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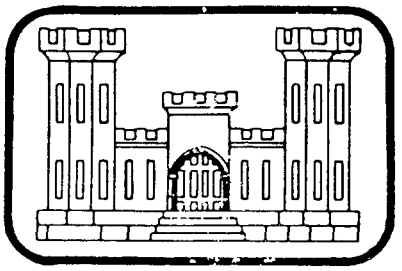

Defense Environmental Restoration Account

City of Gambell and Northeast Cape,
St. Lawrence Island, Alaska

Contract No. DACA85-85-C-0036

Contract Addendum #1

Sampling Plan

March 1986

URS
Corporation
Anchorage, Alaska

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1.0 Introduction

This document was prepared under a modification to the St. Lawrence Island Defense Environmental Restoration Account project. This project, as authorized by the Department of Defense Appropriations Act of 1984 (Public Law 98-212), will implement the cleanup of former military sites in the City of Gambell and Northeast Cape, St. Lawrence Island, Alaska.

URS Corporation/Anchorage was selected to provide engineering services for this project under Contract No. DACA85-85-C-0036, in accordance with the Scope of Work dated May 17, 1985. The formal Award of Contract and Notice-to-Proceed was issued on June 3, 1985. A preliminary site reconnaissance was performed by URS in early July, 1985, in order to develop materials inventories for preparation of bid documents. The Corps of Engineers has awarded a cleanup contract for the Gambell and Northeast Cape projects, with work scheduled to begin in the summer of 1986. This contract contains provisions for the cleanup and removal of asbestos, POLs, PCB contaminated materials and equipment, and miscellaneous chemicals remaining in the area. All facilities will be demolished to slab level and land-filled in permitted disposal sites. All known contaminated or potentially hazardous materials in surface areas will be removed from the island under the provisions of this contract. Materials buried in landfill sites, oil spills, and concrete slabs have generally been excluded from intensive cleanup activities, pending additional sampling of the project areas to characterize the cleanup sites and assess the potential for contamination by hazardous materials.

A limited subsurface exploration program was prepared for the Gambell site under this contract. No subsurface work was performed at the Northeast Cape site. A discussion of geophysical and geotechnical aspects of this investigation are presented in a previously submitted report, "Geotechnical, Geophysical & Soil/Groundwater Quality Studies: Defense Environmental Restoration Program (DERP), Gambell, St. Lawrence Island, Alaska." Additionally, a limited amount of environmental sampling was provided for in this initial reconnaissance, which included testing of general water quality parameters and the presence of polychlorinated biphenyls (PCBs) in electrical transformers, soils, surface waters, and groundwater samples. The results of the groundwater sampling are contained in a previously submitted report, "Preliminary Reconnaissance: Surface and Subsurface Water Sampling, Gambell, Alaska."

This document addresses the preparation of a detailed sampling plan for the Gambell and Northeast Cape sites, with the goal of providing information concerning potential hazardous materials at the sites.

Among the items to be addressed in the sampling plan are:

- project objectives;
- background information concerning the sites;
- survey methods, including sampling locations, procedures, analytical requirements, and quality control;
- personnel and equipment requirements; and
- chain-of-custody procedures.

In addition, this document will provide a site-by-site procedural outline for implementation of the sampling plan. While it must be recognized that changes in site conditions may require modification of the plan, this document provides a systematic sampling program by which to detail the project in terms of scope, manpower, equipment needs, and logistics.

2.0 Project Objective

In July of 1985, URS performed a preliminary field reconnaissance of two project areas on St. Lawrence Island, Alaska, for the U.S. Army Corps of Engineers. The purpose of this assessment was to develop material inventories for preparation of bid documents to implement cleanup of the Gambell and Northeast Cape project areas under the provisions of the Defense Environmental Restoration Account.

The extent of the project areas and reconnaissance activity were defined by the ACOE during the initial stages of the project. No detailed records were available to fully evaluate the project areas; in general, no records existed by which to evaluate specific hazards, material usage, or precisely locate former facilities. Direction concerning site identification, potential materials of concern, and definition of the cleanup areas was provided by the U.S. Army Corps of Engineers; as such, URS can not warrant the completeness of hazard identification, nor assume responsibility for such unknowns.

The ACOE directed that only a limited number of samples were to be collected during the preliminary field reconnaissance. While this provided a limited amount of information about the project areas, it was determined that additional sampling would be required to address remaining agency concerns. This document has been prepared to implement a larger sampling program to support the ACOE's on-going efforts to provide a thorough cleanup of the St. Lawrence Island project areas. By providing greater financial resources and flexibility in the implementation of this sampling program, the ACOE has made a commitment to a more thorough characterization of the cleanup sites identified for this project.

The objective of this sampling effort is to provide a better characterization of the cleanup sites in the Gambell and Northeast Cape project areas than was possible during the preliminary field reconnaissance. This effort will focus upon those portions of the two project areas which are historically known to be likely contamination sites or identified as such during the preliminary field reconnaissance of July, 1985. Areas of concern include former power facilities, radar/communication sites, POL storage areas, dump sites, spills, and barrel caches. The data generated from implementation of this sampling plan will be used to assess the need for additional remedial action within the cleanup areas.

3.0 Project Area Description

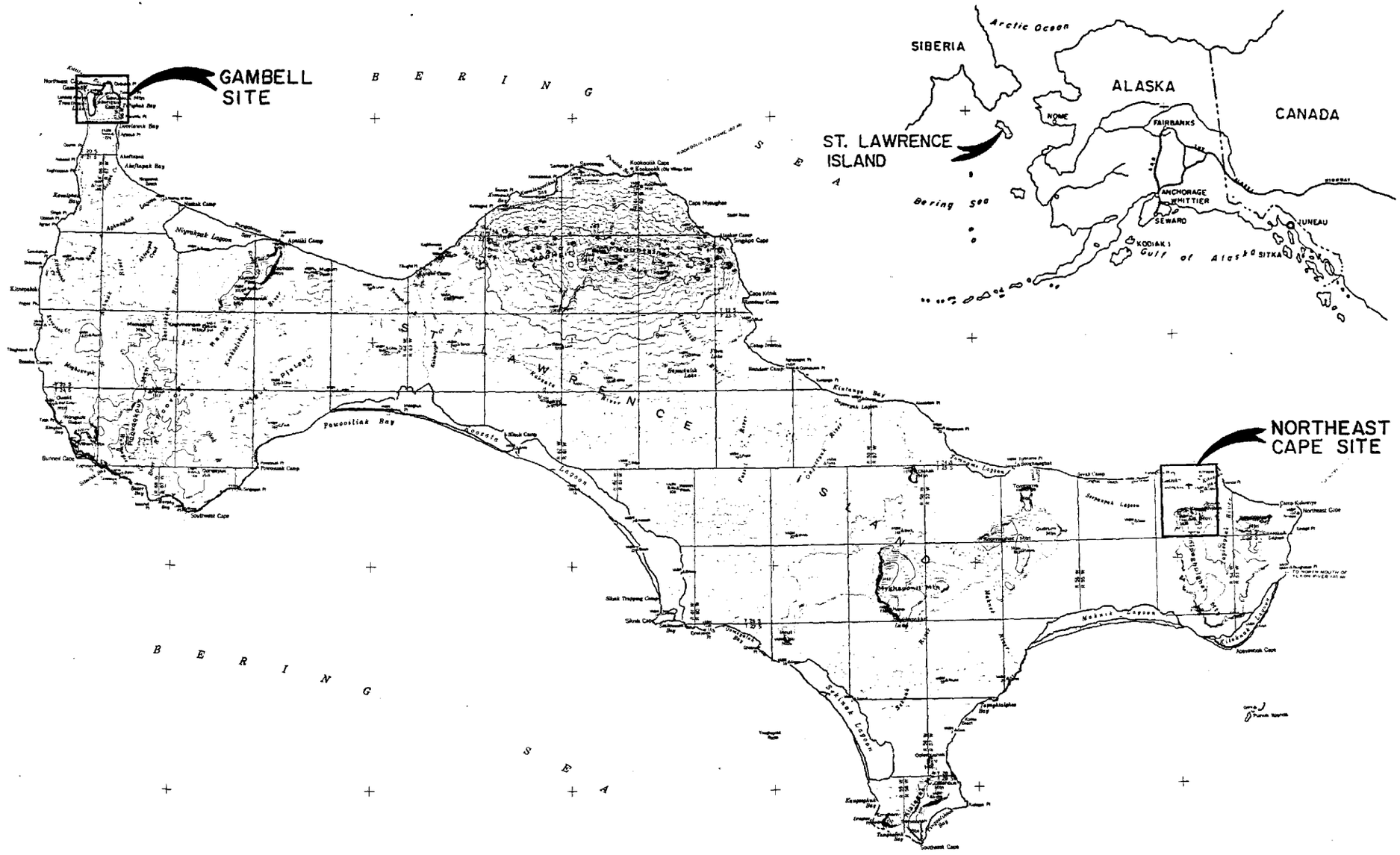
3.1 Historical Background

The work under this contract will occur in two project sites on St. Lawrence Island, Alaska: Gambell and Northeast Cape (Figure III-1). St. Lawrence Island is located in the Bering Sea, southwest of Nome, Alaska, and near the territorial waters of the U.S.S.R. The Gambell site is located approximately 200 air miles southwest of Nome; the Northeast Cape site is approximately 135 air miles from Nome, and separated by about 100 miles from the Gambell site.

The Gambell site has been utilized in the past by the Army, Navy, and Air Force; a limited amount of activity occurred during World War II, but the major impacts occurred in the 1950's. The Air Force operated a temporary Aircraft Control and Warning (AC&W) site at Gambell as early as 1948, to provide intelligence on Russian shipping activities; this facility was subsequently abandoned shortly after the Northeast Cape facility was completed. The Army operated a larger base, reportedly supporting up to several hundred men. No information exists concerning the units assigned to this area or their specific mission. Information concerning location of facilities and their function is limited to that available from verbal descriptions and assistance from local residents of the community, as most facilities were demolished and buried on-site. No base plans or site information were located during a search of historical records. All available information sources indicated that such records, if any existed, were likely forwarded to respective military archives or the National Archives in Washington, D.C. Contacts with several agencies have produced no information as of this time. The sites identified during the preliminary reconnaissance are described in Section 4.3.

The Northeast Cape site was an Air Force Aircraft Control and Warning (AC&W) station, constructed by Morrison-Knudsen in 1951. In 1952, the site was formally activated with assignment of the 712th ACW Squadron and the 6980th Security Squadron. Throughout its existence, Northeast Cape was a surveillance station, providing radar coverage for the Alaskan Air Command, and later NORAD, as a part of an Alaska-wide system constructed to reduce a perceived vulnerability to bomber attack across the polar regions. The original site was designed to support 212 men.

In approximately 1954, the Air Force began construction of a "White Alice" radio delay at Northeast Cape, a communication system utilizing tropospheric scatter for transmission of information detected by the AC&W Radar Facility. Radar operations ceased in June, 1969, with removal of most military personnel by the end of that year. Many facilities were left essentially intact, with minimal removal of equipment due to the high cost of transport from the site. Final removal of personnel occurred prior to 1972. Since that time, the facilities have undergone general deterioration under the forces of weather, salvage, and vandalism. The sites identified during the preliminary reconnaissance are described in Section 4.4.



URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	LOCATION & REGIONAL MAP	Figure III-1

3.2 Preliminary Reconnaissance

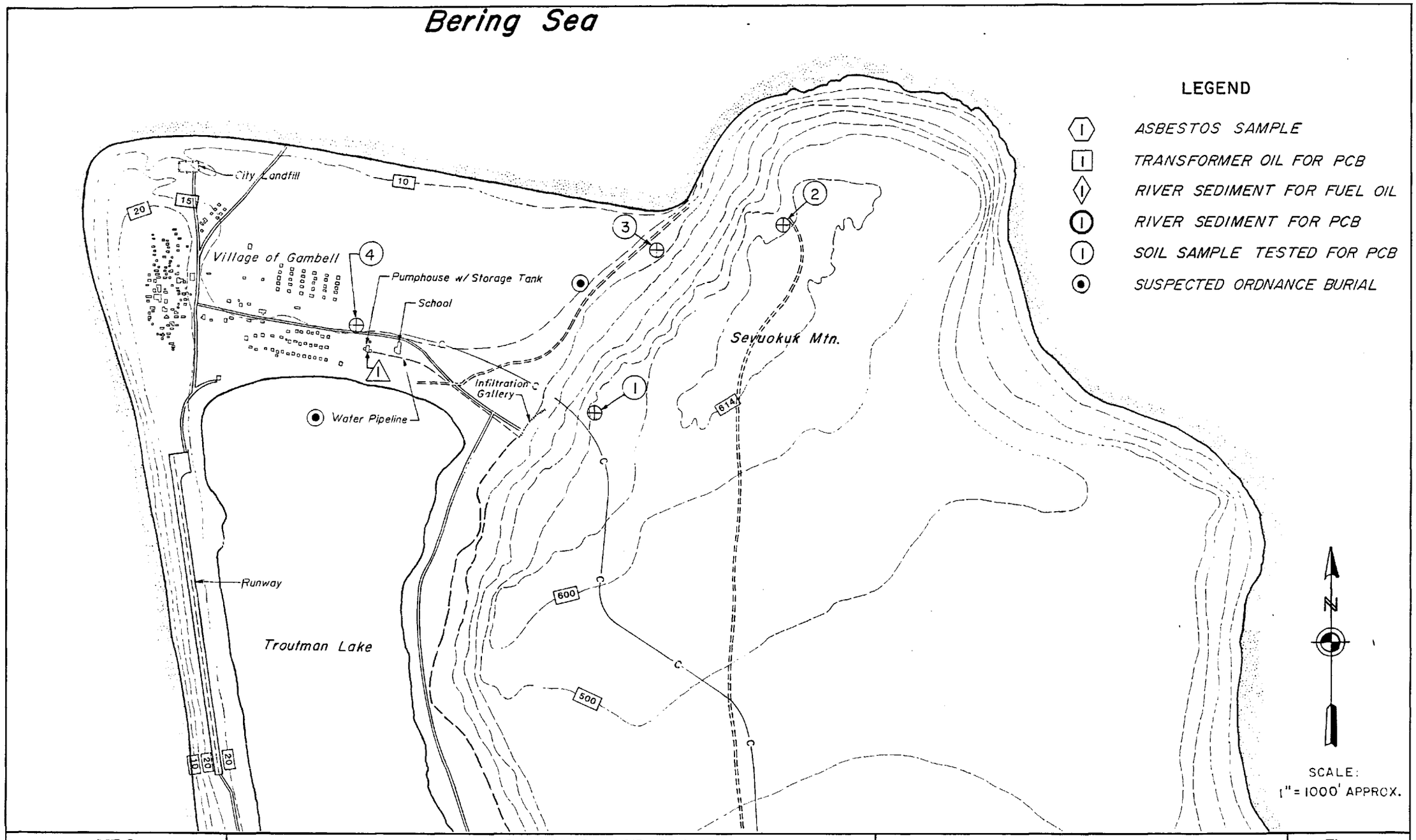
In July, 1985, URS performed a preliminary site reconnaissance of the Gambell and Northeast Cape sites. The Corps of Engineers directed that a limited number of soil and water samples be collected in Gambell for initial screening for selected contaminants; testing was to include primary and secondary water quality, oils and grease, pesticides (including PCBs), and EPA priority pollutants (EPA Hazardous Substance List). In Northeast Cape, testing was to be performed on transformer oils for PCBs and a limited number of soil/sediment samples tested for PCBs and fuel hydrocarbons. At the direction of the Corps of Engineers, this sampling was conducted to provide preliminary information concerning potentially hazardous materials which might have been associated with former military activities. During this reconnaissance, materials inventories were to be developed and potential contamination areas such as warehouses, power stations, and dump sites were to be located.

The intent of this inventory information was to provide a data base for use in preparation of construction documents for the general cleanup of the two project sites. During the initial stages of this project, the Corps of Engineers indicated that the following materials could be encountered on the sites:

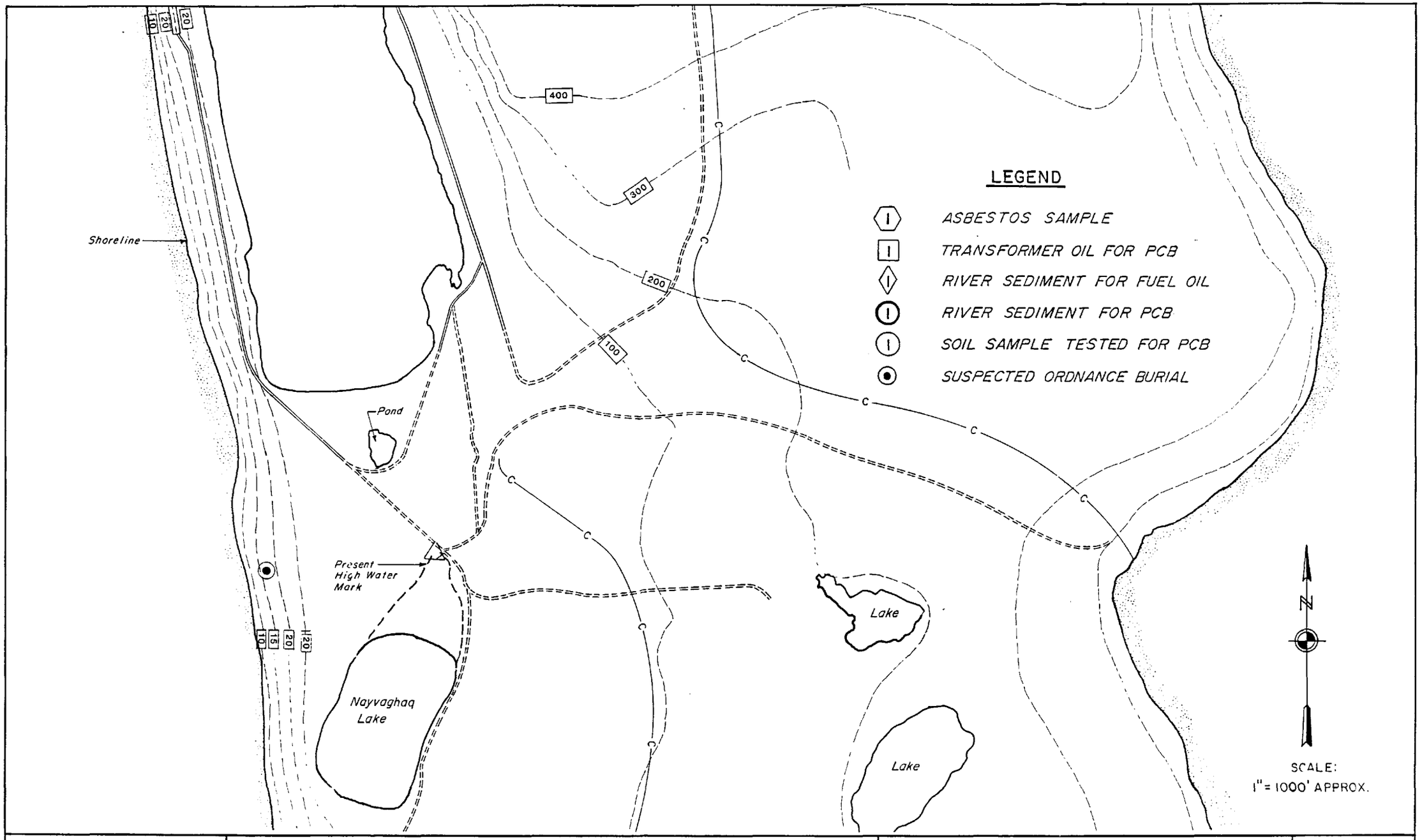
- Friable asbestos;
- POLs;
- PCBs;
- PCB contaminated soils;
- Oxidizers and corrosives;
- Miscellaneous chemicals; and
- Paints and solvents.

