4A				**7,550**	**pounds**	**0**
	Quonset Hut framing	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	500	pounds	0
	steel poles	BD/DR	collision hazard to persons operating ATVs or snow machines	450	pounds	0
	triangle frame supports	BD/DR	collision hazard to persons operating ATVs or snow machines	150	pounds	0
	triangle metal framing	BD/DR	collision hazard to persons operating ATVs or snow machines	60	pounds	0
	steel supports	BD/DR	collision hazard to persons operating ATVs or snow machines	90	pounds	0
	framing structure	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	4,000	pounds	0
	sheet metal	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	30	pounds	0
	miscellaneous metal	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	50	pounds	0
	barbed wire (a)	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	80	pounds	0
	empty drums(a)	CON/HTW	N/A	640	pounds	0
	transformers(a)	CON/HTW	N/A	500	pounds	0
	generator	CON/HTW	N/A	1,000	pounds	0
Site 4/Area 4D				**1,180**	**pounds**	**500**
	sheet metal	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	70	pounds	0
	Quonset hut framing	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	500	pounds	0
	guy wire anchor(a)	BD/DR	collision hazard to persons operating ATVs or snow machines	10	pounds	0
	landing mat	BD/DR	sharp metal edges hazardous to villagers who hunt, or children exploring in vicinity	100	pounds	0
	~~transformers(a)~~	~~CON/HTW~~	~~N/A~~	~~500~~	~~pounds~~	500

Table 5-1
Summary of DERP-FUDS Eligible Debris and Physical Hazards
Gambell, St. Lawrence Island, Alaska

Site Location	Debris	FUDS categorization/ eligibility	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Quantity Removed in 1997
NOTE: ~~Strikeout text~~ indicates that debris was removed (or partially removed) in 1997						
Site 5				**675**	**pounds**	**365**
	miscellaneous metal	BD/DR	sharp metal edges, result of inadequate burial	105	pounds	0
	~~steel cable of various diameters(a)~~	~~BD/DR~~	~~entanglement, hazardous to vehicle operators~~	~~315~~	~~pounds~~	315
	conduit(a)	BD/DR	sharp metal edges, hazardous to vehicle operators	5	pounds	0
	weasel track	BD/DR	protruding debris, hazardous to vehicle operators	200	pounds	0
	~~drum remnants(a)~~	~~BD/DR~~	~~protruding debris; hazard to ATV travel~~	~~30~~	~~pounds~~	30
	~~empty drums(a)~~	~~CON/HTW~~	~~N/A~~	~~20~~	~~pounds~~	20
Area between Site 5 and Site 3 along ATV trail				**155**	**pounds**	**0**
	cable spool(a)	BD/DR	collision hazard in a frequently traveled area	25	pounds	0
	drum remnants(a)	BD/DR	protruding debris; hazard to ATV travel	30	pounds	0
	empty drums(a)	CON/HTW	N/A	100	pounds	0
Site 6				**320**	**pounds**	**0**
	partially buried drums and surficial drum remnants	BD/DR	ATV; well traveled area close to the center of village	30	pounds	0
	landing mat	BD/DR	sharp metal edges; hazardous to small children and vehicle operators	50	pounds	0
	guy wire	BD/DR	entanglement, hazardous to vehicle operators	40	pounds	0
	weasel tracks	BD/DR	protruding debris, hazardous to vehicle operators	200	pounds	0
Site 7				**100**	**pounds**	**0**
	landing mat	BD/DR	sharp metal edges; hazardous to small children in this well traveled area	10	pounds	0
	3-inch-diameter steel cable(a)	BD/DR	entanglement, hazardous to vehicle operators	50	pounds	0
	braided copper wire(a)	BD/DR	entanglement, hazardous to vehicle operators	25	pounds	0
	miscellaneous metal	BD/DR	sharp metal edges; hazardous to small children in this well traveled area	15	pounds	0
Site 8				**132,380**	**pounds**	**17,370**
	landing mat	BD/DR	sharp metal edges; hazard to vehicle operators in this well traveled area	121,910	pounds	15,670
	steel cable and wire(a)	BD/DR	entanglement, hazardous to vehicle operators	800	pounds	0
	metal crate strapping	BD/DR	entanglement, hazardous to vehicle operators	235	pounds	0
	corrugated roofing material	BD/DR	hazardous to vehicle operators	135	pounds	0
	metal grate	BD/DR	collision hazard; hazardous to vehicle operators	300	pounds	0
	hot water heater	BD/DR	collision hazard; hazardous to vehicle operators	100	pounds	0
	metal sled	BD/DR	collision hazard; hazardous to vehicle operators	1,000	pounds	0

Table 5-1
Summary of DERP-FUDS Eligible Debris and Physical Hazards
Gambell, St. Lawrence Island, Alaska

Site Location	Debris	FUDS categorization/ eligibility	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Quantity Removed in 1997
NOTE: ~~Strikeout text~~ indicates that debris was removed (or partially removed) in 1997						
	~~miscellaneous metal~~	~~BD/DR~~	~~hazardous to vehicle operators~~	~~600~~	pounds	600
	~~weasel track~~	~~BD/DR~~	~~protruding debris; hazardous to vehicle operators~~	~~200~~	pounds	200
	empty drums(a)	CON/HTW	N/A	900	pounds	900
	drums containing asphalt(a)	CON/HTW	N/A	6,200	pounds	0
Site 10				**3,600**	**pounds**	**0**
	landing mat	BD/DR	sharp metal edges, located in major trail system; hazardous to vehicle operator	700	pounds	0
	weasel tracks	BD/DR	protruding debris; hazardous to vehicle operators	600	pounds	0
	drums(a)	CON/HTW	N/A	2,300	pounds	0
Site 12				**2,650**	**pounds**	**0**
	landing mat	BD/DR	sharp metal edges; located at intersection of two ATV trails	100	pounds	0
	empty drums(a)	CON/HTW	N/A	2,500	pounds	0
	batteries(a)	CON/HTW	N/A	50	pounds	0
Site 13				**300**	**pounds**	**0**
	metal piping	BD/DR	collision hazard in a well traveled area	150	pounds	0
	guy wire	BD/DR	entanglement hazard in a well traveled area	150	pounds	0
Site 17				**500**	**pounds**	**0**
	Nodwell track	BD/DR	protruding debris due to inadequate burial; hazard to ATV travel	250	pounds	0
	landing mat	BD/DR	sharp metal edges; hazardous to ATV or snow machine operator	130	pounds	0
	braided and electrical steel cable	BD/DR	entanglement; hazard to vehicle operator	65	pounds	0
	scrap metal	BD/DR	sharp metal edges; hazard to vehicle operator	40	pounds	0
	drum remnants associated with potential hazardous waste	CON/HTW	N/A	15	pounds	0

(a) = Estimated weight

	Estimated Grand Total:	**166,930**	**pounds**
KEY:	**Removed in 1997:**		**30,180**
	Estimated Remaining in Gambell:	**136,750**	

ATV - All terrain vehicle
BD/DR - Building demolition/debris removal
CON/HTW - Containerized hazardous or toxic waste
DERP - Defense Environmental Restoration Program
FUDS - Formerly Used Defense Site
kW - Kilowatt
N/A - Not applicable
RI - Remedial investigation

Note: Strikeout text indicates that debris was removed from St. Lawrence Island in 1997 and transported to be recycled.

6. CONCLUSIONS AND RECOMMENDATIONS

A summary of conclusions and recommendations of the Phase II RI is given in Table 6-1.

In general, the environmental risk of contamination at the Gambell Site is found to be insignificant and, therefore, the only remedial action for environmental matrices recommended at this time is removal of soil at Site 4/Area 4B.

TABLE 6-1
Summary of Conclusions of Phase II Remedial Investigation

Site	Reason for Concern	Phase II Activity Performed	Conclusions Based on Phase II Efforts	Recommendations
Site 2	Lead and other metals detected in surface soils	Additional surface soil sampling performed to delineate the areal extent of lead	Human health or ecological risk assessment not warranted because contamination is limited to one sample location with concentrations within the risk-based concentration limits of 500-1,000 mg/kg	No further action
Site 3	DROs, beryllium, and thallium found at a depth of 5 feet	Surface soil sampling was performed to evaluate the presence of beryllium and thallium at the surface	Human health or ecological risk assessment not warranted because of incomplete exposure pathway; contamination is only in subsurface soil	No further action
Site 4/ Area 4B	Trace levels of dioxins and several priority pollutant metals were detected in surface soils	Further surface soil sampling was performed to evaluate risks posed by priority pollutant metals	Human health and ecological risk assessment not warranted because contamination medium will be removed	Remove stained soil
Site 4/ Area 4D	Trace levels of PCBs detected in sediments	Wipe sampling was performed on three transformers for disposal characterization	Transformers found not to contain high levels of PCBs	No further action
Site 5	Information concerning Gambell Site 5 will be contained in a separate report, "Remedial Investigation Gambell Site 5" (Montgomery Watson, 1999).			

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APPENDIX A

Field Forms

USCOE ALASKA
GAMBELL PHASE II REMEDIAL INVESTIGATION
Gambell, St. Lawrence Island, Alaska
1498*0450

SURFACE SOIL SAMPLING FIELD FORM

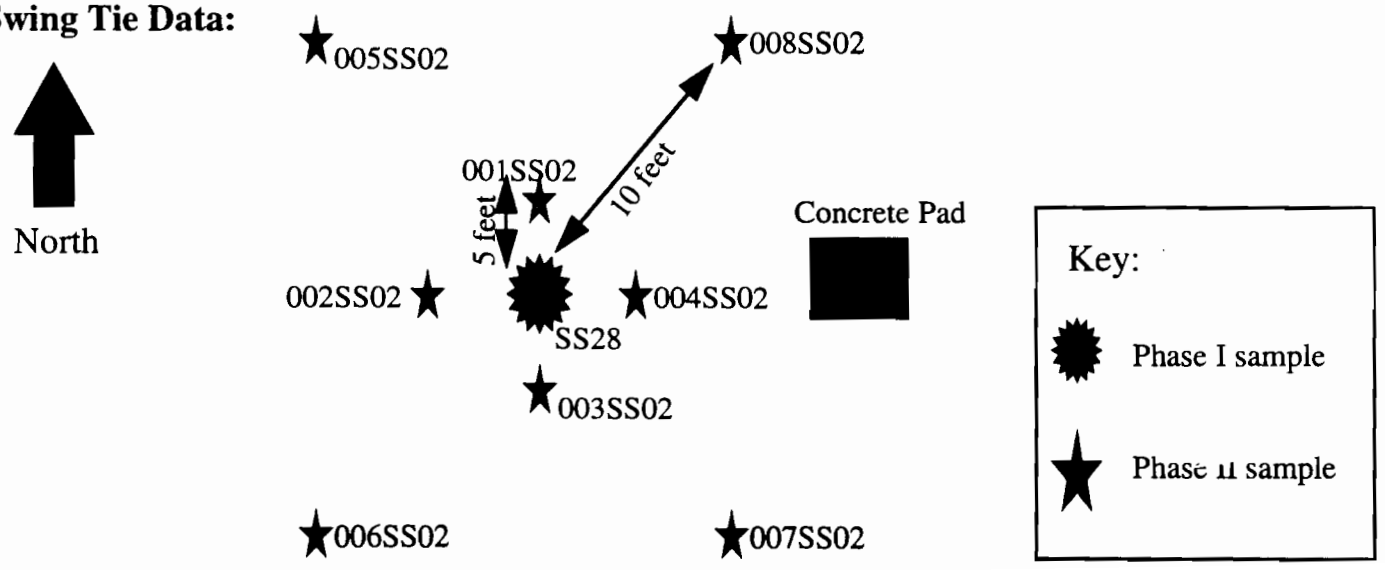
SITE: Site 2	**DATE:** 8/7/96	**START TIME:** 1240
SAMPLE TYPE: Grab	**FIELD CREW:** Doug/ Elise	**WIND:** None
WEATHER: SKY: cloudy PRECIP: Rain AIR TEMPERATURE: 5 degrees C		

SAMPLE COLLECTION

Analyte		Analyte	
Beryllium		Lead	X
Thallium		Cadmium	
Antimony		Copper	
Arsenic			

COMMENTS:	
Sample Depth:	6 inches - 1 foot
PHOTO TAKEN:	Roll GAMET1/#s 4,5
Sample ID:	96GAM001SS02-96GAM008SS02
QA/QC:	96GAM201SS02; 96GAM301SS02

Swing Tie Data:



USCOE ALASKA
GAMBELL PHASE II REMEDIAL INVESTIGATION
Gambell, St. Lawrence Island, Alaska
1498*0450

SURFACE SOIL SAMPLING FIELD FORM

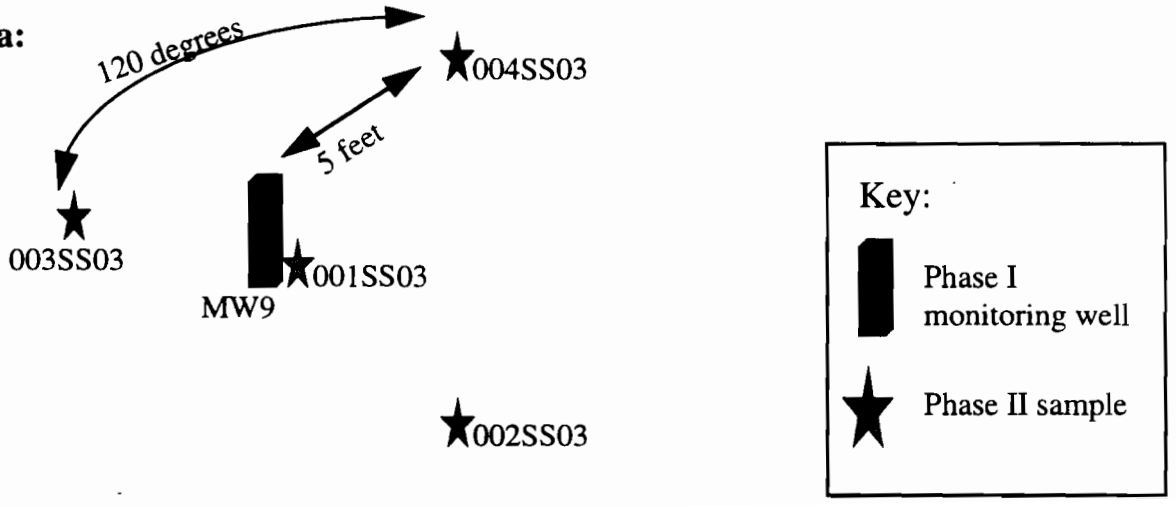
SITE: Site 3	**DATE:** 8/7/96	**START TIME:** 1200
SAMPLE TYPE: Grab	**FIELD CREW:** Doug/ Elise	**WIND:** None
WEATHER: SKY: cloudy	PRECIP: Rain	AIR TEMPERATURE: 5 degrees C

SAMPLE COLLECTION

Analyte		Analyte
Beryllium	X	Lead
Thallium	X	Cadmium
Antimony		Copper
Arsenic		

COMMENTS:	
Sample Depth:	6 inches - 1 foot
PHOTO TAKEN:	Roll GAMET1/#s 1-3
Sample ID:	96GAM001SS03-96GAM004SS03
QA/QC:	96GAM201SS03; 96GAM301SS03

Swing Tie Data:



USCOE ALASKA
GAMBELL PHASE II REMEDIAL INVESTIGATION
Gambell, St. Lawrence Island, Alaska
1498*0450

SURFACE SOIL SAMPLING FIELD FORM

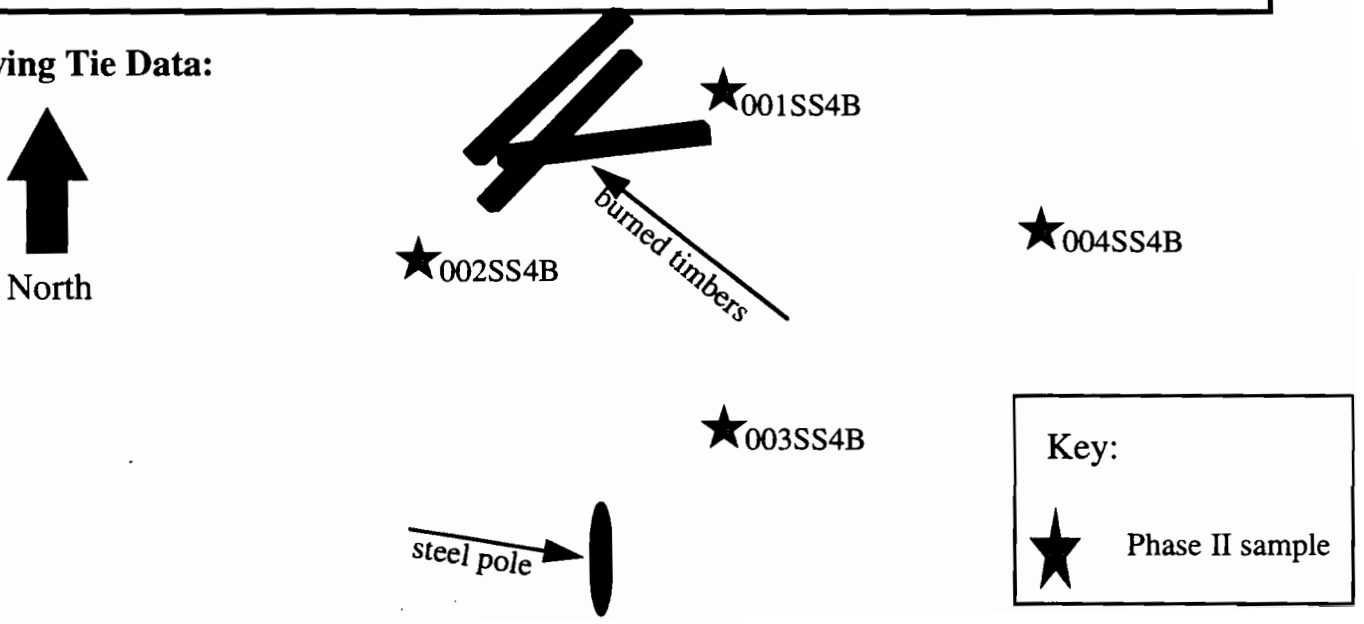
SITE: Site 4/Area 4B	**DATE:** 8/7/96	**START TIME:** 1800
SAMPLE TYPE: Grab	**FIELD CREW:** Doug/ Elise	**WIND:** None
WEATHER: SKY: cloudy PRECIP: Rain AIR TEMPERATURE: 5 degrees C		

SAMPLE COLLECTION

Analyte		Analyte	
Beryllium		Lead	X
Thallium			
Antimony	X	Cadmium	X
Arsenic	X	Copper	X

COMMENTS:	
Sample Depth:	6 inches - 1 foot
PHOTO TAKEN:	Roll GAMET1
Sample ID:	96GAM001SS4B-96GAM004SS4B
QA/QC:	96GAM201SS4B; 96GAM301SS4B

Swing Tie Data:



RESIDENTS SURVEY - GAMBELL

GENERAL QUESTIONS

Typical seasonal climates

freeze	October	12-15 degrees Fahrenheit
thaw	April	26 degrees Fahrenheit
wind		15-20 knots
precipitation	light precipitation during most of the year; rain in the summer	
predominant wind direction		northwest, northeast

Skin exposure (seasonal clothing)

Winter	hats, gloves, down jackets, snow pants, boots
Spring	medium jackets, hats, gloves
Summer	medium warm clothing, gloves, baseball caps
Fall	same as summer

SITE 2 and SITE 3 (base of Sevuokuk Mountain)

Potential Exposure Pathway:

Surface runoff spreading contaminated surface soil causing risk of dermal contact

Potential Receptors:

Gambell residents, birds

Exposure Frequency and Duration (soil ingestion and direct contact, local animal consumption in affected area):

June through September walking around; October picking berries, hiking, shooting birds (auklets)

SITE 4B (North end of Sevuokuk Mountain top)

Potential Exposure Pathway:

Surface runoff spreading contaminated surface soil causing risk of dermal contact

Potential Receptors:

Gambell residents, birds, foxes

Exposure Frequency and Duration (soil ingestion and direct contact, local animal consumption in affected area):

The only time residents go to the top of the mountain is for burial or in late summer to look for young auklets. Residents rarely trap because the price is too low.

SITE 4D (Sevuokuk Mountain top above Pump House)

Potential Exposure Pathway:

Sediment migration to secondary drinking water supply

Potential Receptors:

Gambell residents, birds, foxes

Exposure Frequency and Duration (soil ingestion and direct contact, local animal consumption in affected area):

Nothing is hunted near Site 4/Area 4D. People hike around sometimes in order to see farther out to the rest of the island.

SITE 5 (Base of Sevuokuk Mountain-adjacent to Village water wells)

Potential Exposure Pathway:

Contaminant leaching by precipitaiton to potable aquifer

Potential Receptors:

Gambell residents, domestic animals

Exposure Frequency and Duration (soil ingestion and direct contact, local animal consumption in affected area):

Residents frequently dig at the adjacent archaeological site, called the 'main bone yard' by some. This is a well used site for picking greens, driving by on ATVs, as well as for birdwatchers.