A limited PCB sampling program was provided for under the project scope of work. At the Gambell site, four areas were tested for potential PCB soil contamination. Historical information indicated that electrical transformers, suspected to contain PCB dielectric oils, may have been buried at three of these sites during the original demolition of the military installations. A fourth site was sampled due to the presence of three empty transformer casings. Due to the proximity of these transformers to the community's water source, a water sample was taken at the community watering point at the PHS pumphouse. The location of sampling areas are indicated in Figures III-2 and III-3. All samples were tested by IT Corporation, a Corps of Engineers' approved testing laboratory, and showed no indication of PCB contamination. Test results are indicated in Table III-1 and enclosed in Appendix A.

At the Northeast Cape site, a total of five transformers were tested for the presence of PCB dielectric oil. All five samples yielded positive results, of which four indicated concentrations in excess of 500,000 parts per million (greater than 50% by volume) of Aroclor 1260. River sediment samples were taken at six areas and analyzed for PCB contamination. One sample indicated a concentration of 1 ppm; PCBs were not detected in the remaining five samples. Of a total of 15 samples



URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	GAMBELL SAMPLING LOCATION MAP NORTHERN AREA	Figure III-2



URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	GAMBELL SAMPLING LOCATION MAP SOUTHERN AREA	Figure III-3

TABLE III-1

PRELIMINARY RECONNAISSANCE SAMPLE RESULTS

Sample Type	Sample Number	Site Location		Concentration (ppm)
NE Cape:	RS 1	Site 42:	Fuel Storage Tanks	10,000
Fuel Hydrocarbons	RS 2a	Site 42:	Drainage Area	2,200
(Soil/Sediments)	RS 2b	Site 42:	Stream Junction	nd[1]
	RS 3	Site 15:	Airport Terminal	nd[2]
	RS 4	Site 20:	Cargo Beach Dump Sites	nd[1]
	RS 5	Site 18:	Cargo Beach Area	nd[1]
Gambell: PCB	SS 1	Site 4:	Sevuokuk Mountain,	nd
(Soils)			Transformers	
	SS 2	Site 4:	Sevuokuk Mountain,	nd
			Oil Spill	
	SS 3	Site 3:	Gambell Communication	nd
			Facility	
	SS 4	Site 7:	Military Power Facility	nd
NE Cape: PCB	SS 2	Site 15:	Airport Terminal Area	nd
(Soils)	SS 3	Site 42:	Fuel Storage Tanks	3.7
	SS 4	Site 36:	Power & Heat Bldg.,	nd
			Oil Spill	
	SS 5	Site 36:	Power & Heat Bldg.,	0.8
			S.W. Oil Spill	
	SS 6	Site 35:	Paint & Dope Bldg.,	trace
			East Side	
	SS 7	Site 35:	Paint & Dope Bldg.,	trace
			North Side	
	SS 8	Site 32:	Emergency Power/	trace
			Operations Building	
	SS 13	Site 18:	Cargo Beach Area,	1.1
			Building C27/C23	

TABLE III-1
PRELIMINARY RECONNAISSANCE SAMPLE RESULTS
(Continued)

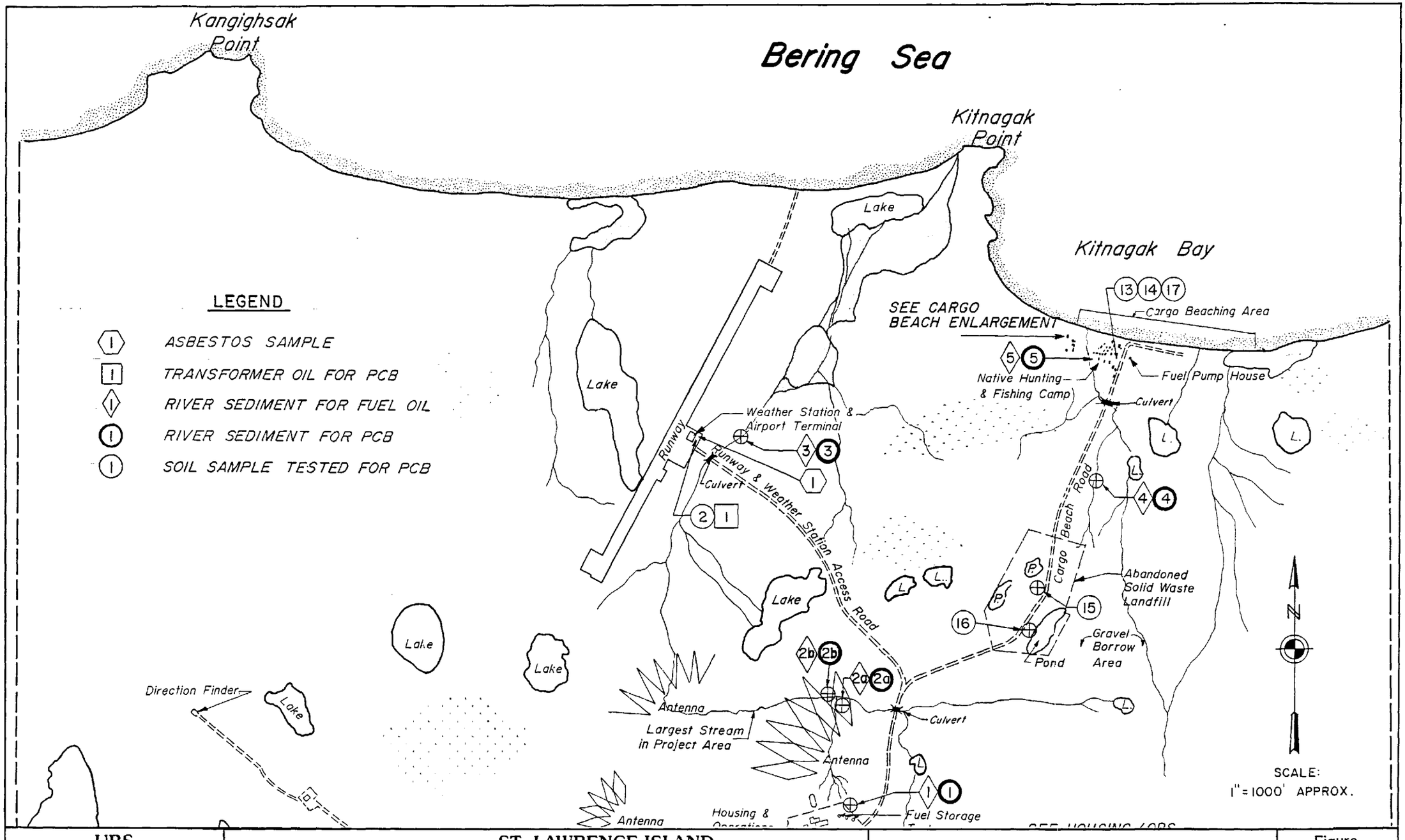
Sample Type	Sample Number	Site Location		Concentration (ppm)
	SS 14	Site 18:	Cargo Beach Area, Building C24	1.6
	SS 15	Site 20:	Cargo Beach Dump Sites	nd
	SS 16	Site 20:	Cargo Beach Dump Sites	trace
	SS 17	Site 18:	Cargo Beach Area, Building C40	nd
	SS 18	Site 36:	Power & Heat Bldg., Downstream Manhole	0.6
	SS 19	Site 26:	Leaking Transformer	nd
	SS 20	Site 26:	Lower Tram, Oil Spill	nd
NE Cape: PCB	RS 1	Site 42:	Fuel Storage Tanks	1.0
(Sediments)	RS 2a	Site 42:	Drainage Area	nd
	RS 2b	Site 42:	Stream Junction	nd
	RS 3	Site 15:	Airport Terminal	nd
	RS 4	Site 20:	Cargo Beach Dump Sites	nd
	RS 5	Site 18:	Cargo Beach Area	nd
NE Cape:	TS 1	Site 15:	Airport Terminal Building	5.0
Transformer Oil	TS 9	Site 32:	Emergency Power/	
Samples			Operations Building	590,000
(PCB)	TS 10	Site 36:	Power & Heat Building	620,000
	TS 11	Site 36:	Power & Heat Building	630,000
	TS 12	Site 36:	Power & Heat Building	730,000

nd_1: Detection Limit of 0.5 ppm.
nd_2: Detection Limit of 100 ppm.
nd_3: Detection Limit of 10 ppm.

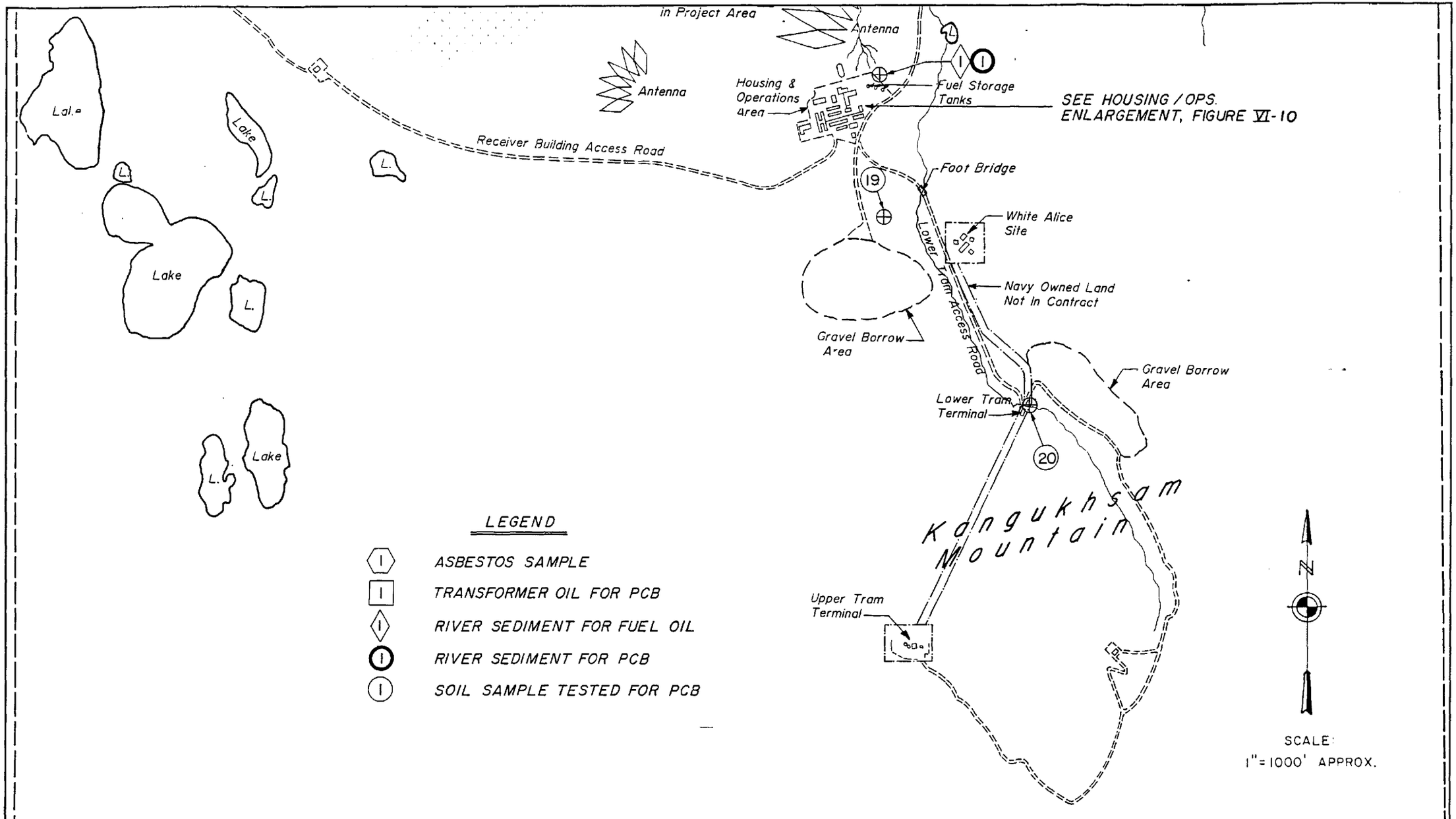
Note: Sample locations indicated in Figures III-2 through III-7 correspond to sample numbers indicated in this table.

for suspected PCB soils, ten indicated the presence of PCBs. Five samples ranged in concentration from 0.6 to 1.6 ppm; the remaining five contained trace amounts of PCBs, below the detection limit of 0.5 ppm. The location of these samples are shown in Figures III-4, III-5, III-6, and III-7. Test results from this sampling are indicated in Table III-1 and enclosed in Appendix A.

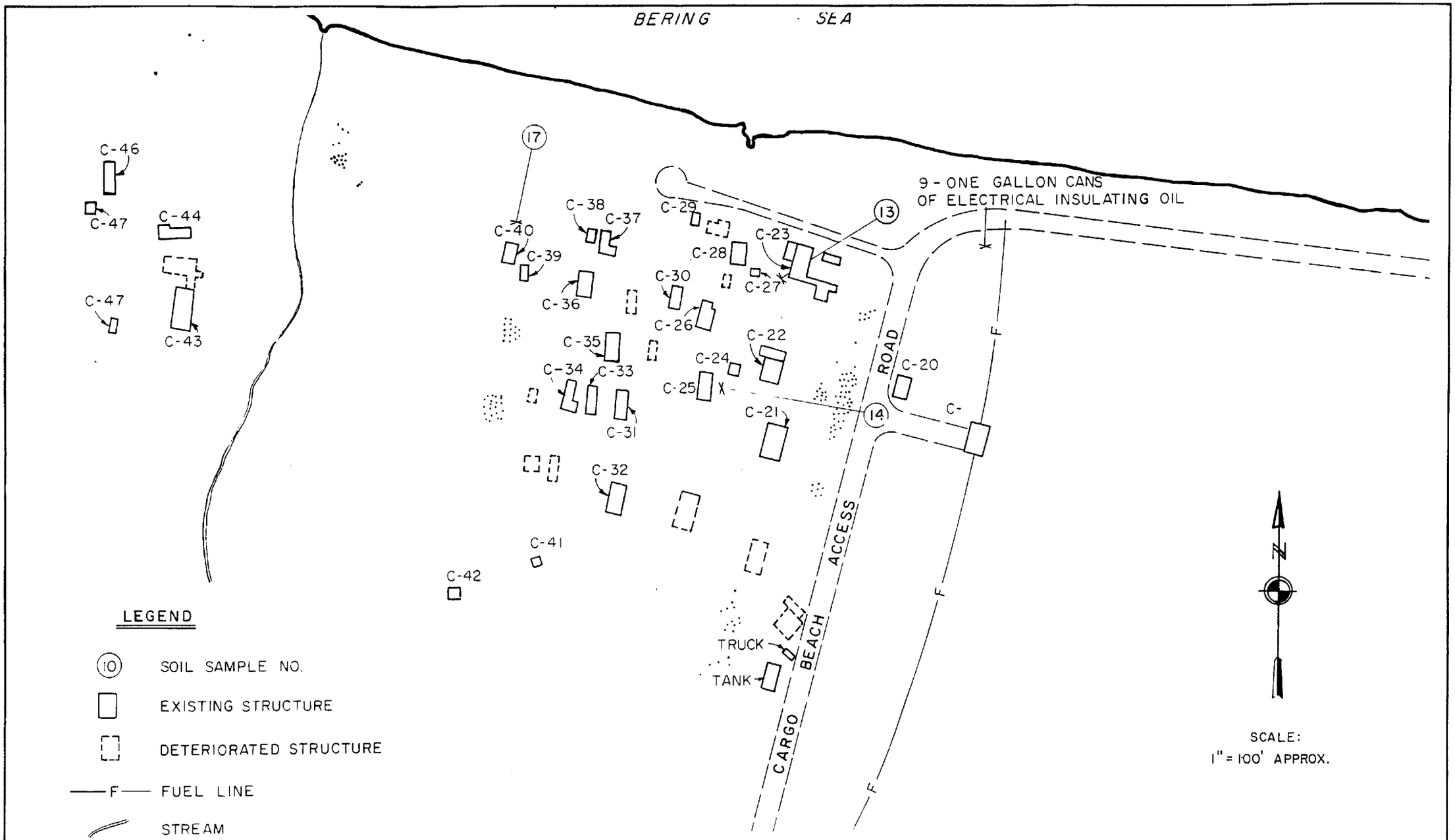
Groundwater samples were collected at five sites identified during the field reconnaissance as areas of potential contamination; these sites included former electrical power facilities, radar/communication sites, and dump sites (Figure III-8). Water sampling wells were placed in conjunction with a subsurface exploration program, utilizing soils borings and magnetometry to define burial areas and soil characteristics. In addition, water samples were obtained from the community's infiltration gallery, an old village well in the western portion of the city, and two local surface water bodies, Nayvaghaq and Troutman Lakes. Observations concerning the analytical results of this sampling are contained in a previously submitted document, "Preliminary Reconnaissance: Surface and Subsurface Water Sampling, Gambell, Alaska". Data from the preliminary reconnaissance is provided in Appendix A. A discussion of geophysical and geotechnical aspects of the reconnaissance are presented in a previously submitted report, "Geotechnical, Geophysical and Soil/Groundwater Quality Studies: Defense Environmental Restoration Program (DERP), Gambell, St. Lawrence Island, Alaska".



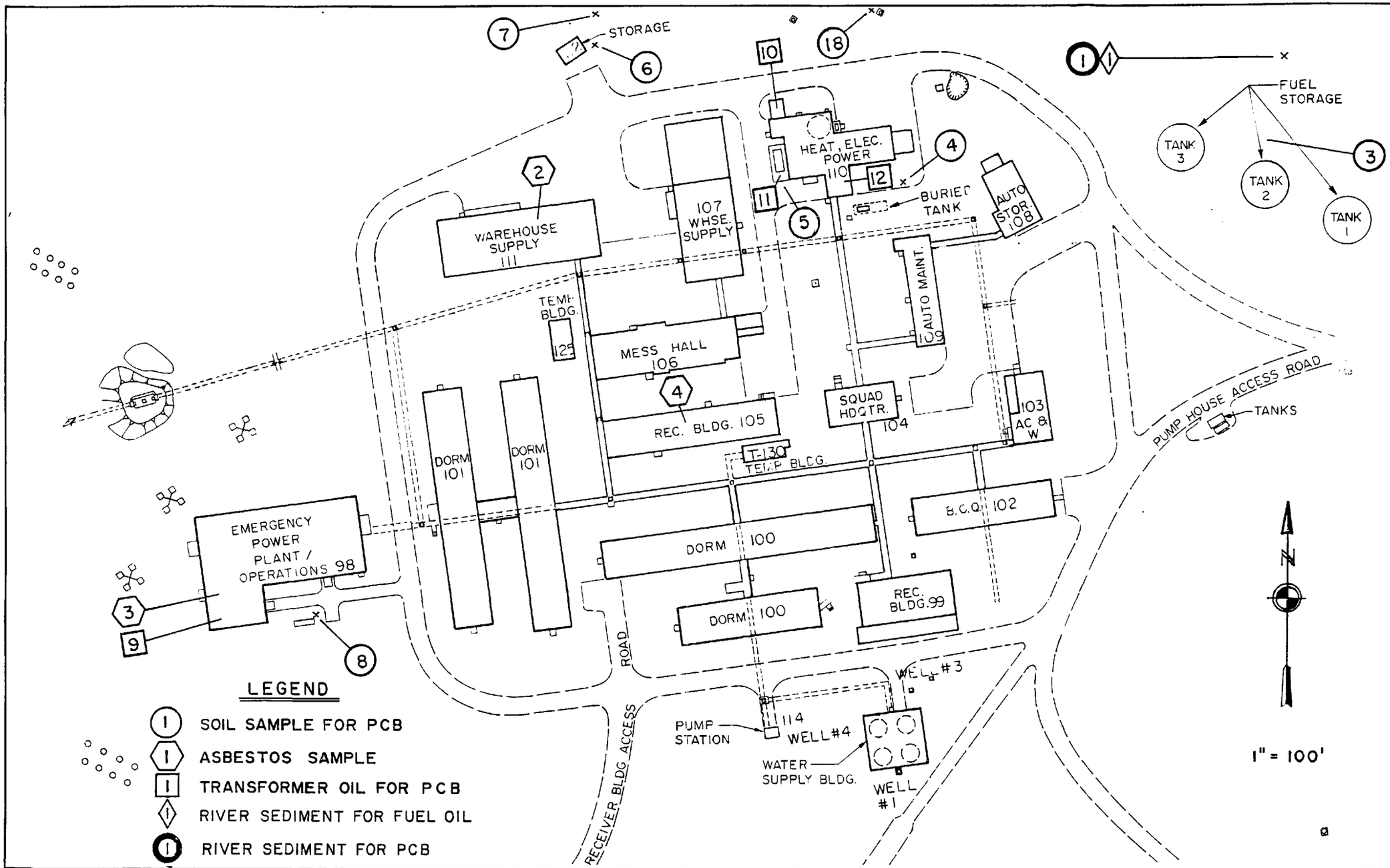
URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	N.E. CAPE SAMPLING LOCATION MAP NORTHERN AREA	Figure III-4



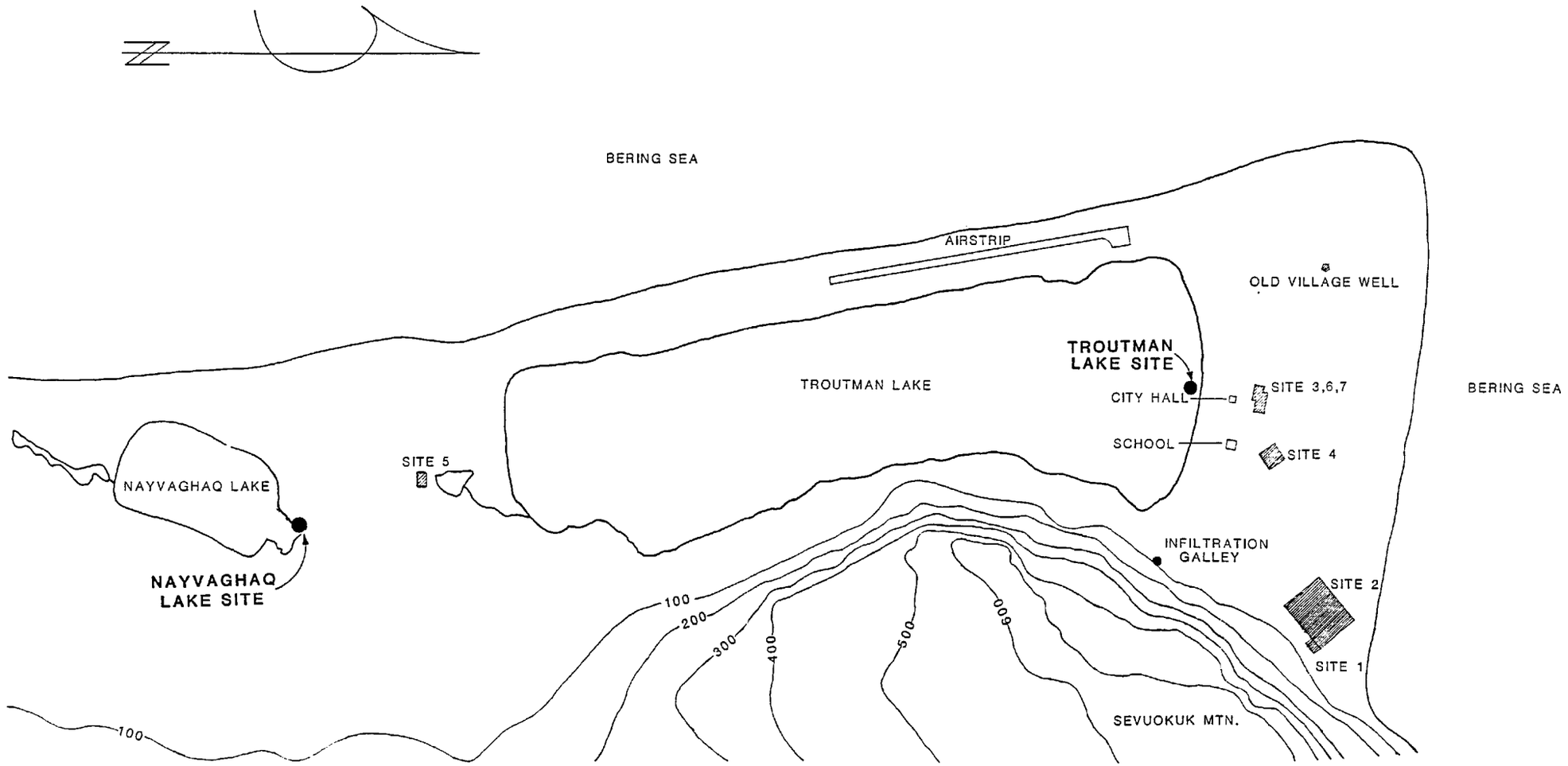
URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	NORTHEAST SAMPLING LOCATION MAP SOUTHERN AREA	Figure III-5



URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	CARGO BEACH ENLARGMENT SAMPLING LOCATION MAP	Figure III-6



URS CORPORATION ANCHORAGE, ALASKA FEB 1986	ST. LAWRENCE ISLAND DEBRIS DISPOSAL & SITE RESTORATION DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT ALASKA DISTRICT—CORPS OF ENGINEERS	HOUSING / OPERATIONS SAMPLING LOCATION MAP	Figure III-7



GAMBELL, ALASKA

FIGURE III-8

SAMPLING PROGRAM SITE PLAN

Base map provided by U.S Corps of Engineers

Prepared For URS Corporation By:

RZA, INC.
Geotechnical Consultants
3105 A Lakeshore Drive, Suite 103
Anchorage, Alaska 99503

Date AUGUST 1985

Scale N/A

4.0 Sampling Plan

4.1 Introduction

During the preliminary field reconnaissance, URS personnel performed a visual survey of the two project areas, Gambell and Northeast Cape collecting information concerning types, quantifies, and locations of debris encountered. Based upon field observations and information provided by the Army Corps of Engineers concerning the nature and extent of the project areas, 43 sites were delineated for use in the presentation of project information. Material inventories were compiled on the basis of the site designations and provided the basis for preparation of plans, specifications, and award of a cleanup contract. That contract provided for the demolition and removal of existing structures, debris, asbestos, POLs, PCB contaminated materials, and other known hazardous materials. However, only limited analytical sampling was performed during the field reconnaissance to assess the potential for environmental contamination.

The objective of this sampling plan, as outlined in Section 2.0, is to obtain data to better characterize the cleanup sites of the two project areas, Gambell and Northeast Cape. The data acquired from this sampling program will be used to assess the need for additional remedial actions within the project areas. However, it was recognized that not all sites would require the same sampling effort. As such, criteria will be required to evaluate the need for additional sampling information, the type of information, and the number of samples. Sampling schemes and anticipated sampling effort have been addressed in the following subsections.

4.2 Sampling Schemes

The provisions of the current cleanup contract developed for the Army Corps of Engineers will ensure the expedient removal of known contaminant sources from the project site. No further work will be done to characterize those materials. Sampling efforts will focus upon those materials to be left in-place, such as foundations or concrete slabs, which may have been contaminated and sites in which additional sampling would be beneficial for assessing potential contamination due to historical or suspected usage of hazardous materials.

URS has developed a sampling approach based upon three contamination pathways:

- soils;
- shallow groundwater; and
- man-made surfaces, such as concrete slabs, flues, or storage tanks.

The intent of this sampling approach is to examine sites which have the potential for, or evidence of, contamination. This approach has been chosen to address the unique conditions of an arctic environment. Both project areas are underlain by permanently frozen ground, with varying active layer depths dependent upon localized soil conditions. These permafrost zones provide an essentially impermeable barrier to

contaminant movement; the documented per§meabilities of permafrost are quite low. As such, it is anticipated that contaminants will be isolated within a shallow active layer, extending from ground surface to an interface with the underlying permafrost zone.

Our approach will consist of obtaining shallow surface soil grab samples and groundwater samples from the area of the permafrost/active layer (thawn) interface. Surface soil sampling will particularly target areas containing evidence of spills or where contaminants might have been concentrated, such as a chemical storage area. Groundwater sources to be sampled will predominantly be suprapermafrost water, which is effectively isolated from potentially deeper aquifers by the permafrost zone. As such, interaction between these suprapermafrost waters and true groundwater aquifers are extremely limited. It is believed that materials leached from surface spills or leachate from buried materials will tend to concentrate at the permafrost/active layer interface; therefore, water samples collected in that area should be representative of potential contamination and relative mobility within the soil. However, to ensure that valid groundwater samples are collected, sampling should occur in late summer, when the active layer is at its maximum thaw depth.

A number of man-made surfaces will also be sampled to ensure that potential contaminants are adequately assessed for structures and materials scheduled to remain in-place. Conventional grab-type sampling can not be applied to these surfaces. Rather, the determination of contamination will be made by the use of wipe or scrape samples under strict guidelines to ensure that representative samples are obtained.

The development of criteria for determining which sites should be sampled and the type of analysis are discussed in subsequent subsections. In addition, the following factors were also considered in determining the type and number of samples to be collected at each site:

- the physical characteristics of the site, such as topography (slopes, gradients), drainage characteristics, and man-made structures (roads, buildings, tanks);
- the practical considerations of sampling such large project areas;
- cost effectiveness;
- the types of materials to be evaluated and the types of sampling methods available; and
- personal observations from the preliminary field reconnaissance.

4.2.1 Sampling Effort

A. Criteria for Site Sampling

Due to the lack of historical information concerning the project areas, a technical decision process is difficult to implement for definitively determining the sampling needs of individual sites. In some instances, site identifications were based upon undocumented information, heresay, and implications judged to be

reliable, as no other documentation or evidence exists. In order to ensure that sites were evaluated in a consistent manner, three criteria were used to determine if sampling should be conducted:

- o was the site utilized as a landfill?
- o was it suspected that hazardous materials were used or spilled at the site?
- o was there evidence of POL use or spills at the site?

If the site was known to be a landfill, three options were considered:

- o no contamination suspected - no additional sampling required;
- o potential POL or PCB disposal - additional testing required; and
- o potential hazardous material disposal - additional testing required.

If the site was not known to have been used as a landfill, the remaining two criteria were considered.

If not utilized as a landfill, historical information concerning the activities of that site, local information, field observations, and preliminary sampling results were evaluated. If it was suspected that hazardous materials may have been used or spilled, the site was selected for additional investigation. If no information suggested hazardous material use, but there was evidence of POL use or spills, the site was also identified as an area of further testing. If none of the three criteria yielded an affirmative response, no additional sampling was planned for the site.

Utilizing this criteria, 24 of the 43 designed sites were identified for additional sampling work. The remaining sites were found to contain essentially inert, non-hazardous materials, or were felt to be adequately addressed under the existing cleanup contract. These 43 sites are identified and described under Sections 4.3 and 4.4 of this plan.

B. Number and Type of Samples

The decision process employed in determining the number and type of samples is a complex issue dependent to site conditions and the media to be sampled. A variety of sampling techniques can be employed to collect samples from soils, groundwater, or man-made surfaces; however, proper selection of sampling techniques and location is important to ensure the validity of sample analyses. After careful consideration of the types of materials which might have been used in the project areas, URS chose the following sampling methods for assessing the sites:

- o discrete shallow (0"-4") soil grab samples;
- o shallow groundwater sampling;
- o scrape samples; and
- o wipe samples.

In general, the materials of interest for these sites consist of persistent, relatively non-volatile materials which would have limited mobility in soils. Due to concern that PCB contamination might be present in POL materials used on site, for which abundant surface spill evidence exists, discrete surface soil grab samples would provide the best information to confirm the presence of hazardous materials. Compounds such as PCBs would be expected to be bound in the organically-richer surface soils in areas of potential spillage. While additional sampling at greater soil depths would be useful in determining the vertical extent of contamination, if any, the intent of this sampling is to determine or verify the presence of selected materials which might pose environmental concerns. As such, surface grab samples can be obtained with relative ease, sited according to visual spill evidence, and collected in accordance with straightforward techniques which yield consistently valid samples.

Soil sampling needs were based upon three criteria:

- suspected improper POL/PCB disposal or spills;
- suspected improper hazardous material disposal or spills; and
- requests from the Army Corps of Engineers for specific information and documentation.

Sites in which only POLs and/or PCBs are of concern will provide the minimum analytical requirements for soil samples. Suspected or apparent surface spills will be sampled according to the following methodology:

- under 1,000 square feet, one (1) discrete sample:
- 1,000-5,000 square feet, two (2) discrete samples;
- 5,000-10,000 square feet, three (3) to five (5) samples; and
- 10,000-100,000+ square feet, six (6) to ten (10) samples.

An estimate of required sample numbers are provided in Sections 4.3 and 4.4.

In sites suspected to contain hazardous materials, based on historical information or prior field work, or for which the Corps of Engineers has requested specific analytical information for documentation purposes, samples will be collected for inclusion of priority pollutant testing. These types of soil samples will largely be directed toward known landfills and large spill areas. In several selected sites, the Corps of Engineers has also requested specific bacteriological sampling for evaluation of sites utilized for sanitary waste disposal. Sample numbers were based upon the following methodologies:

- under 1,000 square feet, one (1) discrete sample;
- 1,000-10,000 square feet, two (2) to three (3) discrete samples; and
- 10,000-100,000 square feet, four (4) to six (6) samples.

Groundwater sampling will typically consist of three to four well locations per site. In areas of discernible hydraulic gradient, typical installations will consist of one (1) upgradient sampling point and two (2) downgradient sampling wells. In areas of uncertain gradient, the sampling site will be bracketed by four (4) wells for shallow groundwater collection. Due to the relating impermeability of the underlying permafrost zone, it is felt that sampling of the suprapermafrost groundwater would provide the best assessment of the presence of contaminants which might be leached from buried materials or surface spills. Since permafrost depths are typically shallow at each project area, these sampling wells will provide reliable information concerning solubilized materials. When combined with surface soil analytical results, a good assessment can be made of the potential for, or presence of, contaminants.

The Army Corps of Engineers has requested that groundwater samples obtained in these project areas be analyzed in accordance with Priority Pollutant methodologies, including volatile and extractable organics, heavy metals, cyanides, and phenols, for purposes of documenting existing conditions. In several sites, the Corps of Engineers has also requested specific bacteriological sampling for areas utilized for sanitary waste disposal.

Wipe and scrape samples will be collected in a number of sites where convention soil or water sampling can not be used. Concerns have been raised by several agencies that concrete slabs, foundations, storage tanks, and other items which are to remain in-place may have been contaminated by materials such as PCBs. Therefore, wipe/scrape sampling will be performed at selected sites for which contamination by PCBs, POLs, or other materials may be a concern. Those sites which are known to have a potential for contamination, either due to past usage or spill evidence, have been identified, and criteria established to determine the analytical requirements for such samples. In areas where it is possible that POLs, PCBs or other hazardous materials may have been used or stored, sampling will occur only at visible spill areas, where surface materials can be effectively scraped or wiped. These samples will be collected in accordance with laboratory guidelines, which will establish criteria for determining if a valid sample can be obtained and detailed sampling procedures to ensure consistency in sample collection.

C. Quality Assurance and Control

Implementation of this sampling plan will be conducted in accordance with EPA guidelines for quality assurance and control, as outlined in Appendix C of this document. In addition, the Army Corps of Engineers has requested that archival samples be collected for each sampling sites. Split samples will be collected at each sampling location for each media to be tested. One sample split will be submitted to an approved laboratory for analysis; the remaining split will be retained as an archival sample.

Ten percent (10%) of the total number of samples collected will be split three ways. One split will be submitted to an approved laboratory for analysis; a second split will be retained as an archival sample. The final split will be collected in a third sample jar, and provided to the Corps of Engineers for possible analysis by another lab, at their discretion. Duplicates, background samples, and field blanks will be provided in accordance with the guidelines of Appendix C, Quality Assurance and Control.

4.2.2 Guidelines for Sample Analysis

A variety of medias will be sampled for this project, including soils, sediments, groundwater, ash, and residues on solid surfaces. Due to the range of analytical testing which has been requested for this project, the following guidelines have been provided to differentiate sample types and analytical requirements. The designation of sample types and analytical requirements for the various contaminants of concern will be discussed in the following sub-sections.

A. Soil and Sediment Sampling

As outlined in Section 4.2.1 B, criteria was established to differentiate the level of sampling effort required at particular sites. To simplify the presentation of sampling requirements, two sample types have been defined. Soil samples analyses will be performed according to the following classification types:

- Type 1
  - Polychlorinated biphenyls (PCBs) and organochlorine pesticides;
  - Total petroleum hydrocarbons;
  - Soil pH.

- Type 2
  - Same as Type 1;
  - Priority pollutants.

Analytical parameters, methods, and associated detection limits for these analyses are listed in Table IV-1. The number of samples to be taken at each site is set forth in Sections 4.3 and 4.4 of this plan. Soil grab samples will be collected as discrete surface (0" - 4") samples. Subsurface samples will consist of split spoon samples. The sampling procedures to be used in collecting these samples are discussed in Section 5.1.1.

B. Groundwater Sampling

Two sample types have been defined to differentiate the level of sampling effort requested by the Corps of Engineers, as discussed in Section 4.2.1.B. These designations have been made to simplify the presentation of sampling requirements in describing individual sampling sites. Groundwater analyses will be conducted according to the following classification types:

TABLE IV-1

SOIL ANALYSES

Sample Type	Analyte	Analytical Method	Detection Limit
Type 1	pH	EPA Method 150.1	--
	Total Petroleum[(1)] Hydrocarbons	EPA Method 418.1	1 ppm
	Polychlorinated Biphenyls (PCB)	EPA Method 8080	0.5 ppm
Type 2	pH	EPA Method 150.1	--
	Total Petroleum[(1)] Hydrocarbons	EPA Method 418.1	1 ppm
	Polychlorinated Biphenyls (PCB)	EPA Method 8080	0.5 ppm
	PRIORITY POLLUTANTS:		
	o Volatile Organics	EPA Method 8240	1 ppm
	o Extractable Organics	EPA Method 8270	1 ppm
	o 14 Metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Hg, Se, Ag, Tl, Zn)	EPA Method 3050	1 ppm
	o Total Cyanide	EPA Method 335.2	1 ppm
	o Total Phenols	EPA Method 420.1	1 ppm

(1): Total Petroleum Hydrocarbons is a measure of mineral oil content (light fuels, heating oils, diesel), as opposed to Oil and Grease which measures biodegradable animal greases, vegetable oils, and relatively non-biodegradable mineral oils.

- Type 1:
  - Field pH, conductivity, and temperature;
  - Priority pollutants.

- Type 2:
  - Same as Type 1;
  - Persistent pathogens.

Analytical parameters, methods, and associated detection limits for these analyses are listed in Table IV-2. Field measurement of pH, conductivity, and temperature will be obtained from temporary aliquots which will be discarded in the field. The number of samples to be collected at each site is set forth in Sections 4.3 and 4.4 of this plan. The sampling procedures to be used in collecting these samples are discussed in Section 5.1.2.

C. Wipe/Scrape Samples

In those areas where conventional grab sampling techniques are not possible, such as residues in storage tanks or spill areas on concrete, the presence of contaminants will be determined through surficial "scrape" or "wipe" sampling. The number of samples to be taken at each site is set forth in Section 4.4 of this plan. The selection of sampling locations will be determined in the field based on visual evidence of residues or spills, and a knowledge of past operations at the site. Samples will be collected in accordance with the procedures discussed in Section 5.1.3.

Wipe/scrape samples will be collected for analysis by one of two sample types:

- Type 1:
  - Polychlorinated biphenyls (PCBs);
  - Petroleum hydrocarbons.

- Type 2:
  - Same as Type 1;
  - Semi-volatile organics (base/neutral and acid extractable compounds).

The analytical parameters, methods, and detection limits for these analyses are listed in Table IV-3. These analyses will provide qualitative and semi-qualitative results for a wide variety of organic compounds, expressed as a weight-per-weight basis. No specific standard exists for the analysis of semi-volatile organics from wipe or scrape samples. However, the method employed will be based upon laboratory recommendations and detailed sampling criteria; initial information indicates that such sampling will be comparable with EPA Method 8270. As this procedure is defined, a technical Go/No-Go criteria will be established to define the application of this method.