FIELD SURVEY
Gambell Site 2

Present and Future Land Uses:

Native use; ATVs cross the site

Condition and Type of Biota:

Gravel; section of stained gravel near SS28

Vegetation Survey (% of cover, vegetation condition and type):

<5% cover; mostly grasses terminating into beach

Soil Adherence Factor (type and condition, grain size, moisture, sorting, color, fetch):

Gravel, little moisture and sorting, rounded gravel, high fetch, brown-gray color

Drainages or Standing Water (ponds, stream, standing water, size, distance):

None

Predominant Wind Direction:

northwest or northeast (as per Jenna Apatiki)

Estimate Streamflow (where applicable):

NA

Biological Samples (where applicable):

NA

Chemical Samples (where applicable):

8 samples around SS27 for lead analysis

Photographs and Video:

Yes (Roll GAMET1/#s 4, 5; GAMET2/#s 1-4)

Potential Source of Chemical Release:

Buried debris

Potential Transport Medium:

Wind movement of surficial gravel

Potential Receptors:

Residents walking around (not as often here because it is off the ATV trail and away from the mountain)

Potential Exposure Pathways:

Dermal contact

Background Contaminant Sample:

Monitoring Well 14

FIELD SURVEY
Gambell Site 3

Present and Future Land Uses:

ATV road passes through

Condition and Type of Biota:

Healthy, no staining; ATV trail cuts through the site; some trail erosion

Vegetation Survey (% of cover, vegetation condition and type):

70% vegetation; majority are grasses, sedges, low-lying mosses, and some lichen

Soil Adherence Factor (type and condition, grain size, moisture, sorting, color, fetch):

Gravel, little moisture and sorting, 1/2-1/4" rounded gravel, high fetch, brown-gray color

Drainages or Standing Water (ponds, stream, standing water, size, distance):

None

Predominant Wind Direction:

northwest or northeast (as per Jenna Apatiki)

Estimate Streamflow (where applicable):

NA

Biological Samples (where applicable):

NA

Chemical Samples (where applicable):

4 samples around MW9 for beryllium and thallium

Photographs and Video:

Yes (Roll GAMET1/#s 1-3)

Potential Source of Chemical Release:

Buried debris

Potential Transport Medium:

Wind movement of surficial gravel

Potential Receptors:

Residents picking berries, hiking, shooting birds; birdwatchers

Potential Exposure Pathways:

Dermal contact

Background Contaminant Sample:

MW14

FIELD SURVEY
Gambell Site 4B

Present and Future Land Uses:

Native use

Condition and Type of Biota:

Mainly large cobbles and boulders; good condition

Vegetation Survey (% of cover, vegetation condition and type):

Mainly lichen, some sedges and grasses; 50% cover

Soil Adherence Factor (type and condition, grain size, moisture, sorting, color, fetch):

Silty sands and cobbles, low moisture, medium fetch, brown in color

Drainages or Standing Water (ponds, stream, standing water, size, distance):

None

Predominant Wind Direction:

northwest or northeast (as per Jenna Apatiki)

Estimate Streamflow (where applicable):

NA

Biological Samples (where applicable):

NA

Chemical Samples (where applicable):

4 samples collected at the limits of the stained area for antimony, arsenic, cadmium, copper and lead analysis

Photographs and Video:

Yes (Roll GAMET2/#s 5-12)

Potential Source of Chemical Release:

Radar station that burned in the 1950's causing low levels of dioxins and metals in the soil

Potential Transport Medium:

Transport of surficial contaminants by wind or water

Potential Receptors:

Young birds and foxes

Potential Exposure Pathways:

Dermal contact (residents do not go to the top of the mountain to pick salmon berries as per Jenna Apatiki)

Background Contaminant Sample:

SS270 at northern edge of Sevuokuk Mountain

FIELD SURVEY
Gambell Site 4D

Present and Future Land Uses:

Native use; residents might hike around or use this location as a lookout point

Condition and Type of Biota:

Grasses, apparently healthy; not stressed vegetation or staining observed

Vegetation Survey (% of cover, vegetation condition and type):

100% cover except surface water and rocks

Soil Adherence Factor (type and condition, grain size, moisture, sorting, color, fetch):

Silty organic sand, high adhesion due to moisture content and vegetative cover

Drainages or Standing Water (ponds, stream, standing water, size, distance):

Marshy drainages draining to the west (down the mountain)

Predominant Wind Direction:

northwest or northeast (as per Jenna Apatiki)

Estimate Streamflow (where applicable):

NA

Biological Samples (where applicable):

NA

Chemical Samples (where applicable):

Surface soil samples adjacent to and upstream of transformers (1994); wipe samples of the transformers (1996)

Photographs and Video:

Yes

Potential Source of Chemical Release:

Transformers in drainage

Potential Transport Medium:

Sediment and water drainages; transport of dissolved constituents in surface water

Potential Receptors:

Residents hiking occassionally; foxes

Potential Exposure Pathways:

Dermal contact; ingestion of water via infiltration gallery and/or at the village well points

Background Contaminant Sample:

SS270 at northern edge of Sevuokuk Mountain

APPENDIX B

Laboratory Analytical Results Summary

Appendix B
Key to Data Qualifiers

AY	Matrix interference suspected
BA	Relative percent difference out of control
BW	Sample extract analyzed after holding time expired
AZ	Surrogate recovery outside acceptable range due to matrix interference
AK	Lighter hydrocarbon than diesel
X	External; contamination probable

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 02

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAM001SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	16.0000		(1.6000)	MG/KG	SW6010	820690-1	MASA
96GAM201SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	14.0000		(1.6000)	MG/KG	SW6010	820690-2	MASA
96GAM301SS02	08/07/96	GAM02	SS	Surface Soil QA	Lead	18.4000		(1.1400)	MG/KG	SW6010	96-153	NPDL
96GAM002SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	63.0000		(1.6000)	MG/KG	SW6010	820690-3	MASA
96GAM003SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	54.0000		(1.6000)	MG/KG	SW6010	820690-4	MASA
96GAM004SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	40.0000		(1.6000)	MG/KG	SW6010	820690-5	MASA
96GAM005SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	41.0000		(1.5000)	MG/KG	SW6010	820690-6	MASA
96GAM006SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	55.0000		(1.6000)	MG/KG	SW6010	820690-7	MASA
96GAM007SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	12.0000		(1.6000)	MG/KG	SW6010	820690-8	MASA
96GAM008SS02	08/07/96	GAM02	SS	Surface Soil Primary	Lead	3.6000		(1.6000)	MG/KG	SW6010	820690-9	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 03

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAM001SS03	08/07/96	GAM03	SS	Surface Soil Primary	Beryllium	ND		(0.2800)	MG/KG	SW6010	820690-10	MASA
	08/07/96	GAM03	SS	Surface Soil Primary	Thallium	ND		(0.2700)	MG/KG	SW7841	820690-10	MASA
96GAM201SS03	08/07/96	GAM03	SS	Surface Soil Primary	Beryllium	ND		(0.2800)	MG/KG	SW6010	820690-11	MASA
	08/07/96	GAM03	SS	Surface Soil Primary	Thallium	ND		(0.2800)	MG/KG	SW7841	820690-11	MASA
96GAM301SS03	08/07/96	GAM03	SS	Surface Soil QA	Beryllium	ND		(0.0500)	MG/KG	SW6010	96-154	NPDL
	08/07/96	GAM03	SS	Surface Soil QA	Thallium	ND		(2.5200)	MG/KG	SW6010	96-154	NPDL
96GAM002SS03	08/07/96	GAM03	SS	Surface Soil Primary	Beryllium	ND		(0.2800)	MG/KG	SW6010	820690-12	MASA
	08/07/96	GAM03	SS	Surface Soil Primary	Thallium	ND		(0.2800)	MG/KG	SW7841	820690-12	MASA
96GAM003SS03	08/07/96	GAM03	SS	Surface Soil Primary	Beryllium	ND		(0.2700)	MG/KG	SW6010	820690-13	MASA
	08/07/96	GAM03	SS	Surface Soil Primary	Thallium	ND		(0.2800)	MG/KG	SW7841	820690-13	MASA
96GAM004SS03	08/07/96	GAM03	SS	Surface Soil Primary	Beryllium	ND		(0.2800)	MG/KG	SW6010	820690-14	MASA
	08/07/96	GAM03	SS	Surface Soil Primary	Thallium	ND		(0.2800)	MG/KG	SW7841	820690-14	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 04B

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAM001SS4B	08/08/96	GAM04	SS	Surface Soil Primary	Antimony	ND	AY	(2.8000)	MG/KG	SW6010	820690-15	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Arsenic	ND		(5.7000)	MG/KG	SW6010	820690-15	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Cadmium	ND		(0.2800)	MG/KG	SW6010	820690-15	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Copper	200.000		(0.5700)	MG/KG	SW6010	820690-15	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Lead	41.0000		(1.7000)	MG/KG	SW6010	820690-15	MASA
96GAM201SS4B	08/08/96	GAM04	SS	Surface Soil Primary	Antimony	ND	AY	(2.9000)	MG/KG	SW6010	820690-16	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Arsenic	ND		(5.9000)	MG/KG	SW6010	820690-16	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Beryllium	ND		(0.2900)	MG/KG	SW6010	820690-16	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Cadmium	ND		(0.2900)	MG/KG	SW6010	820690-16	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Copper	20.0000	BA	(0.5900)	MG/KG	SW6010	820690-16	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Lead	7.6000	BA	(1.8000)	MG/KG	SW6010	820690-16	MASA
96GAM301SS4B	08/08/96	GAM04	SS	Surface Soil QA	Antimony	ND		(1.2500)	MG/KG	SW6010	96-155	NPDL
	08/08/96	GAM04	SS	Surface Soil QA	Arsenic	ND		(3.2700)	MG/KG	SW6010	96-155	NPDL
	08/08/96	GAM04	SS	Surface Soil QA	Cadmium	ND		(0.0500)	MG/KG	SW6010	96-155	NPDL
	08/08/96	GAM04	SS	Surface Soil QA	Copper	86.9000		(0.2100)	MG/KG	SW6010	96-155	NPDL
	08/08/96	GAM04	SS	Surface Soil QA	Lead	14.5000		(1.1400)	MG/KG	SW6010	96-155	NPDL
96GAM002SS4B	08/08/96	GAM04	SS	Surface Soil Primary	Antimony	ND	AY	(3.2000)	MG/KG	SW6010	820690-17	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Arsenic	17.0000		(6.4000)	MG/KG	SW6010	820690-17	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Cadmium	1.1000		(0.3200)	MG/KG	SW6010	820690-17	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Copper	830.000		(0.6400)	MG/KG	SW6010	820690-17	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Lead	170.000		(1.9000)	MG/KG	SW6010	820690-17	MASA
96GAM003SS4B	08/08/96	GAM04	SS	Surface Soil Primary	Antimony	ND	AY	(2.8000)	MG/KG	SW6010	820690-18	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Arsenic	ND		(5.6000)	MG/KG	SW6010	820690-18	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Cadmium	6.0000		(0.2800)	MG/KG	SW6010	820690-18	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Copper	1900.00		(0.5600)	MG/KG	SW6010	820690-18	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Lead	260.000		(1.7000)	MG/KG	SW6010	820690-18	MASA
96GAM004SS4B	08/08/96	GAM04	SS	Surface Soil Primary	Antimony	ND	AY	(15.0000)	MG/KG	SW6010	820690-19	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Arsenic	ND		(30.0000)	MG/KG	SW6010	820690-19	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Cadmium	6.0000		(1.5000)	MG/KG	SW6010	820690-19	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Copper	680.000		(3.0000)	MG/KG	SW6010	820690-19	MASA
	08/08/96	GAM04	SS	Surface Soil Primary	Lead	840.000		(9.0000)	MG/KG	SW6010	820690-19	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 04D

Sample ID	Date	Location Number	Matrix	Type	Parameter		Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAM001WI	06/26/96	GAM	WI	Wipe Primary	PCB-1016 (Aroclor 1016)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1221 (Aroclor 1221)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1232 (Aroclor 1232)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1242 (Aroclor 1242)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1248 (Aroclor 1248)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1254 (Aroclor 1254)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1260 (Aroclor 1260)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-1	MASA
96GAM011WI	06/26/96	GAM	WI	Wipe Primary	PCB-1016 (Aroclor 1016)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1221 (Aroclor 1221)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1232 (Aroclor 1232)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1242 (Aroclor 1242)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1248 (Aroclor 1248)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1254 (Aroclor 1254)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1260 (Aroclor 1260)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-2	MASA
96GAM002WI	06/26/96	GAM	WI	Wipe Primary	PCB-1016 (Aroclor 1016)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1221 (Aroclor 1221)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1232 (Aroclor 1232)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1242 (Aroclor 1242)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1248 (Aroclor 1248)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1254 (Aroclor 1254)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1260 (Aroclor 1260)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-3	MASA
96GAM003WI	06/26/96	GAM	WI	Wipe Primary	PCB-1016 (Aroclor 1016)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1221 (Aroclor 1221)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1232 (Aroclor 1232)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1242 (Aroclor 1242)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1248 (Aroclor 1248)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1254 (Aroclor 1254)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1260 (Aroclor 1260)		1.7000		(1.0000)	UG/WIPE	SW8080	820642-4	MASA
96GAM100WI	06/26/96	GAM	WI	Wipe Primary	PCB-1016 (Aroclor 1016)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1221 (Aroclor 1221)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1232 (Aroclor 1232)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1242 (Aroclor 1242)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1248 (Aroclor 1248)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 04D

Sample ID	Date	Location Number	Matrix	Type	Parameter		Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAM100WI	06/26/96	GAM	WI	Wipe Primary	PCB-1254 (Aroclor 1254)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA
	06/26/96	GAM	WI	Wipe Primary	PCB-1260 (Aroclor 1260)	<	1.0000		(1.0000)	UG/WIPE	SW8080	820642-5	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15001	08/07/96	GAM05	WA	Ground Water Primary	Diesel Range Organics	ND		(0.2500)	MG/L	SW8100	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloropropene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromo-3-chloropropane	ND		(3.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromoethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3,5-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,4-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Isopropyltoluene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Benzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromobenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromochloromethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromodichloromethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromoform	ND		(3.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromomethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Carbon tetrachloride	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chlorobenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15001	08/07/96	GAM05	WA	Ground Water Primary	Chloroethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloroform	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloromethane	ND		(5.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromochloromethane	ND		(2.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromomethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dichlorodifluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Ethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Hexachlorobutadiene	ND		(2.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Isopropylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Methylene chloride	ND		(5.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Naphthalene	ND		(5.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Styrene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Tetrachloroethene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Toluene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichlorofluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Vinyl chloride	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Xylenes	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Propylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	sec-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	tert-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-20	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-20	MASA
96GAM[illegible]V15201	08/07/96	GAM05	WA	Ground Water Primary	Diesel Range Organics	ND	BW,AZ	(0.2500)	MG/L	SW8100	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15201	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloropropene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromo-3-chloropropane	ND		(3.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromoethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3,5-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,4-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Isopropyltoluene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Benzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromobenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromochloromethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromodichloromethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromoform	ND		(3.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromomethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Carbon tetrachloride	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chlorobenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloroethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloroform	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloromethane	ND		(5.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromochloromethane	ND		(2.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromomethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dichlorodifluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Ethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15201	08/07/96	GAM05	WA	Ground Water Primary	Hexachlorobutadiene	ND		(2.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Isopropylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Methylene chloride	ND		(5.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Naphthalene	ND		(5.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Styrene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Tetrachloroethene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Toluene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichlorofluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Vinyl chloride	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Xylenes	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Propylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	sec-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	tert-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-22	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-22	MASA
96GAMMW15301	08/07/96	GAM05	WA	Ground Water QA	Diesel Range Organics	ND	AK	(25.0000)	UG/L	M8100	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1,1,2-Tetrachloroethane	ND		(0.0400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1,1-Trichloroethane	ND		(0.0400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1,2,2-Tetrachloroethane	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1,2-Trichloroethane	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1-Dichloroethane	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1-Dichloroethene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,1-Dichloropropene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2,3-Trichlorobenzene	ND		(0.1100)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2,3-Trichloropropane	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2,4-Trichlorobenzene	ND		(0.1000)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2,4-Trimethylbenzene	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2-Dibromo-3-chloropropane	ND		(0.0400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2-Dibromoethane	ND		(0.0500)	UG/L	SW8260	96-150	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15301	08/07/96	GAM05	WA	Ground Water QA	1,2-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2-Dichloroethane	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,2-Dichloropropane	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,3,5-Trimethylbenzene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,3-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,3-Dichloropropane	ND		(0.1000)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	1,4-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	2,2-Dichloropropane	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	2-Butanone	ND		(8.4400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	2-Chlorotoluene	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	4-Chlorotoluene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	4-Isopropyltoluene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Acetone	ND		(6.6600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Benzene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Bromobenzene	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Bromochloromethane	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Bromodichloromethane	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Bromoform	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Bromomethane	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Carbon disulfide	ND		(3.1900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Carbon tetrachloride	ND		(0.1800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Chlorobenzene	ND		(0.0300)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Chloroethane	ND		(0.1100)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Chloroform	ND		(0.2400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Chloromethane	ND		(0.2200)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Dibromochloromethane	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Dibromomethane	ND		(0.2700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Dichlorodifluoromethane	ND		(0.0400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Ethylbenzene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Hexachlorobutadiene	ND		(0.1500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Isopropylbenzene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Methylene chloride	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Naphthalene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW15301	08/07/96	GAM05	WA	Ground Water QA	Styrene	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Tetrachloroethene	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Toluene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Trichloroethene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Trichlorofluoromethane	ND		(0.0400)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	Vinyl chloride	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	cis-1,2-Dichloroethene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	cis-1,3-Dichloropropene	ND		(0.1200)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	m,p-Xylene (Sum of Isomers)	ND		(0.0500)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	n-Butylbenzene	ND		(0.1100)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	n-Propylbenzene	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	o-Xylene	ND		(0.0800)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	sec-Butylbenzene	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	tert-Butylbenzene	ND		(0.0700)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	trans-1,2-Dichloroethene	ND		(0.0600)	UG/L	SW8260	96-150	NPDL
	08/07/96	GAM05	WA	Ground Water QA	trans-1,3-Dichloropropene	ND		(0.0900)	UG/L	SW8260	96-150	NPDL
96GAMMW16002	08/07/96	GAM05	WA	Ground Water Primary	Diesel Range Organics	0.5800	BW,AZ	(0.2400)	MG/L	SW8100	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,1-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1,2-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,1-Dichloropropene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,3-Trichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2,4-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromo-3-chloropropane	ND		(3.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dibromoethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW16002	08/07/96	GAM05	WA	Ground Water Primary	1,3,5-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,3-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	1,4-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	2-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	4-Isopropyltoluene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Benzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromobenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromochloromethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromodichloromethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromoform	ND		(3.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Bromomethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Carbon tetrachloride	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chlorobenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloroethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloroform	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Chloromethane	ND		(5.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromochloromethane	ND		(2.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dibromomethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Dichlorodifluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Ethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Hexachlorobutadiene	ND		(2.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Isopropylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Methylene chloride	ND		(5.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Naphthalene	ND		(5.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Styrene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Tetrachloroethene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Toluene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Trichlorofluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	Vinyl chloride	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: 05

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMMW16002	08/07/96	GAM05	WA	Ground Water Primary	Xylenes	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	cis-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	n-Propylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	sec-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	tert-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-21	MASA
	08/07/96	GAM05	WA	Ground Water Primary	trans-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-21	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Pumphouse

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMPMPHS003	08/07/96	GAMP	WA	Ground Water Primary	Benzene	1.1000		(1.0000)	UG/L	SW8020F	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Ethylbenzene	ND		(1.0000)	UG/L	SW8020F	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Toluene	1.9000		(1.0000)	UG/L	SW8020F	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Xylenes	ND		(1.0000)	UG/L	SW8020F	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1016 (Aroclor 1016)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1221 (Aroclor 1221)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1232 (Aroclor 1232)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1242 (Aroclor 1242)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1248 (Aroclor 1248)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1254 (Aroclor 1254)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1260 (Aroclor 1260)	ND		(0.9400)	UG/L	SW8080	820690-23	MASA
96GAMPMPHS203	08/07/96	GAMP	WA	Ground Water Primary	Benzene	ND		(1.0000)	UG/L	SW8020F	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Ethylbenzene	ND		(1.0000)	UG/L	SW8020F	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Toluene	1.5000		(1.0000)	UG/L	SW8020F	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	Xylenes	ND		(1.0000)	UG/L	SW8020F	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1016 (Aroclor 1016)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1221 (Aroclor 1221)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1232 (Aroclor 1232)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1242 (Aroclor 1242)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1248 (Aroclor 1248)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1254 (Aroclor 1254)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
	08/07/96	GAMP	WA	Ground Water Primary	PCB-1260 (Aroclor 1260)	ND		(0.9400)	UG/L	SW8080	820690-24	MASA
96GAMPMPHS303	08/07/96	GAMP	WA	Ground Water QA	Benzene	ND		(0.0300)	UG/L	SW8021A	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Ethylbenzene	ND		(0.0400)	UG/L	SW8021A	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Toluene	ND		(0.0100)	UG/L	SW8021A	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Xylenes	ND		(0.0800)	UG/L	SW8021A	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	4,4'-DDD	ND		(0.0500)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	4,4'-DDE	ND		(0.1400)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	4,4'-DDT	ND		(0.0900)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Aldrin	ND		(0.0700)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Chlordane	ND		(2.3000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Dieldrin	ND		(0.0400)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Endosulfan I	ND		(0.0900)	UG/L	SW8081	96-151	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Pumphouse