TABLE IV-2

GROUNDWATER ANALYSES

Sample Type	Analyte	Analytical Method	Detection Limit
Type 1	pH	EPA Method 150.1	--
	Conductivity	EPA Method 120.1	1 umho/cm
	Temperature	--	--
	Polychlorinated Biphenyls (PCB)	EPA Method 608	1 ppb
	PRIORITY POLLUTANTS:		
	o Volatile Organics	EPA Method 624	10 ppb
	o Extractable Organics	EPA Method 625	10 ppb
	o 14 Metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Hg, Se, Ag, Tl, Zn)	EPA Method 200.7	100 ppb
	o Total Cyanide	EPA Method 335.2	1 ppm
	o Total Phenols	EPA Method 420.1	1 ppm

TABLE IV-2

GROUNDWATER ANALYSES

(Continued)

Sample Type	Analyte	Analytical Method	Detection Limit
Type 2	pH	EPA Method 150.1	--
	Conductivity	EPA Method 120.1	1 umho/cm
	Temperature	--	--
	Polychlorinated Biphenyls (PCB)	EPA Method 608	1 ppb
	PRIORITY POLLUTANTS:		
	o Volatile Organics	EPA Method 624	10 ppb
	o Extractable Organics	EPA Method 625	10 ppb
	o 14 Metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Hg, Se, Ag, Tl, Zn)	EPA Method 200.7	100 ppb
	o Total Cyanide	EPA Method 335.2	1 ppm
	o Total Phenols	EPA Method 420.1	1 ppm
	PERSISTENT PATHOGENS:		
	o Hepatitis A Virus	(1)	--
	o Salmonella	(2)	--

(1) No specific methodology addresses detection of hepatitis A virus in soil and water; to be coordinated with Center for Disease Control (CDC) and analytical lab.

(2) In accordance with Standard Methods for the Examination of Water and Wastewater, American Public Health Association (16th Edition), and Bacteriological Analytical Manual, Food and Drug Administration, Association of Official Analytical Chemists.

TABLE IV-3

WIPE/SCRAPE ANALYSES

Sample Type	Analyte	Analytical Method	Detection Limit
Type 1	Polychlorinated Biphenyls	NIOSH Method 5503; or EPA Method 608	(1)
	Total Petroleum Hydrocarbons	EPA Method 418.1	(1)
Type 2	Polychlorinated Biphenyls (PCB)	EPA Method 608	(1)
	Total Petroleum Hydrocarbons	EPA Method 418.1	(1)
	Extractable Organics	EPA Method 8270	(1)

(1) EPA standards do not specifically address wipe/scrape analyses; detection limits will be established for samples in coordination with the analytical laboratory. Analytical results will be expressed on a weight-per-weight basis.

D. TCDD Samples

Ash samples will be collected from several sites in which there exists a potential that improper use of PCB dielectric oils occurred. A concern exists that use of PCB contaminated oils as a fuel may have yielded incomplete combustion products, transforming the PCBs into more toxic compounds such as chlorinated dibenzodioxins or dibenzofurans.

In order to address these concerns, ash samples will be analyzed for 2,3,7,8 - tetrachlorodibenzo-p-dioxin (2,3,7,8 - TCDD). Selection of this particular isomer is made because:

- The 2,3,7,8 - TCDD isomer is the most toxic tetrachlorodibenzofuran isomer known;
- The lab standard for 2,3,7,8 - TCDD is available, whereas lab standards do not exist for other isomers; and
- The formation of the 2,3,7,8 - TCDD isomer, although a remote possibility, is more likely than other isomers.

Ash samples will be collected as scrapings or wipes, as appropriate, from camp fires, oil heating units, and flues. The analysis will be according to the analytical methodology of EPA's Contract Laboratory Program, as outlined in invitation-for-bids number WA 84-002, "Dioxin Analysis: Soil/Sediment Matrix, Multi-concentration, Selected Ion Monitoring (SIM) GC/MS Analysis with Jar Extraction Procedure". The number of samples to be taken at each site is set forth in Section 4.4 of this plan.

4.3 Gambell Project Area

Little evidence remains of the military installations in this area. During abandonment of the facilities, most were demolished and buried on-site; the materials remaining are primarily debris such as landing mat, barrels, and cables scattered throughout the area. Based upon local knowledge of the location and function of certain facilities, a number of sites were identified during the preliminary reconnaissance; these areas, Sites 1 through 13, are described below. Table IV-4 provides a summary of the types and number of samples to be collected at each site.

4.3.1 Site 1: Gambell Landfill

A. Site Description

A barrel dump lies adjacent to the existing community landfill, in the western portion of Site 1. The area contains 55-gallon barrels, piping, landing mat, and miscellaneous debris. The types of equipment disposed of along with this debris suggests that at least a portion may be the result of military operations.

TABLE IV-4

GAMBELL SAMPLING SUMMARY

Site Number	Soil and Sediment Type 1	Soil and Sediment Type 2	Groundwater Type 1	Groundwater Type 2
1	2	-	4	-
2	-	-	-	-
3	-	3	3	-
4	6	-	-	-
5	-	-	-	-
6	-	4(1)	-	4
7	3	-	4	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	-
11	-	-	-	-
12	-	-	3	-
13	-	3	3	-

(1): These subsurface split-spoon samples will be tested for persistent pathogens.

B. Potential Contamination

Local POL contamination may have occurred due to disposal of containers in this area. Due to its proximity to the active landfill site, typical leachate materials are likely to be observed.

C. Recommended Sampling

It is recommended that four (4) monitoring wells be placed at the perimeter of the dump site. Prior to well placement, the approximate extent of subsurface burial will be determined by magnetometry. Type 1 groundwater samples will be collected from each well, with field measurement of pH, conductivity, and temperature. The site will be carefully examined for any signs of POL spills, and Type 1 soil grab samples taken as required. It is estimated that two grab samples may be required.

4.3.2 Site 2: Gambell Housing/Operations Area

A. Site Description

This site is reported to have been used as a military housing and operations area. However, the original structures have been demolished and buried randomly about the site. The nature of this material is largely unknown. Surface evidence is largely limited to miscellaneous metal and concrete debris. The site is reported to contain buried pieces of heavy equipment, and mounds of buried debris are visible over approximately ten acres. Historical information indicates that ordnance was buried in a portion of this area, reported to be cases of carbine and machine gun ammunition.

B. Potential Contamination

It is anticipated that small quantities of POLs may be present due to equipment burial. Although ordnance is not to be addressed under this contract, the potential for leaching of nitrates, phosphates, and metals from them exists.

C. Recommended Sampling

Due to the presence of buried ordnance in this area, and historical information that indicates that there were no major spills in this area, it is recommended that no monitoring wells be placed here.

No spills were noted on the surface at this site during the preliminary reconnaissance. However, the site will be examined during implementation of the sampling plan; if any evidence of a spill is encountered, a Type 1 soil grab sample will be taken. It is anticipated that no samples will be required.

4.3.3 Site 3: Gambell Communications Facility

A. Site Description

A portion of this site was a former communications base which likely contained auxiliary generators, transformers, oils, fuels and batteries. The status of this material is unknown, but it is suspected that they may have been buried on-site during demolition of the facility. The storage batteries were apparently destroyed and buried on-site, and it is reported that approximately twelve 5-gallon carboys of sulfuric acid were also buried there. The ground surface of this area has a blackened, oily color, and little vegetation has encroached on the disturbed area.

B. Potential Contamination

The demolition and burial of equipment at this site poses a potential for PCB contamination, oil spillage, and acid leakage. A single surface soil grab sample analyzed for PCB contamination during the preliminary reconnaissance showed no detectable concentration at a 0.5 ppm detection limit. Elevated lead concentrations may be a concern, as may other heavy metals.

C. Recommended Sampling

Three monitoring wells are recommended for this site. Type 1 water samples will be collected from the wells for testing for the presence of priority pollutants and field measurement of pH, conductivity, and temperature.

It is also recommended that three Type 2 soil grab samples be taken across the area of surface discoloration. These samples will be tested for soil pH, priority pollutants, PCBs and petroleum hydrocarbons.

4.3.4 Site 4: Sevuokuk Mountain

A. Site Description

The top of Sevuokuk Mountain was the site of a number of small Army, Navy, and Air Force installations, primarily used for communications activities. The site contains scattered debris consisting of metal, wood, concrete and empty 55-gallon barrels. The areas of concern include an oil spill measuring approximately 100 x 150 feet, an area in which the original facilities were burned, and three empty electrical transformer casings lying near one of the mountainside drainage areas.

B. Potential Contamination

The presence of the transformer casings present a potential for PCB contamination in the immediate vicinity and within the drainage area. A single soil grab sample taken from the transformers during the site reconnaissance showed no detectable concentration of PCBs. A single soil grab sample taken at the oil spill site also showed no detectable PCB contamination.

C. Recommended Sampling

Three Type 1 soil grab samples will be taken across the oil spill site on Sevuokuk Mountain. These samples will confirm the original testing results from the preliminary reconnaissance, which indicated no PCB contamination to be present, as well as provide information on the POL materials spilled.

At the transformer casings, it is recommended that three Type 1 soil grab samples be taken from the stream bed where the casings were dumped. These samples will be used to confirm the original indication that no PCB contamination is present.

4.3.5 Site 5: Tramway Site

A. Site Description

The site encompasses a former tramway site, the majority of which was removed by the military. Remnants of steel cable remain along the hillside, as well as miscellaneous metal debris. Six separate communication cables and two power cables extend from the City of Gambell to the top of Sevuokuk Mountain, passing through a midden near the foot of the mountain.

B. Potential Contamination

No contamination is expected at this location. Rocky rubble extends up the mountain, with little to no vegetation; materials remaining on-site are relatively inert.

C. Recommended Sampling

No additional sampling is recommended.

4.3.6 Site 6: Military Landfill

A. Site Description

This site was a waste disposal area for debris and sanitary wastes, in which an estimated 3,000 barrels of lime-stabilized human waste was disposed of by the military. The area is a particular community concern due to its proximity to the village and the desirability of the area for future community growth. Little surface evidence remains beyond a few shallow buried barrels and barrel fragments.

B. Potential Contamination

The contaminants present in the landfill are probably typical of a small landfill site, but may have had contributions of materials generated in the power and communications facilities. Two groundwater samples obtained in this area during the preliminary reconnaissance did not indicate the presence of PCBs.

C. Recommended Sampling

Samples will be taken at the site to determine if viable pathogenic organisms remain from the disposal of human wastes in this area. It is recommended that sampling be accomplished by placement of four (4) monitoring wells at the perimeter of the site, and Type 2 groundwater samples collected for testing for persistent pathogens likely to have survived in the low temperatures of a permafrost zone. This testing will also include field measurements of groundwater pH, conductivity, temperature, and collection of priority pollutant samples.

It is also recommended that split spoon samples be taken just above and within the permafrost zone (beneath the active layer) at two well sites. These soil samples will also be tested for the presence of persistent pathogens to determine if such organisms have been preserved in what are now permanently frozen areas of the dump site.

4.3.7 Site 7: Military Power Facility

A. Site Description

This site was the location of the base power facility, which was reported to have been demolished and buried on-site. The area formerly housed the central power generation equipment with attendant fuels, oils, and electrical distribution equipment; no surficial evidence of the structure remains beyond a small concrete pad and relict coaxial cable. A small surface oil spill was tested for PCBs by obtaining a single surface soil grab sample during the preliminary reconnaissance; none were detected.

B. Potential Contamination

The reported burial of electrical equipment, including transformers, pose a potential for PCB and POL contamination of the site. A small surface oil spill was tested for PCB contamination during the preliminary reconnaissance by obtaining a single surface soil grab sample, as was a subsurface water sample; PCBs were not detected in either sample.

C. Recommended Testing

It is recommended that four (4) monitoring wells be placed on this site. Type 1 water samples will be collected from these wells for analysis. A careful examination of the area will be made for indications of POL spills. Type 1 soil grab samples will be taken in any spill areas identified. It is estimated that three grab samples may be necessary on this site.

4.3.8 Site 8: West Beach Area

A. Site Description

The west beach area contains scattered debris consisting primarily of metal (barrels, landing mat), as well as small quantities of wood and concrete. The major concentrations of debris lie near and along the existing runway. Historical information indicates that ammunition and hand grenades were buried on-site south of Troutman Lake. The northern portion of this area lies along the edge of the Seklowaghyagey Midden site.

B. Potential Contamination

Due to the scatter and relative inertness of materials in this area, contamination is not expected.

C. Recommended Sampling

No additional sampling is recommended.

4.3.9 Site 9: Asphalt Barrel Cache

A. Site Description

This site contains a storage area with approximately one hundred-fifty 55-gallon barrels of asphalt, portions of which have formed a spill as the containers have deteriorated. The spill has apparently reached Troutman Lake and penetrated the soils of the immediate area.

B. Potential Contamination

The material is currently scheduled for removal under the existing Corps of Engineers cleanup contract.

C. Recommended Sampling

No additional testing is recommended.

4.3.10 Site 10: Sevuokuk Mountain Trail System

A. Site Description

The trail systems indicated in the drawings are marked by empty 55-gallon barrels, in varying conditions, located approximately every 200 feet. Additional miscellaneous debris is scattered along the routes, which were used for access to various small installations in the area.

B. Potential Contamination

Contamination potential is considered unlikely; routes were utilized for vehicular access only and marker barrels were emptied before original placement.

C. Recommended Sampling

No additional sampling is recommended.

4.3.11 Site 11: Communication Cable Route

A. Site Description

The communication cable systems extend across the top of Sevuokuk Mountain, lying upon the tundra surface. Metal spools lie approximately every 1000 feet along the cables. Terrain varies from barren rock rubble to tundra, where vegetation has encroached on the cable route in most areas.

B. Potential Contamination

No contamination is expected in this area.

C. Recommended Sampling

No additional sampling is recommended.

4.3.12 Site 12: Nayvaghaq Lake Disposal Area

A. Site Description

This site was used as a surface refuse disposal area, containing approximately 350 refuse barrels and empty POL barrels, discarded automotive batteries, and miscellaneous debris. During high runoff periods, Nayvaghaq Lake extends into this area. About 35% of the barrels contain garbage, with most filled to approximately one-third of capacity.

B. Potential Contamination

The disposal of barrels in this area pose a potential for POL contamination. In addition, lead may be a concern due to battery disposal at the site.

C. Recommended Sampling

The location of this site, adjacent to Nayvaghaq Lake, will likely result in groundwater levels lying just below the ground surface. It is recommended that three 10' to 15' deep monitoring wells be placed outside the dump area to sample the near surface ground water. Type 1 groundwater samples will be collected from these wells, to be tested for priority pollutants.

The soils around the site have been washed by periodic inundation by the lake. However, it is recommended that soil grab samples be taken; it is estimated that three Type 2 samples will be collected.

4.3.13 Site 13: Radar Power Station

A. Site Description

This site was a radar installation for the military, and likely was the temporary AC&W site operated by the Air Force. A former power building and a number of towers were demolished and buried on-site. Little evidence of the installation remains beyond scattered surface debris and burial mounds. It is suspected that electrical transformers were buried on-site.

B. Potential Contamination

The presence of electrical equipment at the site, and the typical disposal actions used in other sites, suggest the potential for PCB contamination. A single surface soil grab sample obtained during the field reconnaissance showed no PCB contamination; a groundwater sample from the site also yielded no detectable PCB contamination.

C. Recommended Sampling

It is recommended that three monitoring wells be placed at the site. Type 1 groundwater samples will be collected for analysis.

4.4 Northeast Cape Project Area

A larger body of background information exists for the Northeast Cape site, particularly in identification of facilities operated on the site. In those areas which have no direct identification, usage and probable function were determined during the field reconnaissance. A number of areas were identified during the preliminary reconnaissance; these areas, sites 14 through 43, are described below. Table IV-5 provides a summary of the types and number of samples to be collected at each site.

4.4.1 Site 14: Airstrip Area

A. Site Description

The general area of the airstrip contains a range of debris materials, including landing mat, a sled, backhoe, and cable. Wood debris include signs, wind sock stands, a small shack, and approximately 16 wood poles. No fuel facilities are present.

B. Potential Contamination

Contamination is not expected in this area. No aircraft were stationed at this base and no aircraft fueling facilities existed; aircraft usage in the area was limited to transfer of personnel and cargo. Due to the infrequent air traffic to this site, it is believed that minimal usage was made of de-icing agents.

TABLE IV-5

NORTHEAST CAPE SAMPLING SUMMARY

Site Number	Soil & Sediment Type 1	Soil & Sediment Type 2	Groundwater Type 1	Groundwater Type 2	Wipe/Scrape Type 1	Wipe/Scrape Type 2	TCDD
14	-	-	-	-	-	-	-
15	4	-	3	-	-	-	-
16	-	-	-	-	-	-	-
17	4	-	-	-	-	-	-
18/19	30	15	8	-	-	-	30
20	10	6	10	-	-	-	-
21	2	-	3	-	-	-	-
22	2	-	3	-	-	-	-
23	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-
26	2	-	-	-	-	-	-
27	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-
31	3	2	-	3	-	-	-
32	3	-	-	-	1	-	-

TABLE IV-5

NORTHEAST CAPE SAMPLING SUMMARY

(Continued)

Site Number	Soil & Sediment Type 1	Soil & Sediment Type 2	Groundwater Type 1	Groundwater Type 2	Wipe/Scrape Type 1	Wipe/Scrape Type 2	TCDD
33	-	-	-	-	-	-	-
34	6	-	-	-	-	-	-
35	-	4	4	-	-	4	-
36	8	-	3	-	-	6	-
37	6	2	-	-	4	-	-
38	-	-	-	-	-	-	-
39	-	-	-	-	-	-	-
40	1	-	-	-	-	-	-
41	-	-	2	-	-	-	-
42	-	6	6	-	-	3	-
43	3	-	3	-	-	-	-

C. Recommended Sampling

No additional sampling is recommended.

4.4.2 Site 15: Airport Terminal Building Area

A. Site Description

This is the site of the airport control tower and terminal. The terminal building itself is approximately 20' x 60' and contains a double bay garage, one floor of office space and second story observation/control room. The facility appears to have been the center for aircraft control operations, runway maintenance and arrival/departure staging. No bulk fuel supply facilities are located on the site. The building appears to have been heated by oil. A 500-gallon day tank is located on the southeast corner of the building. The building contains several pieces of vandalized communications equipment. A power cable stretches from the main camp power house to a 9' x 6' transformer building approximately 40 feet east of the terminal building.

B. Potential Contamination

It is possible that de-icing fluids, maintenance equipment fuels, and/or miscellaneous materials from on/off loading operations could have been spilled in the area of the terminal. Dielectric fluids may have been spilled in the area of the transformer building. The transformer fluids were sampled during the preliminary reconnaissance and found to contain PCBs at a concentration at 5 ppm. A grab sample of soil taken directly in front of the transformer building door was not found to contain PCBs at a threshold level of 0.5 ppm.

C. Recommended Sampling

To determine whether any problems exist with materials potentially spilled during on/off loading operations and maintenance activities, it is recommended that three (3) monitoring wells be constructed. One of these wells will be located on the pad itself; the other two will be located to the north and east of the terminal building. Type 1 soil grab samples will be taken at any location in the pad area with evidence of spills having occurred. It is estimated that four grab samples may be required.

4.4.3 Site 16: Electrical Transmission Line

A. Site Description

Approximately 5400' of this site consists of electrical transmission line extending between the airstrip and the Housing/Operations area. The route consists of one-inch power lines suspended from 20' wooden poles at 150' intervals. No transformers or capacitors were observed along its route.

B. Potential Contamination

No contamination is anticipated due to the presence of this transmission line.

C. Recommended Sampling

No additional sampling is recommended.

4.4.4 Site 17: POL Supply Line Corridor and Pumphouse

A. Site Description

A 4" pipeline was used to carry fuel from the pumphouse on Cargo Beach to bulk storage facilities at the Housing/Operations area. It appears the line carried fuel oil and possibly gasoline. Several small oil spills were noted along its length. These were probably the result of joint leakage.

B. Potential Contamination

Local POL contamination of the soil adjacent to the pipe occurs intermittently for its entire length.

C. Recommended Sampling

The joint leakage observed in the field was minor and generally does not require sampling. However, it is recommended that the pipeline be walked along its entire length during the sampling project; if significant spills exist, spill locations will be documented and Type 1 soil grab samples taken. It is estimated that four grab samples may be required.