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMPMPHS303	08/07/96	GAMP	WA	Ground Water QA	Endosulfan II	ND		(0.0700)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Endosulfan sulfate	ND		(0.0900)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Endrin	ND		(0.0500)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Endrin aldehyde	ND		(0.0500)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Heptachlor	ND		(0.0500)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Heptachlor epoxide	ND		(0.0600)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Methoxychlor	ND		(0.1100)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1016 (Aroclor 1016)	ND		(0.9200)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1221 (Aroclor 1221)	ND		(3.5000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1232 (Aroclor 1232)	ND		(1.7000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1242 (Aroclor 1242)	ND		(3.6000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1248 (Aroclor 1248)	ND		(1.7000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1254 (Aroclor 1254)	ND		(0.6400)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	PCB-1260 (Aroclor 1260)	ND		(0.5900)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	Toxaphene	ND		(10.0000)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	alpha-BHC	ND		(0.0200)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	beta-BHC	ND		(0.0300)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	delta-BHC	ND		(0.0200)	UG/L	SW8081	96-151	NPDL
	08/07/96	GAMP	WA	Ground Water QA	gamma-BHC (Lindane)	ND		(0.0200)	UG/L	SW8081	96-151	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Trip Blank

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMTB803	08/08/96	GAMT	WA	Trip Blank	1,1,1,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1,1-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1,2,2-Tetrachloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1,2-Trichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloropropene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2,3-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2,3-Trichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2,4-Trichlorobenzene	ND		(5.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2,4-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2-Dibromo-3-chloropropane	ND		(3.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2-Dibromoethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,3,5-Trimethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,3-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,3-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	1,4-Dichlorobenzene	ND		(2.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	2,2-Dichloropropane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	2-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	4-Chlorotoluene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	4-Isopropyltoluene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Benzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Bromobenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Bromochloromethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Bromodichloromethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Bromoform	ND		(3.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Bromomethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Carbon tetrachloride	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Chlorobenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Chloroethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Trip Blank

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMTB803	08/08/96	GAMT	WA	Trip Blank	Chloroform	2.0000	X	(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Chloromethane	ND		(5.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Dibromochloromethane	ND		(2.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Dibromomethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Dichlorodifluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Ethylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Hexachlorobutadiene	ND		(2.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Isopropylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Methylene chloride	ND		(5.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Naphthalene	ND		(5.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Styrene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Tetrachloroethene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Toluene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Trichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Trichlorofluoromethane	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Vinyl chloride	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	Xylenes	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	cis-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	cis-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	n-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	n-Propylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	sec-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	tert-Butylbenzene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	trans-1,2-Dichloroethene	ND		(1.0000)	UG/L	SW8260A	820690-25	MASA
	08/08/96	GAMT	WA	Trip Blank	trans-1,3-Dichloropropene	ND		(3.0000)	UG/L	SW8260A	820690-25	MASA
96GAMTB903	08/08/96	GAMT	WA	Trip Blank	1,1,1,2-Tetrachloroethane	ND		(0.0400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1,1-Trichloroethane	ND		(0.0400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1,2,2-Tetrachloroethane	ND		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1,2-Trichloroethane	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloroethane	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloroethene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,1-Dichloropropene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2,3-Trichlorobenzene	ND		(0.1100)	UG/L	SW8260	96-152	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Trip Blank

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMTB903	08/08/96	GAMT	WA	Trip Blank	1,2,3-Trichloropropane	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2,4-Trichlorobenzene	ND		(0.1000)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2,4-Trimethylbenzene	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2-Dibromo-3-chloropropane	ND		(0.0400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2-Dibromoethane	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichloroethane	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,2-Dichloropropane	ND		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,3,5-Trimethylbenzene	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,3-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,3-Dichloropropane	ND		(0.1000)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	1,4-Dichlorobenzene	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	2,2-Dichloropropane	ND		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	2-Butanone	ND		(8.4400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	2-Chlorotoluene	ND		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	4-Chlorotoluene	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	4-Isopropyltoluene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Acetone	ND		(6.6600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Benzene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Bromobenzene	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Bromochloromethane	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Bromodichloromethane	0.1800		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Bromoform	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Bromomethane	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Carbon disulfide	ND		(3.1900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Carbon tetrachloride	ND		(0.1800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Chlorobenzene	ND		(0.0300)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Chloroethane	ND		(0.1100)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Chloroform	1.8300		(0.2400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Chloromethane	0.3800		(0.2200)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Dibromochloromethane	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Dibromomethane	ND		(0.2700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Dichlorodifluoromethane	ND		(0.0400)	UG/L	SW8260	96-152	NPDL

APPENDIX B
Gambell Stations
Analytical Results Summary
Site: Trip Blank

Sample ID	Date	Location Number	Matrix	Type	Parameter	Result	Qualifier	PQL	Units	Method	Lab No.	Lab
96GAMTB903	08/08/96	GAMT	WA	Trip Blank	Ethylbenzene	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Hexachlorobutadiene	ND		(0.1500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Isopropylbenzene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Methylene chloride	0.5600		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Naphthalene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Styrene	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Tetrachloroethene	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Toluene	0.1400		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Trichloroethene	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Trichlorofluoromethane	ND		(0.0400)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	Vinyl chloride	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	cis-1,2-Dichloroethene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	cis-1,3-Dichloropropene	ND		(0.1200)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	m,p-Xylene (Sum of Isomers)	ND		(0.0500)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	n-Butylbenzene	ND		(0.1100)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	n-Propylbenzene	ND		(0.0900)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	o-Xylene	ND		(0.0800)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	sec-Butylbenzene	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	tert-Butylbenzene	ND		(0.0700)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	trans-1,2-Dichloroethene	ND		(0.0600)	UG/L	SW8260	96-152	NPDL
	08/08/96	GAMT	WA	Trip Blank	trans-1,3-Dichloropropene	ND		(0.0900)	UG/L	SW8260	96-152	NPDL

APPENDIX C

Alaska District NPD Laboratory CQAR

DEPARTMENT OF THE ARMY
NORTH PACIFIC DIVISION LABORATORY
CORPS OF ENGINEERS
1491 N.W. GRAHAM AVENUE
TROUTDALE, OREGON 97060-9503

October 22, 1996

Victor Harris
Montgomery Watson
4100 Spenard Road
Anchorage, Alaska 99517

Dear Mr. Harris:

Enclosed, completing all analyses requested to date, are reports of analytical data for the Gambell, St. Lawrence Island, Phase II project sampled by Montgomery Watson, August 7 and 8, 1996. Reference original primary report 820690 from MultiChem Analytical Services. Included are:

a. original Chemical Quality Assurance Report

b. original report H-96-0843 from USACE North Pacific Division Laboratory

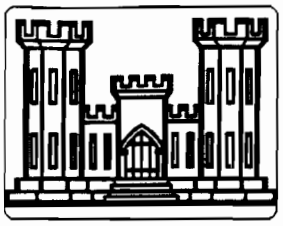
c. original CENPP-PE-L sample cooler receipt forms and a copy of one HTRW discrepancy notification form

If you have any questions or comments regarding the Chemical Quality Assurance Report, please contact the author, Renee Chauvin, at (503) 669-0246 or Pamela Hertzberg at (503) 666-8143.

Sincerely,

for Timothy J. Sherman, Director
North Pacific Division Laboratory

Enclosures



U.S. Army Corps of Engineers
North Pacific Division Laboratory
Troutdale, Oregon

Chemical Quality Assurance Report

Gambell, St. Lawrence Island, Phase II

NPDL Work Order Number: 96-0313

Prepared for: **Alaska District**

Approved by: _____
for PAMELA D. HERTZBERG, Chief
Project Management and Data Evaluation Branch

CHEMICAL QUALITY ASSURANCE REPORT

GAMBELL, ST. LAWRENCE ISLAND, PHASE II

1. **SUMMARY:**

1.1 The data of detected AVO analytes should be considered tentatively identified. The DRO result for one sample should be considered a low estimate, and low levels of DRO may not have been detected in one sample. The data for the detected metallic analytes should be considered estimates, and low levels of antimony may not have been detected in the samples.

1.2 The primary and quality assurance data comparisons are presented in Tables II through VI. The primary data for copper and lead in Table VI do not agree. Refer to section 6.5 for details. The primary and QA data do not agree for AVO analytes in Table III. Refer to section 8.1 for details.

2. **BACKGROUND:** The project samples were collected August 7 and 8, 1996, and received by the analytical laboratories August 9, 12, and 13, 1996.

3. **OBJECTIVES:**

3.1 Five water samples (including two blind duplicate) and 19 soil samples (including three blind duplicate) were collected to determine the extent of the chemical contamination on the site. One trip blank sample was collected to assess field contamination during sample shipment.

3.2 Two quality assurance (QA) water samples, three soil samples, and one trip blank sample were submitted to evaluate the primary laboratory's data.

4. **PROJECT ORGANIZATION:**

4.1 The project samples were collected by Montgomery Watson, Anchorage, Alaska.

4.2 The primary samples were analyzed by Multichem Analytical Services, Anchorage, Alaska (MAS-AK); and their sub-contracted laboratory MultiChem Analytical Services, Renton, Washington (MAS-WA).

4.3 The QA samples were analyzed by U.S. Army Corps of Engineers (USACE) North Pacific Division Laboratory (NPDL), Troutdale, Oregon.

5. ANALYTICAL REFERENCES:

Number	Title	Date
SW-846, Third Edition	Test Methods for Evaluating Solid Waste - Final Update II	1/95
ADEC UST Regulations, 18 AAC 78	Interim Analytical Methods for Petroleum Compounds in Soil and Water	2/92

6. EVALUATION OF THE PRIMARY LABORATORY'S DATA:

6.1 Primary Laboratory Methods: The following is a listing of preparation and analytical methods used by the laboratories as reported in their data deliverable.

Primary Laboratory	Parameter	Preparation Method	Analytical Method
MAS-AK	AVO	--	EPA 8020A Mod.
	DRO	--	EPA 8100 Mod.
MAS-WA	VOC	--	EPA 8260A
	PCB	--	EPA 8080 Mod.
	Total Metals, ICP*	--	EPA 6010
	Total Thallium, AA	--	EPA 7841

*Sb, As, Be, Cd, Cu, Pb -- = not reported

6.2 Chain of Custody Records and Sample Cooler Receipt Forms: All chain of custody (COC) records and sample shipping conditions, as documented on the sample cooler receipt (SCR) form, were evaluated according to EPA and USACE ER 1110-1-263 regulations and the following notations were made. The lack of custody seals on the sample coolers received at MAS-AK is acceptable because the coolers were hand-delivered. Temperatures were not noted for the sample coolers received at MAS-WA. There was an indication on the SCR form that sufficient ice was used, but the criteria for this statement were not indicated, and it could not be verified that the samples were adequately cooled.

6.3 Trip Blank Results: The trip blank results are presented in Table I. The chloroform detected in the primary trip blank sample does not indicate cross-contamination since this analyte was not detected in the associated samples. The presence of chloroform

is probably attributable to the water utilized for preparation of the trip blank sample, as it is a common contaminant of reagent water.

6.4 Sample Holding Times, Reporting Limits, Laboratory Method Blanks, Accuracy and Precision: Sample holding times and detection/reporting limits were evaluated per EPA or project-required criteria. The laboratory method blanks were evaluated for the absence of targeted analytes. The extraction efficiency, accuracy and precision of the data, as represented by surrogate, matrix spike (MS), matrix spike duplicate (MSD), blank spike (BS), and blank spike duplicate (BSD) recoveries and relative percent difference (RPD) results, were compared to EPA, project-required, or laboratory established (LE) quality control (QC) acceptance limits for out of control results.

6.4.1 Volatile Organic Compounds (VOC): One out of five BS recoveries, for 1,1-dichloroethene was below the LE QC acceptance limits. The report case narrative states that this analyte exhibited low recoveries in the MS/MSD samples as well, though these MS/MSD results were not included in the analytical report. The laboratory analyzed other BS and MS/MSD samples three days later using fresh spiking solution, with acceptable recoveries for 1,1-dichloroethene. Since the laboratory demonstrated that the initial recovery failures were apparently due to the spiking solution, the accuracy of the analysis is considered acceptable.

6.4.2 Aromatic Volatile Organics (AVO): The laboratory did not indicate that detected AVO analytes were verified by confirmation analysis, and the data of detected analytes should be considered tentatively identified.

6.4.3 Polychlorinated Biphenyls (PCB): There were no deficiencies noted in the data, and the data quality is acceptable.

6.4.4 Diesel Range Organics (DRO): The surrogate recovery was below the LE QC acceptance limits for samples 96GAM-MW16002 and -MW15201. The samples were re-analyzed, but after the method holding time had expired. The DRO result for sample -MW16002 should be considered a low estimate, and low levels of DRO may not have been detected, if present, in sample -MW15201.

6.4.5 Total Metals: The MS recovery for antimony (55%) was below the EPA and project-specified QC acceptance limits (75-125%). While the BS recovery for antimony was within QC limits, low levels of antimony may not have been detected, if present, in the project samples due to apparent matrix effect.

The laboratory duplicate RPD results for copper (140%) and lead (118%) were above the EPA, project-required, and LE QC acceptance limits, and the MS recoveries for copper (274%) and lead (128%) for the same sample (96GAM-201SS4B) were above the QC limits. The laboratory reported acceptable BS and post-digestion spike recoveries for copper and lead, indicating acceptable analytical system performance. It is notable that the original copper and lead results for this sample do not agree with the field blind duplicate for this sample (see section 6.5), but that the laboratory duplicate results do agree with the field blind duplicate. In addition, the MS spike recoveries are acceptable if based on the laboratory duplicate results instead of the original results (calculated by CENPP-PE-L personnel to be 114% for copper and 91% for lead). Taken altogether, the RPD and recovery data suggest that the copper and lead data from the original analysis of sample -201SS4B are anomalous, possibly due to sample heterogeneity. The data for the detected metallic analytes should be considered estimates based on poor precision due to the sample matrix.

6.5 Field Blind Duplicate Results: The field blind duplicate results are presented in Tables II through VI. The primary data for copper and lead in Table VI do not agree. As discussed in section 6.4.5, the results of the laboratory duplicate and MS analyses of sample 96GAM-201SS4B indicate that the original results for this sample (shown in Table VI) are anomalous. The laboratory duplicate results (114 ppm for copper and 29.4 ppm for lead) are in agreement with the results of the field duplicate sample -001SS4B.

6.6 Overall Evaluation of the Primary Laboratories' Data: The presence of chloroform in the trip blank is probably attributable to the water utilized for preparation of the trip blank sample. The data of detected AVO analytes should be considered tentatively identified. Based on low surrogate recoveries, the DRO result for sample -MW16002 should be considered a low estimate, and low levels of DRO may not have been detected in sample -MW15201. Low levels of antimony may not have been detected, based on the low MS recovery. The data for detected metallic analytes should be considered estimates based on poor precision due to the sample matrix.

7. EVALUATION OF THE QA LABORATORY'S DATA:

7.1 QA Laboratory Methods: The following is a listing of preparation and analytical methods used by the laboratory as reported in their data deliverable.

QA Laboratory	Parameter	Preparation Method	Analytical Method
NPDL	VOC	none	EPA 8260A
	AVO	none	EPA 8021A
	PCB	EPA 3510	EPA 8081
	DRO	EPA 3520	EPA 8100 Mod.
	Total Metals, ICP*	EPA 3050	EPA 6010A

*Sb, As, Be, Cd, Cu, Pb, Tl

7.2 COC Records and SCR Forms: All COC records and sample shipping conditions, as documented on the SCR form, were evaluated according to EPA and USACE ER1110-1-263 regulations and the following notations were made. One of two bottles provided for DRO analysis of sample 96GAM-MW15301 was not acid-preserved. Hydrochloric acid was added by CENPP-PE-L sample handling personnel. A small air bubble was present in one of three AVO vials for sample -PMPHS303 and in one of three VOC vials for sample -MW15301.

7.3 Trip Blank Results: The QA trip blank results are presented in Table I. The VOC analytes detected in the QA trip blank sample do not indicate cross-contamination since these analytes were not detected in the associated field sample. The presence of VOC analytes is probably attributable to the water utilized for preparation of the trip blank sample.

7.4 Sample Holding Times, Reporting Limits, Laboratory Method Blanks, Accuracy and Precision: Sample holding times and detection/reporting limits were evaluated per EPA or project-required criteria. The laboratory method blanks were evaluated for the absence of targeted analytes. The extraction efficiency, accuracy, and precision of the data, as represented by surrogate, MS, MSD, laboratory control (LC), and laboratory control duplicate (LCD) recoveries and RPD results, were compared to EPA, project-required, or LE QC acceptance limits for out of control results.

7.4.1 Volatile Organic Compounds: Two out of 118 MS/MSD recoveries and five out of 118 LC/LCD recoveries were above the LE QC acceptance limits. The accuracy of the analysis is acceptable based on the remaining acceptable recoveries. The sample selected for MS/MSD analysis was the trip blank

sample and thus does not represent the field sample matrix. Potential matrix effects could not be evaluated.

7.4.2 Aromatic Volatile Organics: There were no deficiencies noted in the data, and the data quality is acceptable.

7.4.3 Polychlorinated Biphenyls: One out of two surrogate recoveries was below the LE QC acceptance limits for sample 96GAM-PMPHS303, the laboratory duplicate of this sample, and the method blank. The extraction efficiency of these samples is acceptable based on the surrogate recovery within the QC acceptance limits. The QC analyses (MS/MSD and LC/LCD) were performed using only single-component pesticide analytes, rather than a PCB Aroclor. The QC data are not fully applicable to the requested analysis but did demonstrate acceptable analytical performance.

7.4.4 Diesel Range Organics: There were no deficiencies noted in the data, and the data quality is acceptable.

7.4.5 Total Metals: There were no deficiencies noted in the data, and the data quality is acceptable.

7.5 Overall Evaluation of the QA Laboratory's Data: The presence of VOC analytes in the trip blank is probably attributable to the water utilized for preparation of the trip blank sample. Potential matrix effects could not be evaluated for VOC analysis because the trip blank sample was used for the MS/MSD sample.

8. **COMPARISON OF THE PRIMARY AND QA LABORATORIES' DATA:** The primary and QA data comparisons are presented in Tables II through VI. The analytical results presented in each table were reviewed for agreement with each other or their respective reporting limits and evaluated for comparability. The intra- and inter-laboratory data for a sample must be within a factor of three (for water matrices) and five (for soil/sediment matrices) of each other to be considered in agreement. The primary and QA laboratories' reporting limits must be within a factor of 10 to be considered comparable. Estimated data (results which have been quantified below the reporting limit and qualified with a "J" flag) should not be considered significant for the purpose of data agreement. All data comparisons agree with each other and are comparable with the following exceptions.

8.1 The primary and QA data do not agree for benzene and toluene in Table III. The primary data were not confirmed by secondary analysis. The QA laboratory did confirm the absence of targeted analytes at the method reporting limits.

8.2 The apparent non-comparability of some VOC reporting limits in Table II is due to the QA laboratory's reporting limits for acetone and 2-butanone. These analytes, which have relatively high reporting limits because of poor purgeability, were not included in the primary laboratory's analyte list.

8.3 The PCB reporting limits in Table III are not all comparable because of the QA laboratory's higher reporting limits for two of the Aroclors. However, the data are comparable for all analytes if the comparisons are based on the QA laboratory's detection limits.

8.4 The primary and QA data for thallium in Table V are not comparable because the primary laboratory analyzed for thallium using a method more sensitive than the requested ICP method.

TABLE I Trip Blank			Primary Sample	QA Sample
Matrix: water		Field Identification:	96GAMTB803	96GAMTB903
Parameter	Units	Analytes Detected		
VOC	µg/L	Chloroform	2	1.83
		Bromodichloromethane	< 1	0.18 J
		Chloromethane	< 5	0.38 J
		Methylene Chloride	< 5	0.56 J
		Toluene	< 1	0.14 J

Comments: The presence of targeted analytes in the trip blank samples does not indicate sample cross-contamination. Refer to sections 6.3 and 7.3 for details.