4.4.5 Site 18 & 19: Cargo Beach Area

A. Site Description

The Cargo Beach area was utilized for barge offloading operations. The area was also occupied by native civilian employees of the base. Leftover from the worker camp are over thirty (30) small wood frame houses. Roughly half of these buildings are in use by Island natives as housing while fishing in the area. The area is littered with a wide variety of debris generated from cargo staging operations and the intermittent inhabitation of the area. Debris includes a 6000-gallon fuel storage tank, an abandoned bulldozer, two old trucks, and approximately 1000 55-gallon POL barrels. There are numerous patches of POL stained soil in the area. These range in size from a few square feet to one acre in area. Several full one-gallon cans of dielectric fluid were found in the area. Soil grab samples obtained during the preliminary reconnaissance indicate PCB contamination may be present.

B. Potential Contamination

The Cargo Beach area may be contaminated with a variety of materials. There are numerous areas of POL contamination and possible areas of PCB contamination. It appears that the local natives may have attempted to use dielectric oil for alternative applications. These may have included use as lubricating oil in various pieces of machinery (ie, outboards, three wheelers, weapons, etc.) and/or as a fuel oil or starter fluid for camp fires. The attempted use of this material as a fuel oil or starter fluid may have resulted in incomplete combustion and creation of transformation products such as TCDD or TCDF isomers.

C. Recommended Sampling

Sampling of this area will be extensive due to local and agency concern for the potential of widespread PCB contamination. The proposed sampling effort will consist of collection of samples as follows:

- o Small diameter spill areas: obtain one Type 1 soil grab sample;
- o Larger diameter spill areas: obtain Type 2 soil grab samples using a hexagonal grid design for systematic sampling of spill area, in accordance with the guidelines of the EPA Document, Verification of PCB Spill Cleanup By Sampling and Analysis (1985).

For small diameter spills, discrete samples will be analyzed; it is estimated that approximately 30 Type 1 grab samples will be required. For large diameter spills, a composite sample obtained from the discrete grabs will be analyzed; it is estimated that a total of approximately 15 Type 2 soil grab samples will be required for these sites.

It is recommended that eight (8) monitoring wells be placed across the site. Wells will be placed down-gradient of spill areas to intercept potential groundwater contamination plumes; a minimum of one well will be placed up-gradient to establish baseline information. Type 1 groundwater samples will be collected.

Testing in these sites will also include the collection of ash samples from camp fires and heating stoves for testing for the presence of TCDD compounds. It is anticipated that approximately 30 ash samples will be collected.

4.4.6 Site 20: Cargo Beach Dump Sites

A. Site Description

This site contains the former bases' solid waste disposal areas. Various dumping sites are scattered over a sixteen (16) acre area. An estimated 6000 POL barrels are dumped here and silty backfill is generally oil stained. Trash and miscellaneous debris is exposed at fill slopes. These disposal areas served the base across 20 years of use and probably contain a wide variety of materials.

B. Potential Contamination

The contaminants present in the landfill are probably typical of small landfills, with the addition of materials generated from the power building, the auto shop and the communications facilities. Also, the use of this area for disposal of POL drums will likely result in extensive POL contamination.

C. Recommended Sampling

It is recommended that monitoring wells be placed circumferentially around each dump site. It is estimated that this will require the placement of approximately 10 monitoring wells. Type 1 groundwater samples will be collected for analysis.

Type 1 surface soil grab samples will be taken in areas showing evidence of spills. Two or more grab samples will be collected from spills in excess of 50 feet in diameter. It is estimated that 10 soil grab samples may be required. Six (6) Type 2 soil samples will also be collected.

4.4.7 Site 21: Receiver Building Site

A. Site Description

A building on this site housed radio equipment. The site has been burned and the debris pushed to the sides of the gravel pad which is bordered by tundra. The general site encompasses approximately 5 acres and the only remaining structure is an approximately 12' x 20' one story, reinforced concrete building, with 10" thick walls, roof, and an 18" thick floor slab. The general area contains approximately 2,000 55-gallon barrels. Also, there is approximately 500 cubic yards of assorted metal, wood and miscellaneous partially-buried debris on the site. The site is located 1.5 miles west of the Housing and Operations area.

B. Potential Contamination

It is possible that dielectric fluids containing PCBs were used in the electric equipment on this site. Also, numerous POL drums dumped off the edge of the pad may have contained fuel oil used to heat the building. Contamination from fuel oil spills may exist in the pad area.

C. Recommended Sampling

It is recommended that three (3) monitoring wells be placed around this site. Type 1 groundwater samples will be collected from these wells for analysis. The pad surface will be probed for spills; Type 1 soil grab samples will be taken should spills be encountered. It is estimated that two grab samples will be required.

4.4.8 Site 22: Direction Finder Site

A. Site Description

A small building containing radio equipment occupied this site. The site has been burned and the debris pushed to the sides of the gravel pad, which is bordered by tundra. The site encompasses approximately 3 acres. The only remaining structure is a 20' x 30' concrete slab. The ground in the general area is scattered with thirty-five 55-gallon barrels, metal and wood debris. Among the buried debris is a single transformer casing. The site is located approximately one-half mile west of the receiver station and 1.9 miles west of the Housing/ Operations area.

B. Potential Contamination

It is possible that dielectric fluids containing PCBs were used in the electrical equipment on this site. Also, numerous POL drums dumped off the edge of the pad may have contained fuel oil used to heat the building. Contamination from fuel oil spills may exist in the pad area.

C. Recommended Sampling

It is recommended that three (3) monitoring wells be placed around this site. Type 1 groundwater samples will be collected from these wells for analysis. The pad surface will be probed for spills; Type 1 soil grab samples will be taken should spills be encountered. It is estimated that two grab samples will be required.

4.4.9 Site 23: Antennae Area

A. Site Description

The site contains one 5000' and two 8000' single line antennae, consisting of ¼" wire supported by 60' wood poles every 140' to 160'. The 5000' antenna is located south of Receiver Building road, and the 8000' antenna is located north of the Receiver Building.

B. Potential Contamination

The site contains no materials which might be suspected as contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.10 Site 24: Antennae Area

A. Site Description

The site contains two 5000' single line antennae, consisting of ¼" wire supported by 30' x 3" steel poles spaced at 100' intervals. Both antennae are located west of the Direction Finder Building.

B. Potential Contamination

The site contains no materials which might be suspected as contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.11 Site 25: Antenna Area

A. Site Description

This site contains a single antenna, located south of Receiver Building, and consisting of six 60' wood poles with ¼" wire strung between them.

B. Potential Contamination

The site contains no materials which might be suspected as contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.12 Site 26: Electrical/Communication Lines

A. Site Description

This area consists of power and communication lines, originating at the Housing/Operations area, which extend to the former White Alice site, Lower Tram building, Receiver Building, and Direction Finder Building. Three transformers are located near the White Alice site, one of which is leaking fluid. All three are pole-mounted and the leaking fluid has been spread by wind action.

B. Potential Contamination

The transformers are suspected to be PCB contaminated.

C. Recommended Sampling

It is recommended that two (2) Type 1 surface soil grab samples be collected in the area contaminated by the leaking transformer oil.

4.4.13 Site 27: Assorted Antennae

A. Site Description

This site consist of assorted antennae, including a 14,000' antenna located northeast of the White Alice site, 3 antennae in the main antennae field north and west of the Housing/Operations area, an antenna located just southwest of Housing/Operations area, and remains of two antennae just west of the Housing/ Operations area. Materials utilized include ¼" to 1½" cabling, wood poles, and guy-lines.

B. Potential Contamination

The site contains no materials which might be suspected as contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.14 Site 28: Truss Antennae

A. Site Description

The site contains two steel truss antennae, 40' and 60' tall, respectively, with concrete footings, guy wires, and ¼" cabling. No electrical equipment is present.

B. Potential Contamination

Preliminary site investigations did not indicate the presence of contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.15 Site 29: Antennae Footings

A. Site Description

The site contains three sets of concrete antennae footings, located west of the Housing/Operations area. No additional material was observed.

B. Potential Contamination

Preliminary site investigations did not indicate the presence of contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.16 Site 30: Borrow Area

A. Site Description

The site contains two previously developed 15 acre borrow areas. One is located south of the Housing/Operations area and contains a small to moderate amount of wood and metal debris. The other is located on the east side of the road between the White Alice site and Lower Tram terminal; a small quantity of debris was observed.

B. Potential Contamination

Preliminary site investigations did not indicate the presence of contaminant sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.17 Site 31: Waste Water Treatment Plant

A. Site Description

This is the site of the waste water treatment system which served the Housing/Operations area. It appears the system involved primary sedimentation with treated effluent discharged into a local stream. Sludge disposal was via a small sludge handling impoundment adjacent to the settling tank.

B. Potential Contamination

Concern has been expressed that waste materials may have accumulated in the stream sediments and the sludge lagoon.

C. Recommended Sampling

It is recommended that two (2) Type 2 soil grab samples be obtained from the sludge lagoon, and that three (3) monitoring wells be drilled at this location. Type 2 groundwater samples will be collected. Based on the assumption that lagoon samples will be representative of materials from the settling tank, no samples will be collected from the tank.

It is recommended that three (3) Type 1 soil grab samples be collected at the effluent discharge point; one sample will be collected at the pipe, and the remaining two samples obtained downstream.

4.4.18 Site 32: Emergency Power and Operations Building

A. Site Description

This heavily reinforced concrete building housed emergency power generation and communications equipment. It is partially collapsed and void of equipment. In one corner are three large transformers.

Dielectric fluid from these transformers was sampled and was found to be Aroclor 1260, at a concentration of 590,000 ppm. A grab sample of soil taken outside of the door nearest the transformers was found to contain a trace of PCBs at a detection limit of 0.5 ppm. A 5000-gallon fuel storage "day tank" is located adjacent to this door and a large fuel spill is evident on the ground.

B. Potential Contamination

There is evidence of a fuel spill around the "day tank", adjacent to the building. A grab sample collected during the reconnaissance showed trace PCB contamination in this area.

C. Recommended Sampling

The oil spill adjacent to the day tank will be examined by taking at least two (2) Type 1 soil grab samples across the area. The perimeter of the building will be investigated for the presence of additional spills and additional Type 1 soil grab samples taken as required. It is estimated that one additional grab sample may be required.

The concrete slab in the transformer room will be examined for the presence of any indications of past oil spills. If evidence of such spills exist, Type 1 wipe/scrape samples will be taken and analyzed for the presence of PCBs.

4.4.19 Site 33: General Supply Warehouse

A. Site Description

This single story warehouse building contained miscellaneous materials required for general base operations. This included furniture, forms, toilet paper, stationary, and cleaning fluids. The building has been heavily scavenged, with most usable materials removed.

B. Potential Contamination

Materials which were noted during the inspection of this building include approximately 600 lbs. of cleaning chemicals (mostly soap) and about 30 gallons of corrosives.

C. Recommended Sampling

This material is currently scheduled for removal under the existing Corps of Engineers cleanup contract. No additional sampling is recommended.

4.4.20 Site 33: Mess Hall Warehouse Building

A. Site Description

This building provided warm and cold storage facilities to support the adjoining mess hall operations. The building is partially collapsed and has been scavenged of loose building materials. The food storage areas are essentially empty. The northern-most warm

storage area, although collapsed and scavenged, does contain approximately 4000 to 5000 pounds of miscellaneous chemicals. This included several 55-gallon storage containers which contained plastic quart bottles of sodium hypochloride, probably used as a disinfectant in cleaning the mess hall.

B. Potential Contamination

The warm storage area contains significant quantities of miscellaneous chemicals used for cleaning and disinfecting.

C. Recommended Sampling

This material is currently scheduled for removal under the existing Corps of Engineers cleanup contract. No additional testing is recommended.

4.4.21 Site 34: Mess Hall, Recreation Building, and Dorm Buildings

A. Site Description

These wood frame buildings are in various states of decay and generally cleaned out of all furniture and other materials. Each building contains a storage room and/or janitorial room. Some of these areas contained quart plastic bottles of unmarked chemicals, possibly cleaning fluids.

B. Potential Contamination

Storage areas contain small numbers of unmarked containers.

C. Recommended Sampling

This area will be walked and probed for spills. Type 1 soil grab samples will be taken at any spill sites observed. It is estimated that six grab samples will be required across this area.

4.4.22 Site 35: Paint and Dope Building

A. Site Description

This building was used for storage of paint, solvents and other miscellaneous flammable liquids. Approximately 150 gallons of liquids are contained within the building. The containers are in poor condition and labels illegible. Several one-gallon cans of dielectric oil are stored in the building.

B. Potential Contamination

The concrete slab on which the building is constructed is covered with paints, solvents and other liquids. It appears that vandals had intentionally opened and spilled many of the cans. Among the empty cans are empty, full, and partially full cans of dielectric fluid. It is possible, therefore, that the slab may be

contaminated with PCBs, as well as paint and solvent materials. A single grab sample of soil taken in front of the building during the preliminary reconnaissance was found to be contaminated with trace concentrations of PCBs, below the 0.5 ppm detection limits.

C. Recommended Sampling

Spill areas around this building will be sampled by collection of Type 2 soil grab samples. It is estimated that four (4) soil grab samples may be required. With the potential for a wide variety of paint and solvent-type materials having been spilled in this area, it is further recommended that four monitoring wells be placed around the site. Type 1 groundwater samples will be collected from each.

Within the building, Type 2 wipe and scrape samples will be taken from the building slab. It is estimated that two (2) wipe/scrape samples may be required.

4.4.23 Site 36: Power and Heat Building

A. Site Description

This building housed the base's central heating and power generating facilities. It is a two story wood frame building with steel web ceiling joists, a 24 inch concrete sill foundation and 10 inch slab floor. A wing houses four (4) Cummins diesel generators, overhead ducts and blowers. An approximately 30' x 50' room contains two Ray oil burners and boilers set on 4' x 10' x 5' brick bases, a Cleaver Brooks skid mounted standby boiler, and a 500-gallon pressure tank. Burner stacks extend about 15 feet above the roof. The main water supply pumphouse room contains a 24 foot diameter, 20 foot high water storage tank. The building contains miscellaneous valving, piping, small water tanks, pressure tanks and switching banks. Friable asbestos was used to insulate the diesel generator exhaust pipes, pressure tank and boilers. The building houses three banks of three large transformers, all suspected or confirmed to contain PCB contaminated dielectric fluids. An oil spill site is present near the southwest transformer bank. The southwest transformer bank is housed in a partially-collapsed wood frame addition to the building.

B. Potential Contamination

The transformers sampled during the preliminary reconnaissance were found to contain PCBs at levels exceeding 600,000 ppm. Oil spills around the transformers are also possibly PCB contaminated. These spills are evident on concrete slabs within the building, as well as on soil outside. A single grab sample of soil taken from a spill area tested positive for PCB contamination at 0.8 ppm. The area in and around the building may also have been the scene for spills of fuel, lubricants, anti-freeze, and other materials commonly found around generator and boiler operations.

C. Recommended Sampling

Type 1 soil grab samples will be taken from the various oil spills around this building. It is estimated that this will amount to approximately 8 grab samples. This building contains several concrete slabs which appear to have been contaminated by transformer oil. These areas will be sampled by collection of Type 1 wipe/scrape samples. It is estimated that six (6) wipe/scrape samples may be required. Three (3) monitoring wells will be installed, with collection of Type 1 groundwater samples.

4.4.24 Site 37: Auto Storage Building & Auto Maintenance Building

A. Site Description

These wood frame buildings were used for vehicle storage and maintenance. Adjacent to one building is a gas pump and an empty 150-gallon tank marked "anti-freeze". The buildings are in poor condition and the concrete slab floors are oil stained. No significant quantities of POL materials were observed.

B. Potential Contamination

The concrete slabs and soils at the garage bays may be contaminated with various POL materials, as well as other chemicals associated with auto shop operations, such as anti-freeze, degreasers, and solvents.

C. Recommended Sampling

Type 1 surface soil grab samples will be collected in the spill areas around these buildings. It is estimated that six grab samples will be required.

Any drains or sumps located in the building or garage areas will be grab sampled as Type 2 soil samples, as appropriate. If any spills are evident on the garage floor slabs, they will be wipe or scrape sampled and tested as Type 1 samples for the presence of PCBs. It is estimated that two additional Type 2 grab samples and four Type 1 wipe/scrape samples will be required.

4.4.25 Site 38: Aircraft Control and Warning (AC&W) Building

A. Site Description

From general appearances, this building appears to have been an Administrative/Support building for the AC&W Squadron. The building is a transite-sided wood frame structure, with approximately 60% of the roof collapsed. A concrete block vault measuring 8' x 8' x 10' is located at the southeast corner of the building.

B. Potential Contamination

Preliminary site investigations did not indicate the presence of contamination sources.

C. Recommended Sampling

No additional sampling is recommended.

4.4.26 Site 39: Gymnasium

A. Site Description

The site contains a steel truss gymnasium, with aluminum siding and roof. This building contained a basketball court, two-lane bowling alley, and locker room area. Material has been extensively salvaged from the building; approximately 70% of the roofing is missing.

B. Potential Contamination

Based on historical usage of this area, no contaminant sources are anticipated.

C. Recommended Sampling

Additional sampling is not recommended.

4.4.27 Site 40: Water Supply Building

A. Site Description

This wood frame building contains four (4) welded steel tanks, measuring 20 feet in diameter by 26 feet in height. The building also contains approximately 150 gallons of asbestos cement, 150 gallons of fire brick paint, and 1500 pounds of miscellaneous galvanized pipe.

B. Potential Contamination

It appears that this building was used for storage of some materials. This may have resulted in contamination of the sand floor via occasional spills.

C. Recommended Sampling

A Type 1 soil grab sample of the oiled sand base material will be taken for analysis.

4.4.28 Site 41: Water Supply Wells

A. Site Description

Four steel-cased 6-inch water wells exist on the project site. All three are mechanically sealed with well seals or pump heads. Well #1 is located within a small addition to the water supply building. Due to the dilapidated condition of the building, it was impossible to inspect this well during the preliminary reconnaissance. Well #2 is contained in Building 114, a transite sided, wood frame building set on a concrete slab on grade. It contains a 15 HP Fairbanks-Morse pump and a standby diesel motor pump drive. Well #3 is an abandoned 6-inch well, with a 10-inch surface casing still in place and extending about 2.5 feet above grade. It is located about 20 feet north of the water storage tank house. Well #4 is a 6-inch well located about 500 feet southeast of the water storage tanks. It is covered by a 10 x 14 foot wood building, with a concrete slab on-grade.

B. Potential Contamination

Limited historical information indicates that well depths may range from 40 to 60 feet. These wells can be used to obtain water samples from existing groundwater sources, as an indication of potential migration of materials beyond the near-surface zone.

C. Recommended Sampling

The existing wells will be opened, if possible, purged, and Type 1 groundwater samples collected. It is anticipated that up to two wells may be made accessible for sampling. To ensure that a representative sample is obtained, a minimum of three (3) casing volumes will be cleared prior to sample collected.

4.4.29 Site 42: Fuel Storage Tanks and Spill Area

A. Site Description

This site consists of three (3) welded-steel fuel storage tanks, measuring 50 feet in diameter and 24 feet high, and includes miscellaneous piping and valving. The tanks are built on concrete ring foundations. About 200 feet to the south, diesel and gas day tanks are wedged on grade with gravel fill. All tanks were found to be empty. The three fuel storage tanks appear to have been cleaned, as open hatches exposed dry, rusted tank interiors, with no evident oil residue present.

The area to the north of the three bulk fuel storage tanks is the location of an oil spill. Local natives who worked at the base indicate that several thousand gallons were spilled. The spill occurred in the winter and most of the oil was intentionally burned off. Several acres, however, are oil stained and natural tundra growth appears to have been affected; however, re-growth has occurred over most of the site. Approximately twenty empty POL drums are scattered across the site.

B. Potential Contamination

In the oil spill area, discrete soil grab samples obtained during the preliminary reconnaissance indicated concentrations of fuel hydrocarbons, in the diesel range, of 10,000 ppm in sediments adjacent to the spill area. This contamination was also found in sediment grab samples of local drainage which flow from the tanks to a confluence with a stream flowing down from the Tram site. Grab samples taken below this confluence showed no fuel hydrocarbon contamination in the diesel range at a threshold level of 100 ppm. Additional contamination of this area may have occurred when the fuel oil spill contacted residuals remaining from 55-gallon drums dumped in the area.

In the fuel tanks, concern exists that the tanks may yet contain residuals from POL materials. In addition, a soil grab sample obtained during the reconnaissance near the tanks yielded a PCB concentration of 1 ppm. The potential exists for PCB contamination of the immediate spill area.

C. Recommended Sampling

It is recommended that six (6) monitoring wells be placed around the perimeter of the oil spill area. Type 1 groundwater samples will be collected for use in determining if contaminants have reached the local groundwater regime. A minimum of six (6) Type 2 surface soil grab samples will be collected in the spill and the downstream drainage area.

The fuel storage tanks will be assessed by collection of Type 2 wipe/scrape samples. It is anticipated that three (3) samples will be collected.

4.4.30 Site 43: Morrison-Knudsen Work Camp Site

A. Site Description

A gravel pad located immediately east of the Housing/Operations area was the site of the work camp used by Morrison Knudsen during the original construction of the base. The site has been abandoned and graded flat. All that remains of the camp is a 10' x 14' wooden well house built on a concrete slab. The building contains one of the four abandoned 6-inch water wells found on the base.

B. Potential Contamination

It is possible that POL materials used in the maintenance of construction equipment could have been spilled at the site, as well as other miscellaneous materials utilized in the operation of a construction camp.

C. Recommended Sampling

It is recommended that three (3) monitoring wells be placed at the pad area, and that Type 1 groundwater samples be collected. The area will be probed for evidence of spills, and Type 1 soil grab samples collected at any observed spill areas. It is estimated that three (3) grab samples may be required.

5.0 Sampling Methodology

5.1 Collection Methods

All sample collection, preservation, packaging, shipment and QA/QC protocols will conform to the procedures outlined in Appendix C and Characterization of Hazardous Waste Sites--A Methods Manual--Volume II--Available Sampling Methods (USEPA, 1983). A representative of the analytical laboratory will be present during on-site sampling to provide technical assistance and support for the project.

5.1.1 Soils and Sediments

Based on the variation in soils and sediments (i.e., hardness, compactness, moisture content, temperature, depth and level of contamination suspected), a variety of sample collection methods may be used. In all cases, stainless steel or Teflon-coated sampling tools will be used because they present a relatively non-reactive surface to any of the contaminants targeted for analysis. Containers and packaging of samples will be in accordance with Appendix C.

A variety of small hand tools (i.e., trowels and lab spoons or spatulas) can be used for collecting samples in most types of soils and sediments encountered in the near surface zone (0"-4"). At each sample location, the organic cover will be removed using the trowel, and the sample will be collected using a lab spoon or spatula, in accordance with EPA Sampling Method II-1.

A power auger will be used, if necessary, to collect samples in frozen or extremely compacted soils or if a deep subsurface sample is desired. This system, based upon EPA Sampling Method II-2, will consist of a hollow-stem or continuous-flight auger mounted on a trailer or tracked vehicle, and powered by a gasoline or diesel engine. In addition, this system will include a split-spoon or ring sampler. Ring samplers come with brass sample rings which can be inserted into the barrel of the sampler and used to collect the sample.

With the hollow-stem or flight auger attached, a borehole will be drilled to the desired sampling depth. If the hollow-stem auger is used, the ring or split-spoon sampler can be lowered to the bottom of the borehole through the center of the auger. If the smaller-diameter continuous flight auger is used, the auger must be removed before the sampler can be lowered to the bottom of the borehole. Normally, the weight of the drilling rig will be sufficient to drive the sampler to the desired depth. If the soil or sediment is extremely compacted or frozen, a hammer attachment will be used. The sampler is withdrawn and the sample removed from the sampler.

This system's major advantages are its ability to drive through most material except bedrock and its ability to collect very deep subsurface soil samples. Major disadvantages are reduced mobility and higher cost of operation.

5.1.2 Groundwater

Groundwater monitoring wells will be constructed using 1-¼ inch diameter thin-walled, threaded polyvinylchloride (PVC) pipe casings. Machine slotted, 0.02 inch well bottoming screens will be placed approximately 2.5 feet into frozen material and 2.5 feet into thawed material. Solid PVC pipe will extend beyond this point to ground surface; no thread dressings, glues, solvents, or jointing compounds will be used. Following sample collection, all wells will be capped, location mapped, and each well covered with a thin soil layer to protect it for potential future monitoring.

Groundwater samples will be collected using a stainless steel or Teflon coated hand bailer (EPA Sampling Method III-9), or by use of a peristaltic pump (EPA Sampling Method III-7). The wells will generally be 15 feet or less in depth and have casings less than two (2) inches in diameter. As a result, the use of a bailer or peristaltic pump system provides the most cost-effective method of sampling. In addition, this method has the least impact on the groundwater samples because it does not aerate the sample like mechanical pump systems.

Prior to sample collection, water will be cleared from these wells until water from the aquifer has replaced standing water in the casing. Clearing will be accomplished by hand bailing or peristaltic pumping. Based upon previous experience in obtaining groundwater samples in Gambell, free groundwater may be limited at some sites. A minimum of two (2) bailer volumes must be cleared prior to sampling in order to be considered a valid sample; if a peristaltic pump is utilized, an equivalent volume will be required prior to collection of a sample. At this point, the water sample will be collected and transferred to the appropriate sample containers. Sample containers will be made of non-reactive material (glass or polyethylene) and appropriate for the type of sample collected. Water cleared from the wells will be disposed of by diversion to a hand-dug sump, where it will be allowed to percolate into the soils of the site.

5.1.3 Wipe/Scrape Samples

Scrape-type samples will be collected where an oily crust of significant thickness has developed, such as at concrete pads or transformer bank foundations. In addition, ash samples from camp fires, oil heating units, and flues will be collected as scrape samples, if possible. Scrape sampling will require the use of a stainless steel or Teflon scraper to collect these accumulated residuals for analysis. Requirements for collection of representative volumes and background samples will be closely coordinated with the laboratory.

Wipe samples will be collected from suspected contaminated surfaces where little or no scrapable crust is present, such as concrete slabs, floors, tanks or flues. Wipe samples will be collected using gauze or fiberglass filter material impregnated with a suitable solvent, as recommended by the laboratory for analytical target materials. Specific laboratory requirements for obtaining representative samples, prevention of cross-contamination, and blanks for solvents and wipe filters will be documented prior to field implementation.

5.2 Quality Assurance and Control

Quality assurance and control (QA/QC) samples will be collected in accordance with the provisions of Appendix C. A detailed QA/QC program will be prepared as a portion of the field sampling program implementing this plan. The specific QA/QC samples required for each site will be indicated prior to implementation of the sampling plan, based upon a random assignment of duplicate and split sample locations. For this level of the project, QA/QC requirements will be discussed in general terms for field QA/QC, laboratory QA/QC, and chain of custody controls.

5.2.1 Field QA/QC

Field QA/QC is limited to those quality control procedures for sampling acquisition. These procedures are:

- Ensure samples collected are representative of the natural system;
- Collect field duplicate samples totalling at least 10% of the total samples collected;
- Placement of samples in containers previously cleaned according to EPA approved methods (for this project, only new containers will be used);
- Properly preserve samples as prescribed by EPA methods;
- Properly label all samples at time of collection according to EPA approved methods; and
- Properly clean/decontaminate all sampling equipment after each sample is collected.

5.2.2 Laboratory QA/QC

The QA/QC procedures to be used in the laboratory are:

- Initial multipoint and daily single point checks for analytical methods;
- Daily multipoint check for metal analyses;
- Surrogate standard spiked samples to monitor percent recovery for analytical methods;
- Daily reagent blanks for all methods;
- Duplicate analysis of 10% of samples; and
- Daily sample control checks.

5.2.3 Chain of Custody

To ensure validity and identity of all samples received at the laboratory, a system of custody verification will be implemented. This system includes:

- Master sample log book with sequential alpha-numeric identification, date, time, sample type, and person taking sample;
- Chain-of-custody forms to be filled out for each sample collected; and
- Conformance with EPA's Enforcement Considerations For Evaluation Of Uncontrolled Hazardous Waste Disposal Sites (1973).

Appendix A

Laboratory Test Results

IT CORPORATION

IT ANALYTICAL SERVICES

17605 Fabrica Way • Cerritos, California 90701 • 213 921 9831 / 714-523 9200

CERTIFICATE OF ANALYSIS

Prepared For: URS Engineers
825 W. 8th Ave.
Anchorage, AK 99501

Attn: Rich McManis

Date: July 17, 1985

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JUL 22 1985
URS ENGINEERS - ANCH.

Date Received: July 15, 1985 | P.O. Number: PJ4988 | Job Number: 33702/rjc

Four (4) bulk samples.

The samples were analyzed for fibrous asbestos by polarized light microscopy with dispersion staining using EPA procedure 600/M4-82-020. The results are as follows.

Sample	Asbestos Found	% Asbestos Found
#1	Chrysotile	21
#2	Chrysotile	14
	Amosite	18
#3	Chrysotile	<1
#4	Chrysotile	20
	Amosite	16

I certify that this report fully represents the findings of work performed by me or under my direct supervision

Mary Hammons
Mary Hammons
Chemist

Reviewed and Approved

Steve Jones, Ph.D.
Technical Director

July 31, 1985

RECEIVED

AUG 07 1985

URS ENGINEERS - ANCH.

URS Corporation
825 W. 8th Avenue
Anchorage, Alaska 99501

ATTN: Rich McManis

Following are the results of our analysis for the presence of fuel hydrocarbons in the diesel range in six samples received on July 16, 1985.

The samples were extracted with acetone. A portion of the extracts were partitioned with distilled hexane. Final detection was by gas chromatography using a flame ionization detector and a 10m SPB-1/WCOT column. The detection limits for samples 30265-68 are higher than normal due to the presence of unidentified components with characteristics of hydrocarbons with higher boiling points than "diesel" in the sample extracts.

nd = none detected

Lab. #	Sample Identification	Results Parts per Million (dry soil basis) Diesel Range
	Proj. # 4988 Proj. Name: D.E.R.P.	
30263	RS #1, N.E. Cape oil tanks	10,000.
30264	RS #2a,N.E. Cape tank str. mouth	2,200.
30265	RS #2b, N.E. Cape down stream junky	nd *
30266	RS #3, N.E. Cape down stream A.P. Bridge	nd
30267	RS #4, N.E. Cape down stream main pump	nd *
30268	RS #5, N.E. Cape CB	nd *
Detection Limits		10. 100.*

Patricia L. Murphy

PLM/jd

July 26, 1985

RECEIVED
JUL 29 1985
URS ENGINEERS - ANCH.

URS Corporation
825 W. 8th Avenue
Anchorage, Alaska 99501

ATTN: Rich McManis

Following is the result of our analysis for polychlorinated biphenyl mixtures in one sample of water received on July 16, 1985.

For the analysis of polychlorinated biphenyl mixtures, the water sample was extracted by repeated partitioning with dichloromethane. The extract was evaporated, re-diluted with 5% ethyl ether in hexane and cleaned-up using sulfuric acid and Florisil. Final detection was by gas chromatography using an electron capture detector.

Any of the following mixtures of polychlorinated biphenyls would have been detected had they been present at or above its limit of detection: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262 and 1268.

Lab Number	Sample Identification	Result: Polychlorinated Biphenyls Aroclor Mixtures	Result: Polychlorinated Biphenyls Micrograms per liter
30262	Gambell #E, Watering Point PHS, pump house 7/5/85, 9:30 am	None	nd
Detection Limit			0.1

Craig Unverferth

CU/jd

July 26, 1986

RECEIVED
JUL 29 1985
URS ENGINEERS - ANCH.

URS Corporation
825 W. 8th Avenue
Anchorage, Alaska 99501

ATTN: Rich McManis

RESULTS OF ANALYSES FOR
POLYCHLORINATED BIPHENYL MIXTURES IN OIL SAMPLES

METHOD OF ANALYSIS. A portion of each sample was diluted with 5% ethyl ether/ iso-octane and treated with acid and Florisil. The resulting extract was examined using an electron capture detector.

Any of the following mixtures of polychlorinated biphenyls would have been detected had they been present at or above the limit of detection.

AROCLORS: 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262 and 1268.

trace = less than the detection limit
nd = none detected

Lab Number	Sample Identification	Date Received	RESULTS POLYCHLORINATED BIPHENYLS Aroclor Mixtures Detected	Parts per Million
30257	N.E. Cape #1, Transformer oil sample airport terminal building	7/16/85	1260	5.0
30258	N.E. Cape #9, Building #98	7/16/85	1260	590,000.
30259	N.E. Cape #10, Bldg. #110, North	7/16/85	1260	620,000.
30260	N.E. Cape #11, Bldg. 110, West	7/16/85	1260	630,000.
30261	N.E. Cape #12, Bldg. #110, South	7/16/85	1260	730,000.

Craig Unverferth

CU/jd

July 26, 1985

RECEIVED

JUL 29 1985

URS ENGINEERS - ANCH.

URS Corporation
825 W. 8th Avenue
Anchorage, Alaska 99501

ATTN: Rich McManis

Following are the results of our analysis for polychlorinated biphenyl mixtures in nineteen samples of soil received on July 16, 1985.

The method of analysis involved extracting the samples with acetone and partitioning an aliquot of the acetone with 5% ethyl ether in hexane. Portions of the resulting extracts were cleaned-up with acid and Florisil. Final detection was by gas chromatography using an electron capture detector.

Any of the following mixtures of polychlorinated biphenyls would have been detected had they been present at or above its limit of detection: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262 and 1268.

nd = none detected

Lab Number	Sample Identification	Results: Polychlorinated Biphenyls — Aroclor Mixtures	Results: Polychlorinated Biphenyls — Parts per Million (samples as received)
30238	Gambel #1, RWM1SW 7/4/85	None	nd
30239	Gambel #2, RWM1SW 7/4/85	None	nd
30240	Gambel #3, HE1RWM Site B4, 7/5/85	None	nd
30241	Gambel #4, HE1RWM Site B11, 7/5/85	None	nd
30242	N.E. Cape #2, Bld. 6 Airport Terminal	None	nd
30243	N.E. Cape #3 North of Tank 2 oil spill	1254	3.7

trace = less than the detection limit
nd = none detected

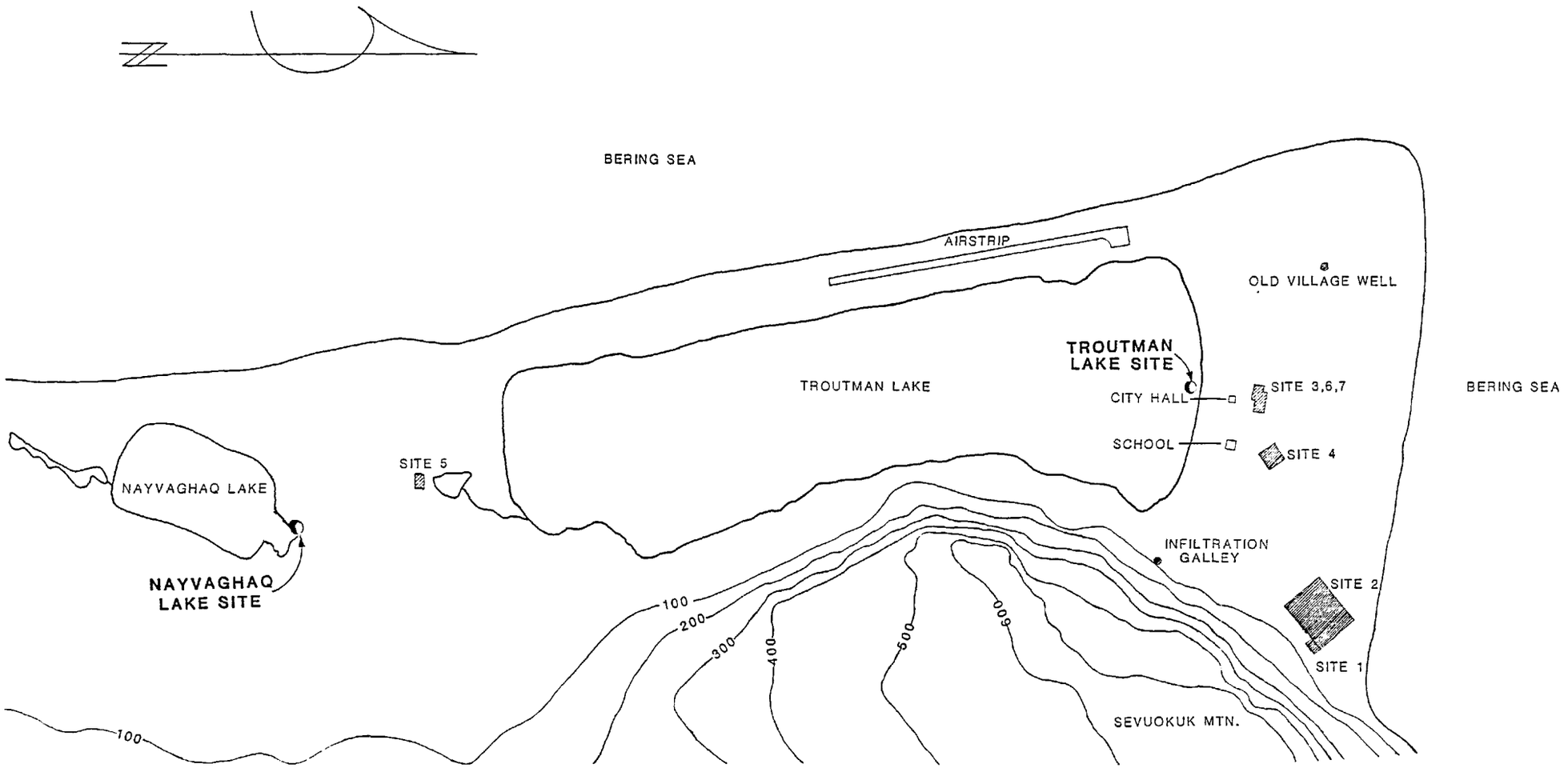
Lab Number	Sample Identification	Results: Polychlorinated Biphenyls — Aroclor Mixtures	Results: Polychlorinated Biphenyls — Parts per Million (samples as received)
30244	N.E. Cape #4 Oil Spill South East of Bldg. 110	None	nd
30245	N.E. Cape #5, Oil Spill South West of Bldg 110	1260	0.8
30246	N.E. Cape #6, Spill to East of Bldg 112	1260	trace
30247	N.E. Cape #7, North of Bldg 112 by empty Dielectric oil can	1254	trace
30248	N.E. Cape #8, taken @ Bldg 98 by 1000 gal. tank	1260	trace
30249	N.E. Cape #13, Betch Cargo between C-27 + C-23	1260	1.1
30250	N.E. Cape #14, Cargo Batch South side of Bldg C-24	1260	1.6
30251	N.E. Cape #15, West side road @ cargo Betch solid waste pump N. of pond & hill	None	nd
30252	N.E. Cape #16, E. side road @ Cargo Betch, solid waste dump, N. side of pond & hill	1260	trace
30253	N.E. Cape #17, North side of Bldg C-40, Cargo Betch	None	nd
30254	N.E. Cape #18, Downstream of M.H. North of power house	1260	0.6

trace = less than the detection limit
nd = none detected

Lab Number	Sample Identification	Results: Polychlorinated Biphenyls — Aroclor Mixtures	Results: Polychlorinated Biphenyls — Parts per Million (samples as received)
30255	N.E. Cape #19, PCB soil sample under transformer, between main camp & lower TRAM	None	nd
30256	N.E. Cape #20, PCB soil sample of transformer building lower Tram	None	nd
30263	RS #1, N.E. Cape Oil tanks	1254/1260	1.0
30264	RS #2a, N.E. Cape Tank Str. mouth	None	nd
30265	RS #2b, N.E. Cape Down Str. Junk -y	None	nd
30266	RS #3, N.E. Cape Down Str. A.P. Bridge	None	nd
30267	RS #4, N.E. Cape Down Stream Main Dump	None	nd
30268	RS #5, N.E. Cape, CB	None	nd
Detection Limit			0.5