TABLE II			Primary Samples		QA Sample
Matrix: water		Field Identification:	96GAM-MW15001	96GAM-MW15201	96GAM-MW15301
Parameter	Units	Analytes Detected			
VOC	µg/L		< [1-5]	< [1-5]	< [0.33-84.4]
DRO	mg/L	DRO	< 0.25	< 0.25	< 0.082

Comments: The data agree. The apparent non-comparability of some VOC reporting limits is due to the QA laboratory's more extensive analyte list. Refer to section 8.2 for details.

TABLE III			Primary Samples		QA Sample
Matrix: water		Field Identification:	96GAM-PMPHS003	96GAM-PMPHS203	96GAM-PMPHS303
Parameter	Units	Analytes Detected			
AVO	µg/L	Benzene	1.1	< 1.0	< 0.3
		Toluene	1.9	1.5	< 0.1
		Ethylbenzene	< 1.0	< 1.0	< 0.4
		Total Xylenes	< 1.0	< 1.0	< 0.8
PCB	µg/L		< [0.94]	< [0.94]	< [2.0-12]

Comments: The primary and QA data do not agree for benzene and toluene. Refer to section 8.1 for details. The primary and QA PCB reporting limits are not all comparable. Refer to section 8.3 for details.

µg/L or µg/Kg = parts per billion (ppb)
< {reporting limit} = analyte not detected
mg/L or mg/Kg = parts per million (ppm)
J = estimated concentration

TABLE IV

			Primary Samples		QA Sample
Matrix: soil		Field Identification:	96GAM-001SS02	96GAM-201SS02	96GAM-301SS02
Parameter	Units	Analytes Detected			
Total Metals	mg/Kg	Lead	16	14	18.4

Comments: The data agree.

TABLE V

			Primary Samples		QA Sample
Matrix: soil		Field Identification:	96GAM-001SS03	96GAM-201SS03	96GAM-301SS03
Parameter	Units	Analytes Detected			
Total Metals	mg/Kg	Beryllium	< 0.28	< 0.28	< 0.55
		Thallium	< 0.27	< 0.28	< 11

Comments: The primary and QA reporting limits for thallium are not comparable. Refer to section 8.4 for details.

TABLE VI

			Primary Samples		QA Sample
Matrix: soil		Field Identification:	96GAM-001SS4B	96GAM-201SS4B	96GAM-301SS4B
Parameter	Units	Analytes Detected			
Total Metals	mg/Kg	Antimony	< 2.8	< 2.9	< 5.57
		Arsenic	< 5.7	< 5.9	< 11.1
		Cadmium	< 0.28	< 0.29	< 0.56
		Copper	200	20	86.9
		Lead	41	7.6	14.5

Comments: The primary blind duplicate data do not agree for copper and lead. Refer to section 6.5 for discussion.

µg/L or µg/Kg = parts per billion (ppb)
< {reporting limit} = analyte not detected
mg/L or mg/Kg = parts per million (ppm)
J = estimated concentration

1 of 2 Coolers

CENPD-ET-EL rev. 7/96

HTRW COOLER RECEIPT FORM

C:\wg31\htw\HTW-CRF

Project: Gambell, St Lawrence Isl, Phase II W.O.# 96-313

Cooler received on 8/13/96 and opened on 8/13/96 by Colleen Gross

(signature) Colleen M. Gross

1. Were custody seals on outside of cooler and intact? ..... YES NO
   a. If YES, how many and where: 1 front right, 1 back left
   b. Were signature and date correct? ..... (YES) NO
2. Were custody papers taped to the lid inside the cooler? ..... (YES) NO
3. Were custody papers properly filled out (ink, signed, dated, etc.)? ..... (YES) NO
4. Did you sign custody papers in the appropriate place? ..... (YES) NO
5. Did you attach shipper's packing slip to this form? ..... (YES) NO
6. What kind of packing material was used? bubblewrap
7. Was sufficient ice used (if appropriate)? ..... (YES) NO

   Approved by [signature] Date 8/13/96 Temperature 5.3°C

8. Were all bottles sealed in separate plastic bags? ..... (YES) NO
9. Did all bottles arrive in good condition (unbroken)? ..... (YES) NO
10. Were all bottle labels complete (ID. No., dated, Anal. method, etc,) ..... (YES) NO
11. Did all bottle labels agree with custody papers? ..... (YES) NO
12. Were correct bottles used for the tests indicated? ..... (YES) NO
13. If present, were VOA vials/containers checked for absence of air bubbles/ head space and noted if found? Size of bubble 2mm ..... (YES) NO 2
14. Was sufficient volume of sample sent in each bottle? ..... (YES) NO
15. Were correct preservatives used? ..... YES (NO) 1

    Approved by: [signature] Date 8/13/96

    If not approved:

    a. Name of person contacted Pat Thomas Date 8/13/96

    b. Corrective action taken; if necessary: _____

Additional Comments: (see attached) CB

1. 1 of 2 samples for 96GAMMW15301 (1 liter bottles) was not preserved with HCl for method DRO 8100M - I preserved it with HCl

2. 1 of 3 vials for sample 96GAMPMPHS303 (method BETX, SW8020A) had a bubble in it. 1 of 3 vials of sample 96GAMMW15301 (method VOA, 8260A) had a bubble.

2 of 2 COOLERS

CENPD-ET-EL rev. 7/96

HTRW COOLER RECEIPT FORM

C:\wg31\htw\HTW-CRF

Project: Gambell, St Lawrence Is Fse II W.O.# 96-0313

Cooler received on 8/13/96 and opened on 8/13/96 by Mark Francisco

(signature) Mark Francisco

1. Were custody seals on outside of cooler and intact? ..... (YES) NO
   a. If YES, how many and where: 1 on Front, 1 on Back
   b. Were signature and date correct? ..... (YES) NO
2. Were custody papers taped to the lid inside the cooler? ..... YES (NO)
3. Were custody papers properly filled out (ink, signed, dated, etc.)? ..... (YES) NO
4. Did you sign custody papers in the appropriate place? ..... (YES) NO
5. Did you attach shipper's packing slip to this form? ..... (YES) NO
6. What kind of packing material was used? Bubble wrap
7. Was sufficient ice used (if appropriate)? ..... (YES) NO

   Temperature 5.8°C

   Approved by [signature] Date 8/13/96

8. Were all bottles sealed in separate plastic bags? ..... (YES) NO
9. Did all bottles arrive in good condition (unbroken)? ..... (YES) NO
10. Were all bottle labels complete (ID. No., dated, Anal. method, etc,) ..... (YES) NO
11. Did all bottle labels agree with custody papers? ..... (YES) NO
12. Were correct bottles used for the tests indicated? ..... (YES) NO
13. If present, were VOA vials/containers checked for absence of air bubbles/ head space and noted if found? Size of bubble _____ ..... YES NO N/A
14. Was sufficient volume of sample sent in each bottle? ..... (YES) NO
15. Were correct preservatives used? ..... (YES) NO

    Approved by: [signature] Date 8/13/96

    If not approved:

    a. Name of person contacted _____ Date _____

    b. Corrective action taken; if necessary: _____

Additional Comments: COC was in first Cooler. (see attached)

U.S. ARMY CORPS OF ENGINEERS - NORTH PACIFIC DIVISION LABORATORY
1491 NW Graham Road, Troutdale, Oregon 97060-9508

From: Pamela D. Amir	Office: CENPP-PE-L	Telephone: (503) 666-8143
To: Del Thomas	Office: CENPA	Telephone: 907/753-2681
Date: 8/13/96	Pages Sent: Header + 0	Signature:

HTRW Discrepancy Notification Form

Project Name: Gambell, St. Lawrence Island, Phase II W.O.# 96-0313

Problems Encountered:

1. Custody Seals: a. ☐ None present
   b. ☐ Broken
   c. ☐ Signature or date did not match Chain of Custody
   d. ☐ Other _____

FAXED DATE: 8/13/96

2. Chain of Custody Form: a. ☐ Not signed
   b. ☐ Not dated Complete date not used
   c. ☐ Other _____

3. Temperature: a. ☐ EPA requires coolers to arrive at the lab with an internal temperature of 4 °Celsius ± 2 °, cooler arrived at 5.3 °Celsius.
   2 of 2 coolers 5.8

4. Packing of Samples: a. ☐ Samples were not in individual plastic bags
   b. ☐ Broken containers
   c. ☐ Labels incomplete or did not agree with Chain of Custody
   d. ☐ Improper container size used
   e. ☒ Air bubbles in VOA vials, size of bubble 2mm
   f. ☐ Head space in containers
   g. ☒ Improper preservative used
   h. ☐ Other _____

Comments & Corrective action taken: (4g) 1 of 2 samples for (DRO 8100m) 96GAMMW15301 (liter bottles) was received unpreserved. The sample was preserved w/ HCL at NPDL.

(4e) 1 of 3 vials for sample 96GAMPMPHS303 (method BTEX 8020) had small bubble. 1 of 3 vials of sample 96GAMMW15301 (method VOC 8260A) had a small bubble.

If you have any problems or questions regarding this FAX call (503) 665-4166
Our FAX number is (503) 665-0371

APPENDIX D

Summary of Applicable Regulatory Criteria

GAMBELL REGULATORY BACKGROUND

CERCLA authorized federal action to respond to the release or threatened release of hazardous substances from any source into any part of the environment. CERCLA also authorized the creation of a trust fund, commonly referred to as Superfund, which can be used by the United States Environmental Protection Agency (USEPA) to clean up emergency and long-term hazardous waste problems. Federal facilities do not contribute to or use the Superfund. However, with the passage of Superfund Amendments and Reauthorization Act of 1986 (SARA), federal agencies became subject to CERCLA and NCP regulations. The site is not listed on the National Priorities List (NPL). However, several portions of RCRA and CERCLA are applicable.

In the early 1980s, congressional concern over abandoned military buildings and debris in Alaska and concern over releases of hazardous substances from federal facilities laid the foundation for DERP. Soon after the passage of CERCLA in December 1980, the DOD retained the authority to clean up hazardous substances released from active and formerly used DOD sites. In December 1983, the Defense Appropriation Act (Public Law 98-212) provided funding for cleanup of hazardous substances released from DOD sites. The Act also initiated environmental restoration activities at FUDS.

In October 1986, Congress passed SARA, which authorized the Secretary of Defense to carry out the DERP under his jurisdiction and established a new transfer account to be known as the Defense Environmental Restoration Account (DERA).

The role of DERP is to provide centralized policy, consistency, and management of the overall program. Execution of the program has been delegated to the United States Army Corps of Engineers. Therefore, the Alaska District is currently completing the Gambell site investigation and restoration in cooperation with the State of Alaska Department of Environmental Conservation (ADEC).