Craig Unverferth

CU/jd



GAMBELL, ALASKA

FIGURE 2

SAMPLING PROGRAM SITE PLAN

Base map provided by U.S.Corps of Engineers

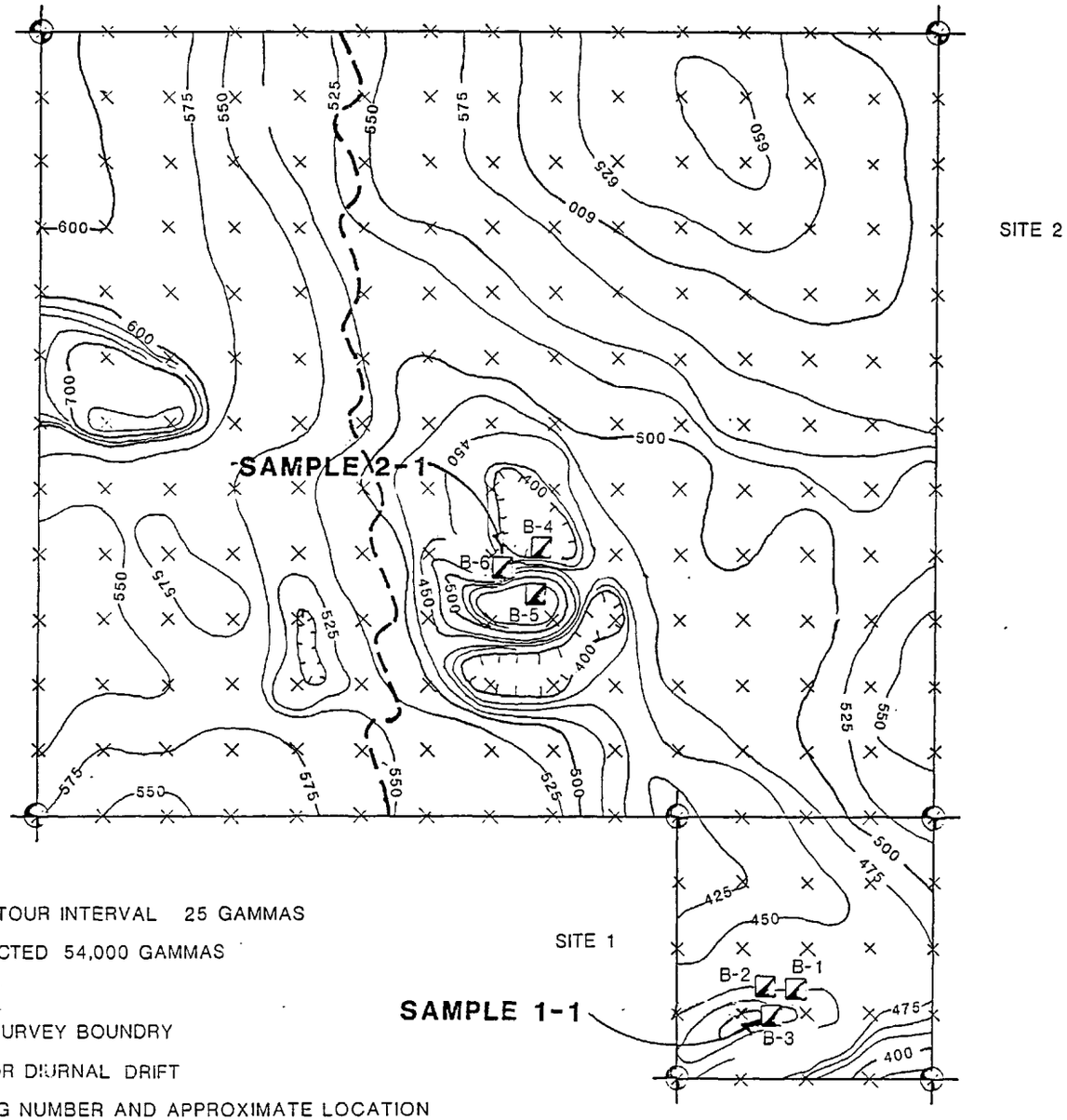
Prepared For URS Corporation By:

RZA, INC.
Geotechnical Consultants
3105 A Lakeshore Drive, Suite 103
Anchorage, Alaska 99503

Date AUGUST 1985

Scale N/A

POTENTIAL AMMO DUMP,
NOT DRILLING
IN THIS AREA .



MAGNETIC CONTOUR INTERVAL 25 GAMMAS

DATUM SUBTRACTED 54,000 GAMMAS

X DATA POINT

MAGNETIC SURVEY BOUNDRY

CORRECTED FOR DIURNAL DRIFT

B2-3 BORING NUMBER AND APPROXIMATE LOCATION

GAMBELL, ALASKA

FIGURE 3

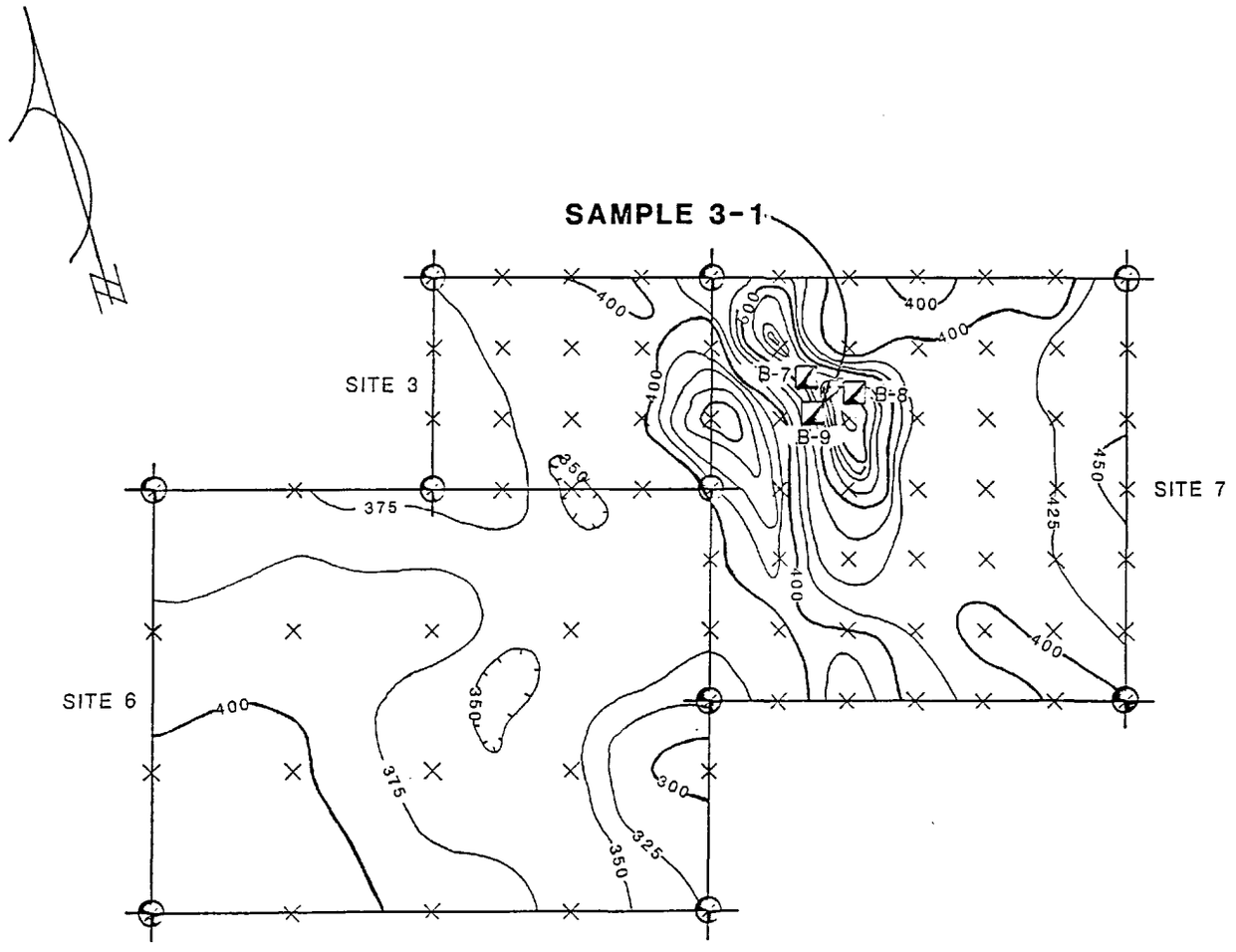
SITE 1&2 SAMPLING LOCATIONS

Prepared For URS Corporation By: *RZA, INC. Geotechnical Consultants*

3105 A Lakeshore Drive, Suite 103 Anchorage, Alaska 99503

Date JULY 1985

Scale 1" - 100'



MAGNETIC CONTOUR INTERVAL 25 GAMMAS

DATUM SUBTRACTED 54,000 GAMMAS

× DATA POINT

MAGNETIC SURVEY BOUNDRY

CORRECTED FOR DIURNAL DRIFT

B-3 BORING NUMBER AND APPROXIMATE LOCATION

GAMBELL, ALASKA

FIGURE 4

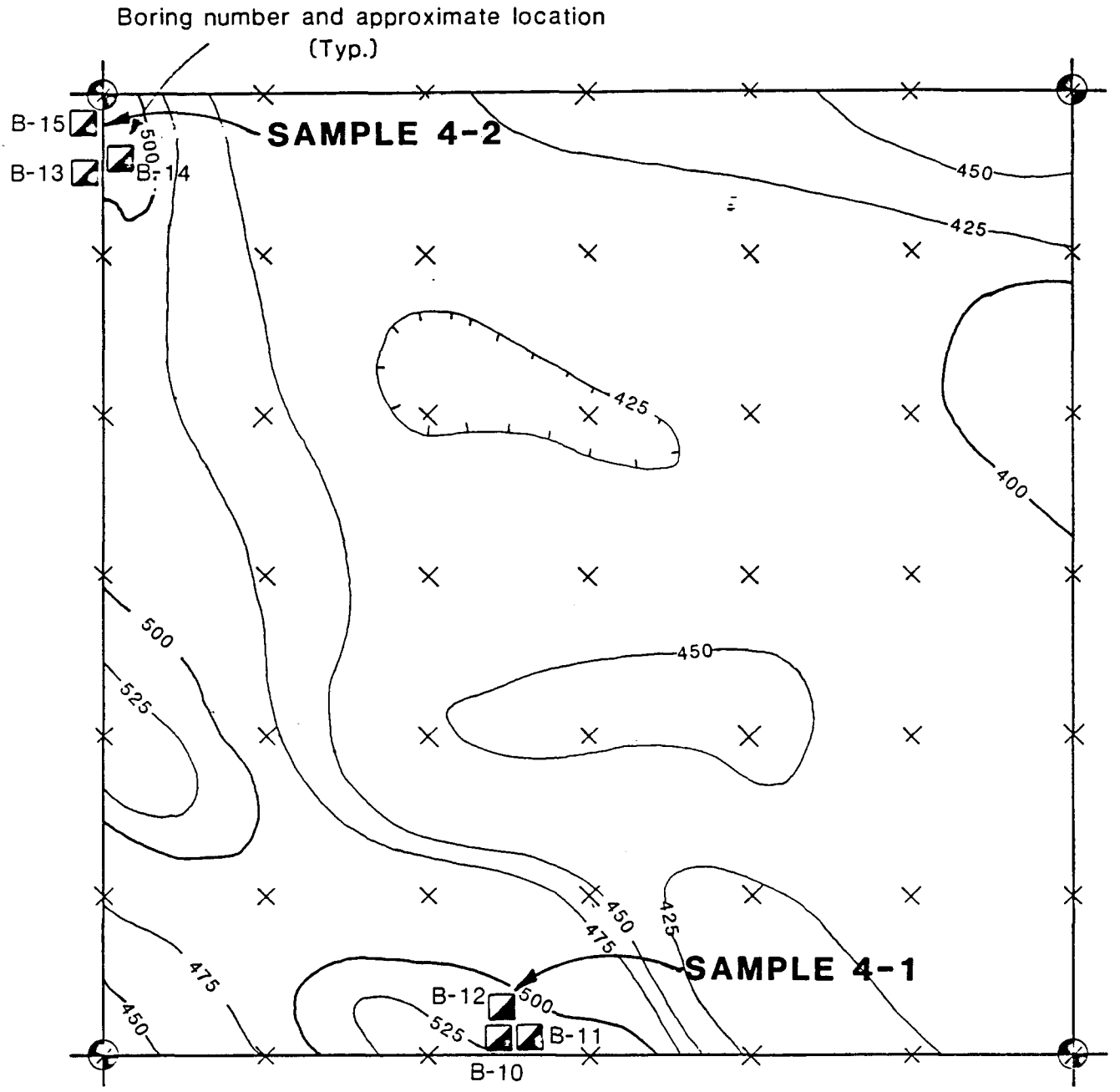
SITE 3 SAMPLING LOCATION

Prepared For URS Corporation By: *RZA, INC.* *Geotechnical Consultants*

3105 A Lakeshore Drive, Suite 103 Anchorage, Alaska 99503

Date JULY 1985

Scale 1" - 50



MAGNETIC CONTOUR INTERVAL 25 GAMMAS

DATUM SUBTRACTED 54,000 GAMMAS

× DATA POINT

MAGNETIC SURVEY BOUNDRY

CORRECTED FOR DIURNAL DRIFT

GAMBELL, ALASKA

FIGURE 5
SITE 4 SAMPLING LOCATION

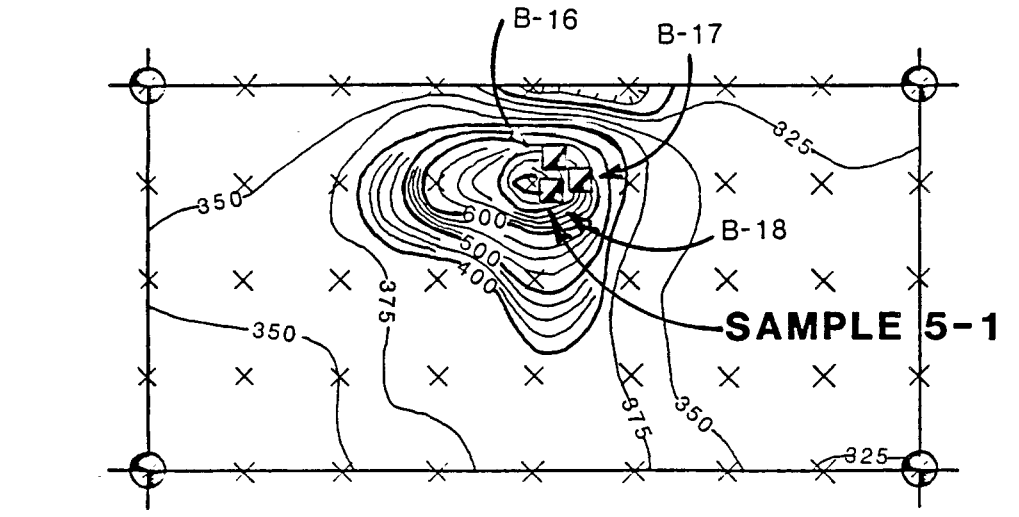
Prepared For URS Corporation By:

RZA, INC.
Geotechnical Consultants
3105 A Lakeshore Drive,
Suite 103
Anchorage, Alaska 99503

Date JULY 1985

Scale 1" - 50'

B-16 : 31/2 SOLID FLIGHT TO 30.0'
B-17 : 6" HOLLOW STEM FOR SOIL
B-18 : 6" HOLLOW STEM FOR OBSERVATION WELL



MAGNETIC CONTOUR INTERVAL 25 GAMMAS

DATUM SUBTRACTED 54,000 GAMMAS

× DATA POINT

MAGNETIC SURVEY BOUNDRY

CORRECTED FOR DIURNAL DRIFT

D.E.R.P. GAMBELL, ALASKA

FIGURE 6
SITE 5 SAMPLING LOCATION

Prepared For URS Corporation By: *RZA, INC. Geotechnical Consultants*

3105 A Lakeshore Drive, Suite 103 Anchorage, Alaska 99503

Date JULY 1985

Scale 1" - 50'

TABLE (1): PHYSICAL CHARACTERISTICS

CHARACTERISTIC	MAXIMUM POTABLE CONC.	SITE 1: SAMPLE 1-1	SITE 2: SAMPLE 2-1	SITE 3: SAMPLE 3-1	SITE 4: SAMPLE 4-1	SITE 4: SAMPLE 4-2	SITE 5: SAMPLE 5-1	NAYVAGHAQ LAKE	TROUTMAN LAKE	OLD VILLAGE WELL	INFILT. GALLERY
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
TOTAL DISSOLVED SOLIDS (TDS)	500	143	175	960	100	210	70	176	675	670	48
ODOR	#3 ODOR THRESHOLD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
COLOR	15 UNITS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: This characteristic not detected during field investigations.

TABLE (2): BIOLOGICAL CHARACTERISTICS

CHARACTERISTIC	MAXIMUM POTABLE CONC.	SITE 1: SAMPLE 1-1	SITE 2: SAMPLE 2-1	SITE 3: SAMPLE 3-1	SITE 4: SAMPLE 4-1	SITE 4: SAMPLE 4-2	SITE 5: SAMPLE 5-1	NAYVAGHAQ LAKE	TROUTMAN LAKE	OLD VILLAGE WELL	INFILT. GALLERY
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
AMMONIA - N	NA	0.82	0.05	QNS	0.18	1.0	0.77	<0.05	0.05	QNS	QNS
NITRATE - N	10	2.0	<1.0	0.21	<0.10	<1.0	<1.0	<1.0	<1.0	1.4	1.2
PHOSPHOROUS (ORTHO-P)	NA	<0.01	0.16	0.063	0.063	0.08	0.01	0.01	<0.01	0.016	0.01
PHOSPHOROUS (TOTAL - P)	NA	1.2	0.65	2.6	5.8	3.1	3.4	<0.05	0.1	0.9	<0.05
FECAL COLIFORM	1 COLONY PER 0.1 L			0	0						

NA: Not applicable; no criteria established for potable water supplies.
QNS: Quantity not sufficient to perform testing.

NOTE: Concentrations detected in samples are displayed to right of column; for example, 0.16 mg/l. Concentrations displayed to left of column are below detection limits of equipment used; for example, <0.01 mg/l, is limit of detection.

TABLE (3): WATER QUALITY PARAMETERS

CHARACTERISTIC	MAXIMUM POTABLE CONC.	SITE 1: SAMPLE 1-1	SITE 2: SAMPLE 2-1	SITE 3: SAMPLE 3-1	SITE 4: SAMPLE 4-1	SITE 4: SAMPLE 4-2	SITE 5: SAMPLE 5-1	NAYVAGHAQ LAKE	TROUTMAN LAKE	OLD VILLAGE WELL	INFILT. GALLERY
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
pH, UNITS	6.5 TO 8.5 UNITS	5.5	6.3	7.2	7.4	7.2	6.3	6.4	6.8	6.7	6.6
CONDUCTIVITY (umhos/cm)	NA	190	280	1600	160	340	110	300	1100	1000	80
ALKALINITY (as CaCO3)	NA	6.0	13	195	36	110	18	10	12	18	12
HARDNESS (as CaCO3)	NA	142	59	409	204	208	260	43	90	159	18
CHEMICAL OXYGEN DEMAND (COD)	NA	1750	25	215	175	1570	2660	30	23	36	38

NA: Not applicable; no criteria established for potable water supplies.
QNS: Quantity not sufficient to perform testing.

NOTE: Concentrations detected in samples are displayed to right of column; for example, 0.16 mg/l. Concentrations displayed to left of column are below detection limits of equipment used; for example, <0.01 mg/l, is limit of detection.