The Gambell Site has not been occupied by the United States Military since 1972 when the White Alice Station was abandoned. The Alaska District is currently undertaking to investigate, and if necessary, restore the environmental conditions at the Gambell site under DERP.

Applicable Federal, State and Local Regulations

Existing federal, state, and local regulations can be triggered by discoveries or activities resulting from investigation at the site. In Superfund, these requirements are referred to as applicable or relevant and appropriate requirements (ARARs). In general, the regulatory requirements address:

- Reporting and cleanup of newly-discovered spills and contamination
- Storage, labeling, transportation, and disposal of excavated materials and debris
- Permitting of facilities and discharges
- Cleanup criteria and technologies
- Access restrictions
- Monitoring and closure

Regulatory requirements pertinent to this stage of the investigation are discussed in the following paragraphs. In the course of performing environmental investigations, discovery of existing environmental conditions may trigger reporting and cleanup requirements under

a number of environmental statutes and regulations targeted at specific constituents or situations. Relevant federal regulations and the regulatory agencies which govern them include:

CERCLA/United States Environmental Protection Agency (USEPA)
RCRA–Subtitle C and D other than CA requirements/USEPA
Toxic Substance Control Act (TSCA)/USEPA
Clean Air Act (CAA)/USEPA
Safe Drinking Water Act (SDWA)/USEPA
Clean Water Act (CWA)/USEPA
Hazardous Materials Transportation Act (HMTA)/Department of Transportation (DOT)
Occupational Safety and Health Act (OSHA)/Department of Labor (DOL)
Coastal Zone Management Act of 1972 (CZMA)/Department of Commerce (DOC)
Endangered Species Act of 1973 (ESA)/Department of the Interior (DOI)
Marine Mammal Act of 1972 (MMA)/DOC
National Historic Preservation Act of 1966 (NHPA)/DOI

Of the federal regulations listed above, TSCA may be relevant and appropriate but is not directly applicable to remedial action at the site because it applies to releases that occurred after May 4, 1987. The CERCLA program includes guidance on remedial actions at PCB-contaminated sites (USEPA 1990). Both of these regulations are considered, but may not be directly applicable.

Containerized and excavated materials that are designated as waste, such as contaminated soils and groundwater wastes, are subject to the requirements of RCRA. Wastes must be classified according to the prescribed procedures in RCRA, Section 261, to determine if waste is hazardous or non-hazardous, including characterization for the four RCRA hazardous waste characteristics, ignitability, corrosivity, reactivity, and toxicity generally referred to as toxicity characteristic leachate procedure (TCLP). The implications of the "contained in," "derived from," and "mixed with" stipulations of RCRA apply as well.

In addition to the federal regulations, there are several state regulations which are considered ARARs. For clarity, it is easiest to address these ARARs by their respective state agency. Agencies include the Alaska Department of Environmental Conservation (ADEC), Department of Natural Resources (DNR), and the Division of Governmental Coordination (DGC), as described below.

Alaska Department of Environmental Conservation

ADEC requires that, as additional information becomes available through on-going site assessments, any past releases to the environment (spills) which have not previously been reported to the ADEC, must be reported under the requirements of the Alaska Oil and Hazardous Substances Pollution Control regulation (18 AAC 75). Upon discovering and reporting, regulatory requirements and guidelines can be identified for ensuing activities such as evaluating the nature and extent of contamination, identifying appropriate contaminant-specific action levels and cleanup criteria, and specifying remediation strategies.

ADEC has authority for specifying soil, surface water, and groundwater cleanup levels resulting from the discharge of an oil or hazardous substance. The authority is granted

under AS 46.03.070, AS 46.09.020 and codified in Oil and Hazardous Substances Pollution Control Regulations (18 AAC 75.327), which specifies that a "discharge must be cleaned up to the department's satisfaction." The Alaska District is currently undertaking the Gambell Remedial Investigation under the DERP/FUDS program in cooperation with the ADEC.

Additional ADEC ARARs include 18 AAC 60, Solid Waste; 18 AAC 62, Hazardous Waste Regulation; 18 AAC 70, Water Quality Standards; 18 AAC 72, Wastewater Disposal (specifically, permitting for dewatering); 18 AAC 78, Underground Storage Tanks (Guidance for ADEC cleanup matrix); and 18 AAC 80, Drinking Water.

Department of Natural Resources

DNR is responsible for administering the Section 106 process of 36 CFR 800, which stems from the National Historic Preservation Act of 1966 (NHPA). Although the Section 106 process is a federal regulation, 36 CFR 800 specifically states that the responsibility for administration is deferred to the State Historic Preservation Office (SHPO). The State of Alaska SHPO falls under DNR, Division of Parks and Recreation, Office of History and Archaeology.

DNR is also responsible for issuing permits with respect to the sale of timber and materials. For the Gambell project, the use of borrow materials (i.e., clean fill) falls under 11 AAC 71, Timber and Material Sales.

Division of Governmental Coordination

Additionally, DNR is the issuing agency for tideland permits (18 AAC 62.720) in conjunction with the Division of Governmental Coordination's (DGC) implementation of the Alaska Coastal Management Program (ACMP) Consistency Review. This review process entails the completion of the Coastal Project Questionnaire (CPQ) (6 AAC 50) for any activities which take place in or may impact the coastal zone. However, federal agencies conducting an activity that will affect the coastal zone are required to abide by the regulations set forth under the CZMA (15 CFR 930) and submit a federal consistency determination.

A flow chart detailing the regulatory process including legislation, regulation, and the agencies responsible for implementing the respective ARARs is provided in Figure E-1. A corresponding table detailing the regulations by action-specific, chemical-specific, and location-specific criteria is provided in Table E-1.

DERP
(Defense Environmental Restoration Program)
DOD

DERA
(Defense Environmental Restoration Account)
DOD

FUDS
(Formerly Used Defense Sites)
USACE

CERCLA
(Comprehensive Environmental Response, Compensation, and Liability Act of 1980)
EPA

40 CFR 302: Hazardous Substance Designation, Reportable Quantities, and Release Notification Requirements
Section 105: National Contingency Plan

SARA
(Superfund Amendments and Reauthorization Act of 1986)
EPA

40 CFR 300: Superfund Program, National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 355: Facility Notification and Release Reporting Requirements
40 CFR 370: Hazardous Chemical Invetory Reporting Requirements
40 CFR 392: Toxic Release Reporting Requirements

ARARs
(Applicable or Relevant and Appropriate Requirements)
CERCLA 121

RCRA
(Resource Conservation and Recovery Act of 1976)
EPA

40 CFR 257: Disposal of Solid Waste
40 CFR 261: Identification and Listing of Hazardous Waste
40 CFR 262: Standards Applicable to Generators of Hazardous Waste
40 CFR 263: Standards Applicable to Transporters of Hazardous Waste
40 CFR 268: Land Disposal Restrictions
40 CFR 280: Underground Storage Tanks

HMTA
(Hazardous Materials Transportation Act)
DOT

49 CFR 171: Hazardous Materials Regulations
49 CFR 172: Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information and Training Requirements
49 CFR 173: Shippers-General Requirements for Shipment and Packagings
49 CFR 174: Carriage by Rail
49 CFR 175: Carriage by Aircraft
49 CFR 176: Carriage by Vessel
49 CFR 177: Carriage by Public Higway
49 CFR 178: Specifications for Packagings

TSCA
(Toxic Substances Control Act)
EPA

40 CFR 761: Polychlorinated Biphenyls Manufacturing, Processing, Distribution in Commerce and Use Prohibitions
40 CFR 763: Asbestos

IATA
(International Air Transportation Association)

Dangerous Good Regulations, 35th Edition

Canadian ministry of Transportation

35-36-37 Elizabeth II

CAA
(Clean Air Act)
EPA

40 CFR 61: National Emissions Standards for Hazardous Air Pollutants (NESHAP)
EPA 560/5-85-024: Guidance for Controlling Asbestos
EPA 340/1-90-018: Asbestos/NESHAP Regulated Asbestos Materials Guidance
EPA 340/1-90-019: Asbestos/NESHAP Adequately Wet Guidance

OSHA
(Occupational Safety and Health Act)
DOL

29 CFR 1910: Occupational Safety and Health Standards
29 CFR 1926: Safety and Health Regulations for Construction

SDWA
(Safe Drinking Water Act)
EPA

40 CFR 141: National Primary Drinking Water Regulations

CZMA
(Coastal Zone Management Act of 1972)
DOC/NOAA

15 CFR 928: Coastal Zone Managment and Coastal Energy Impact State Programs Performace Review
15 CFR 930: Federal Consistency with Approved Coastal Management Programs

CWA
(Clean Water Act of 1977)
EPA

40 CFR 110: Discharge of Oil
40 CFR 116: Designation of Hazardous Substances
40 CFR 117: Determination of Reportable Quantities for Hazardous Substances

Alaska Coastal Management Program (ACMP)
AS 46.40010
State of Alaska, Office of the Governor
Division of Governmental Coordination

6 AAC 50: Project Consistency with ACMP
6 AAC 80: Standards of the Program
6 AAC 85: Guidelines for District Programs

State of Alaska
Department of Environmental Conservation

18 AAC 60: SolidWaste Management (proposed)
18 AAC 62: Hazardous Waste Regulations
18 AAC 70: Water Quality Standards
18 AAC 72: Wastewater Disposal
9440-DB002: Wastewater General Permit
18 AAC 75: Oil and Other Hazardous Substances
18 AAC 75.140: Pollution Control Regulations Non- UST Contaminated Soil Cleanup Levels
18 AAC 78: Underground Storage Tanks
18 AAC 78.315: Soil Cleanup Levels
18 AAC 80: Drinking Water

States of Alaska
Department of Natural Resources

11 AAC 62: Tide and Submerged Lands
11 AAC 62.720: Tideland Permit
11 AAC 71: Timber and Material Sales

NHPA
(National Historic Preservation Act of 1966)
DOI

36 CFR 800: Protection of Historic Properties
Section 106: Federal Review Process Advisory Council on Historic Preservation (ACHP)

ESA
(Endangered Species Act of 1973)
DOI/USF&W

50 CFR 17: Endangered and Threatened Wildlife and Plants

MMA
(Marine Mammal Act of 1972)
DOC/NMFS

50 CFR 227: Threatened Fish and Wildlife

State of Alaska, Department of Natural Resources
State Historic Preservation Office (SHPO)

Section 106: Federal Review Process, Administered by SHPO

Appendix D

U.S. Army Engineer District, Alaska (Alaska District)
Gambell - ST. LAWRENCE ISLAND, ALASKA

MONTGOMERY WATSON
Anchorage, Alaska

GAMBELL REGULATORY FLOWCHART