TABLE (4): INORGANIC MATERIALS

CHARACTERISTIC	MAXIMUM POTABLE CONC.	SITE 1: SAMPLE 1-1	SITE 2: SAMPLE 2-1	SITE 3: SAMPLE 3-1	SITE 4: SAMPLE 4-1	SITE 4: SAMPLE 4-2	SITE 5: SAMPLE 5-1	NAYVAGHAQ LAKE	TAQUIMAN LAKE	OLD VILLAGE WELL	INFILT. GALLERY
* PRIMARY WATER CRITERIA *	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
ARSENIC (As)	0.05	0.19	<0.05	0.09	0.15	0.11	0.21	<0.05	<0.05	<0.05	<0.05
BARIUM (Ba)	1.0	0.51	<0.05	0.14	0.43	0.42	1.3	<0.05	<0.05	<0.05	<0.05
CADMIUM (Cd)	0.01	0.011	<0.01	<0.01	<0.01	<0.01	0.025	<0.01	<0.01	<0.01	<0.01
CHROMIUM (Cr)	0.05	0.08	<0.05	<0.05	0.14	0.1	0.29	<0.05	<0.05	<0.05	<0.05
LEAD (Pb)	0.05	<0.05	<0.05	<0.05	<0.05	0.11	5.9	<0.05	<0.05	<0.05	<0.05
MERCURY (Hg)	0.002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SELENIUM (Se)	0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SILVER (Ag)	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
* SECONDARY WATER CRITERIA*	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
CHLORIDE (Cl)	250	58	88	520	28	54	22	103	400	390	14
COPPER (Cu)	1.0	0.13	<0.05	0.07	0.13	0.2	6.6	<0.05	<0.05	<0.05	<0.05
IRON (Fe)	0.3	46	5.9	32	81	42	72	0.18	<0.05	4.0	0.08
MANGANESE (Mn)	0.05	29	0.07	1.3	1.5	2.5	4	<0.05	<0.05	0.17	<0.05
SODIUM (Na)	250	31	42	290	28	57	22	42	182	165	9.7
SULFATE (SO4)	250	9.5	16	210	4.5	23	5.7	11	45	45	9.5
ZINC (Zn)	5.0	0.38	0.08	0.15	0.33	0.27	4.6	<0.05	<0.05	0.85	<0.05
OTHER ELEMENTS OF INTEREST	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
ALUMINUM (Al)	NA	59	2.6	15	47	37	65	<0.05	<0.05	<0.05	<0.05
BORON (B)	NA	0.05	<0.05	0.39	0.1	0.17	0.42	<0.05	0.09	0.1	<0.05
CALCIUM (Ca)	NA	24	<0.05	65	39	42	40	3.8	0.09	26	4.4
MAGNESIUM (Mg)	NA	20	7.8	60	26	25	39	8.2	25	23	1.8
NICKEL (Ni)	NA	0.1	<0.05	<0.05	0.1	0.1	0.29	<0.05	<0.05	<0.05	<0.05
POTASSIUM (K)	NA	6.7	5.1	28	19	16	17	1.5	7.3	10	<1.0
SILICON (Si)	NA	29	7.5	27	62	39	56	<0.05	<0.05	1.5	2.7
STRONTIUM (Sr)	NA	0.23	0.09	0.59	0.34	0.44	0.39	0.06	0.19	0.2	<0.05
TIN (Sn)	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM (V)	NA	<0.05	<0.05	<0.05	0.13	0.11	0.18	<0.05	<0.05	<0.05	<0.05
ZIRCONIUM (Zr)	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

NA: Not applicable; no criteria established for potable water supplies.
INS: Quantity not sufficient to perform testing.

NOTE: Concentrations detected in samples are displayed to right of column; for example, 0.16 mg/l. Concentrations displayed to left of column are below detection limits of equipment used; for example, <0.01 mg/l, is limit of detection.

TABLE (5): ORGANIC MATERIALS

CHARACTERISTIC	MAXIMUM POTABLE CONC.	SITE 1: SAMPLE 1-1	SITE 2: SAMPLE 2-1	SITE 3: SAMPLE 3-1	SITE 4: SAMPLE 4-1	SITE 4: SAMPLE 4-2	SITE 5: SAMPLE 5-1	NAYVAGHAQ LAKE	TROUTMAN LAKE	OLD VILLAGE WELL	INFILT. GALLERY
PETROLEUM PRODUCTS	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
OIL AND GREASE	NA	14	0.71	QNS	0.19	0.54	115	0.22	0.17	QNS	QNS
PESTICIDES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
AROCLOR 1016	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1221	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1232	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1242	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1248	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1254	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1260	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1262	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND
AROCLOR 1268	ND	ND	ND	ND	ND	ND	ND	*	*	*	ND

NA: Not applicable; no criteria established for potable water supplies.
QNS: Quantity not sufficient to perform testing.
*: Water samples were not tested for presence of PCBs.

Table 6: EPA Hazardous Substance List

Volatile Compounds	Site 3	Site 4
COMPOUND	CONC(ug/l)	CONC (ug/l)
========	====	====
BENZENE	1. ND	1. ND
CARBON TETRACHLORIDE	1. ND	1. ND
CHLOROBENZENE	1. ND	1. ND
1,2-DICHLOROETHANE	1. ND	1. ND
1,1,1-TRICHLOROETHANE	1. ND	1. ND
1,1-DICHLOROETHANE	1. ND	1. ND
1,1,2-TRICHLOROETHANE	1. ND	1. ND
1,1,2,2-TETRACHLOROETHANE	1. ND	1. ND
CHLOROETHANE	1. ND	1. ND
2-CHLOROETHYLVINYL ETHER	10. ND	10. ND
CHLOROFORM	12.	1. ND
1,1-DICHLOROETHENE	1. ND	1. ND
TRANS-1,2-DICHLOROETHENE	1. ND	1. ND
1,2-DICHLOROPROPANE	1. ND	1. ND
TRANS-1,3-DICHLOROPROPENE	1. ND	1. ND
CIS-1,3-DICHLOROPROPENE	1. ND	1. ND
ETHYLBENZENE	1. ND	1. ND
METHYLENE CHLORIDE	1. ND	1. ND
CHLOROMETHANE	1. ND	1. ND
BROMOMETHANE	1. ND	1. ND
BROMOFORM	1. ND	1. ND
BROMODICHLOROMETHANE	3. TR	1. ND
CHLORODIBROMOMETHANE	1. ND	1. ND
TETRACHLOROETHENE	1. ND	1. ND
TOLUENE	5. TR	5. TR
TRICHLOROETHENE	1. ND	1. ND
VINYL CHLORIDE	1. ND	1. ND
ACETONE	10. ND	10. ND
2-BUTANONE	10. ND	10. ND
CARBON DISULFIDE	1. ND	1. ND
2-HEXANONE	1. ND	1. ND
4-METHYL-2-PENTANONE	1. ND	1. ND
STYRENE	1. ND	1. ND
VINYL ACETATE	1. ND	1. ND
TOTAL XYLENES	1. ND	1. ND

*CON'T

ND - THIS COMPOUND WAS NOT DETECTED; THE LIMIT OF DETECTION FOR THIS COMPOUND IS STATED TO THE LEFT OF THE ND SPECIFIER.

TR - TRACE, THIS COMPOUND WAS PRESENT, BUT WAS BELOW THE LEVEL AT WHICH THE CONCENTRATION COULD ACCURATELY BE DETERMINED. THE APPROXIMATE CONCENTRATION IS REPORTED FOR YOUR REFERENCE.

Table 6: (Con't)

Base/Neutral & Acid Compounds	Site 3	Site 4
COMPOUND	CONC (ug/l)	CONC (ug/l)
========	====	====
2, 4, 6-TRICHLOROPHENOL	1. ND	1. ND
4-CHLORO-3-METHYLPHENOL	1. ND	1. ND
2-CHLOROPHENOL	1. ND	1. ND
2, 4-DICHLOROPHENOL	1. ND	1. ND
2, 4-DIMETHYLPHENOL	1. ND	1. ND
2-NITROPHENOL	1. ND	1. ND
4-NITROPHENOL	1. ND	1. ND
2, 4-DINITROPHENOL	1. ND	1. ND
4, 6-DINITRO-2-METHYLPHENOL	1. ND	1. ND
PENTACHLOROPHENOL	1. ND	1. ND
PHENOL	1. ND	1. ND
BENZOIC ACID	1. ND	1. ND
2-METHYLPHENOL	1. ND	1. ND
4-METHYLPHENOL	1. ND	1. ND
2, 4, 5-TRICHLOROPHENOL	1. ND	1. ND
ACENAPHTHENE	1. ND	1. ND
BENZIDINE	1. ND	1. ND
1, 2, 4-TRICHLOROBENZENE	1. ND	1. ND
HEXACHLOROBENZENE	1. ND	1. ND
HEXACHLOROETHANE	1. ND	1. ND
BIS(2-CHLOROETHYL)ETHER	1. ND	1. ND
2-CHLORONAPHTHALENE	1. ND	1. ND
1, 2-DICHLOROBENZENE	1. ND	1. ND
1, 3-DICHLOROBENZENE	1. ND	1. ND
1, 4-DICHLOROBENZENE	1. ND	1. ND
3, 3'-DICHLOROBENZIDINE	1. ND	1. ND
2, 4-DINITROTOLUENE	1. ND	1. ND
2, 6-DINITROTOLUENE	1. ND	1. ND
1, 2-DIPHENYLHYDRAZINE	1. ND	1. ND
FLUORANTHENE	1. ND	1. ND
4-CHLOROPHENYL PHENYL ETHER	1. ND	1. ND
4-BROMOPHENYL PHENYL ETHER	1. ND	1. ND
BIS(2-CHLOROISOPROPYL)ETHER	1. ND	1. ND
BIS(2-CHLOROETHOXY)METHANE	1. ND	1. ND
HEXACHLOROBUTADIENE	1. ND	1. ND
HEXACHLOROCYCLOPENTADIENE	1. ND	1. ND
ISOPHORONE	1. ND	1. ND
NAPHTHALENE	1. ND	1. ND
NITROBENZENE	1. ND	1. ND
N-NITROSODIMETHYLAMINE	1. ND	1. ND
N-NITROSODIPHENYLAMINE	1. ND	1. ND
N-NITROSODIPROPLYAMINE	1. ND	1. ND
BIS(2-ETHYLHEXYL)PHTHALATE	6. TR	3. TR
BUTYL BENZYL PHTHALATE	1. ND	1. ND
DI-N-BUTYL PHTHALATE	1. ND	1. ND
DI-N-OCTYL PHTHALATE	1. ND	1. ND
DIETHYL PHTHALATE	1. ND	1. ND
DIMETHYL PHTHALATE	1. ND	1. ND
BENZO(A)ANTHRACENE	1. ND	1. ND
BENZO(A)PYRENE	1. ND	1. ND

Table 6: (Con't)

Base/Neutral & Acid Compounds	Site 3	Site 4
COMPOUND	CONC (ug/l)	CONC (ug/l)
========	====	====
BENZO(B)FLUORANTHENE	1. ND	1. ND
BENZO(K)FLUORANTHENE	1. ND	1. ND
CHRYSENE	1. ND	1. ND
ACENAPHTHYLENE	1. ND	1. ND
ANTHRACENE	1. ND	1. ND
BENZO(GHI)PERYLENE	1. ND	1. ND
FLUORENE	1. ND	1. ND
PHENANTHRENE	1. ND	1. ND
DIBENZO(A,H)ANTHRACENE	1. ND	1. ND
INDENO(1,2,3-CD)PYRENE	1. ND	1. ND
PYRENE	1. ND	1. ND
ANILINE	1. ND	1. ND
BENZYL ALCOHOL	1. ND	1. ND
4-CHLOROANILINE	1. ND	1. ND
DIBENZOFURAN	1. ND	1. ND
2-METHYLNAPHTHALENE	1. ND	1. ND
2-NITROANILINE	1. ND	1. ND
3-NITROANILINE	1. ND	1. ND
4-NITROANILINE	1. ND	1. ND

ND - THIS COMPOUND WAS NOT DETECTED; THE LIMIT OF DETECTION FOR THIS COMPOUND IS STATED TO THE LEFT OF THE ND SPECIFIER.

TR - TRACE, THIS COMPOUND WAS PRESENT, BUT WAS BELOW THE LEVEL AT WHICH THE CONCENTRATION COULD ACCURATELY BE DETERMINED. THE APPROXIMATE CONCENTRATION IS REPORTED FOR YOUR REFERENCE.

Table 7: Other Organic Compounds

Compound	Site 3 (ug/l)	Site 4 (ug/l)
Carboxylic acids	13	ND<1
Alcohol (high molecular wt)	54	ND<1
Hexadecanoic acid	ND<1	8
Total hydrocarbons	7	200
1,1,2-Trichloro-1,2,2-trifluoroethane	ND<1	300

ND - This compound was not detected; the limit of detection for this analysis is less than the amount stated in the table above.

Appendix B

Site Safety Plan

PREFACE

The preparation of a detailed site safety plan is beyond the scope of this current contract amendment. This document will be prepared as a portion of the field implementation of the sampling programs. The following URS document, Safety Manual: Hazardous Waste Site Investigations, is enclosed to provide a general guideline for the preparation of a site-specific evaluation to ensure the safe conduct of investigations in potential hazardous waste sites.

SAFETY MANUAL

HAZARDOUS WASTE SITE INVESTIGATIONS

URS COMPANY, INC.
BUFFALO OFFICE
625 DELAWARE AVENUE
BUFFALO, NEW YORK 14202

DECEMBER 1985

ACKNOWLEDGEMENT OF HAZARDOUS WASTE SITE
SAFETY PROCEDURES

I, _____, am an employee of URS Company, Inc. (the "Company"). I have received and have read the Safety Manual entitled "Safety Manual - Hazardous Waste Site Investigations" presented by the Company to me on the following date(s):_____. I understand that:

A. the Company receives, processes, assesses, samples, analyzes, collects and handles hazardous materials

B. there is a potential risk of exposure to the hazardous materials if I violate the standards and controls imposed by the Company; and

C. I understand the contents of the Safety Manual and agree to abide by the standards presented therein.

I have had the opportunity to ask questions and receive answers on the contents of this Safety Manual presented by the Company.

_____
(Employee's Signature)

Address: _____

_____

Dated: _____

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APPENDIX A Medical Surveillance Program
APPENDIX B Action Levels for Monitoring Instruments
APPENDIX C Safety Plan Outline

SAFETY MANUAL - HAZARDOUS WASTE SITE INVESTIGATIONS

1.0 PURPOSE

This document is a general guideline for the safe conduct of hazardous waste site (HWS) investigations. It provides guidance to project managers, task leaders and field team members. All field personnel are required to adhere to the guidelines contained in this document.

2.0 SCOPE

Every safety hazard associated with HWS investigations cannot be anticipated; and accordingly, rules cannot be developed for every contingency that could arise. Consequently, a practical safety program consists of: (a) rules and adherence thereto, (b) a technical analysis of information available, and (c) the application of common sense and good judgment. All employees are, therefore, required to adhere to the rules contained in this document, but more importantly, they are required to maintain a high level of safety consciousness. The latter involves constant vigilance for unsafe or potentially hazardous conditions or practices and immediate corrective action as necessary to improve or avoid the condition or practice.

3.0 RESPONSIBILITIES

HWS investigations, by their very nature, require extraordinary precautions to prevent loss of life, injury, or health hazard to investigators and the public. This responsibility transcends all others related to HWS investigations.

Responsibilities for implementing safe HWS investigation procedures, and specifically for the procedures contained in this document, are described below and shown diagrammatically in Figure 3-1.

3.1 Office Manager

The Office Manager is responsible for the overall administration of a safety program within the office. His specific responsibilities include the following:

A. Establishes policy concerning safety at HWS investigations.

B. Establishes a HWS safety training program.

C. Makes final decisions of proposed new procedures or corrective actions at HWS investigations.

D. Designates personnel to implement health and safety program.

E. Generally monitors health and safety program.

3.2 Project Manager

The Project Manager is responsible for the administration and implementation of a project specific safety plan. His specific responsibilities include:

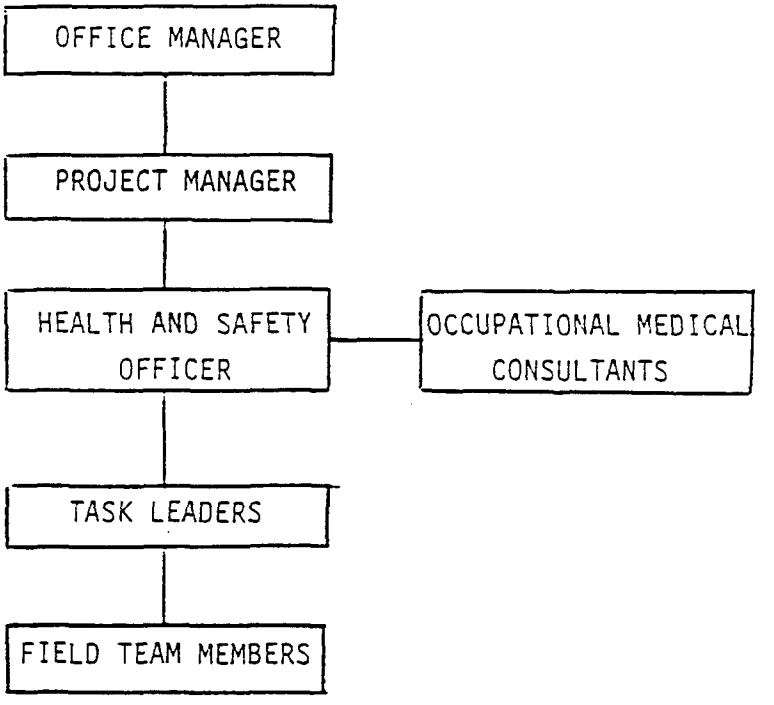

FIGURE 3-1 SAFETY CHAIN-OF-COMMAND

A. Maintaining a high level of safety consciousness among the project team.

B. Ensuring that employees assigned to the project have been trained and advised as to the health and safety hazard potentials on materials suspected of being present at the site.

C. Ensuring that personnel assigned to the project are provised with the proper safety equipment to meet the required level(s) of protection specified in the site specific health and safety plan.

D. Assigns project personnel the task of on-site safety coordinator.

E. Recommends disciplinary actions for personnel who perform work outside of compliance with this document or the site specific health and safety plan.

F. Responsible for the timely and accurate completion of all injury/illness (from exposure) reporting forms.

3.3 Health and Safety Officer

The health and safety officers responsibilities include the following:

A. Develop a site specific safety plan for each project.

B. Conducts a HWS health and safety training program.

C. Advise Office Manager on industry trends on safety equipment and training of personnel.

D. Monitors employee health through the services of an Occupational Medical Consultant.

E. Works with the Project Manager to ensure that the site specific safety plan is implemented.

F. Advises Project Manager on specific corrective actions.

3.4 Task Leaders

Task Leaders are appointed by the Project Manager. They are field personnel whose primary duties may be technical, but who are responsible for the day to day implementation of the health and safety plan while performing on-site operations. In larger operations, the Task Leader may devote a majority of his time to overseeing safety. Task Leaders are expected to:

A. Assumes the role of or delegates the position of on-site safety coordinator.

B. Conducts necessary on-site meetings (tool box meetings) to inform personnel of anticipated hazards or potential safety problems.

C. Review encountered problems or accidents and implement corrective actions.

D. Ensures that all personnel entering the site are familiar with the site specific safety plan.

E. Immediately call to the attention of the Project Manager any unsafe condition or practice noted; and critique the safety aspects of the project during debriefing and in follow-up reports.

Under the direction and guidance of the Project Manager the Task Leader is responsible for implementing and adjusting as necessary, the level of safety precautions appropriate to the individual HWS being evaluated - such as use of respiratory protection, etc. The Task Leader ensures that all participants conduct their work in accordance with the Project Safety Plan and applicable safety rules. He/she is authorized to direct any assigned employee to leave the HWS if the employee fails to observe safety requirements or in any way creates a safety hazard. Once the Task Leader makes the decision to direct an assigned employee to leave the site, the employee so instructed must leave the site without further discussion, and the incident will be addressed and documented in consultation with the Project Manager before the individual may return to the site.

4.0 PROCEDURES

4.1 General Safety Precautions

4.1.1 Unsafe Situations

All employees are directed to immediately bring to the attention of the Task Leader or Project Manager any unsafe condition, practice, or circumstance associated with or resulting from HWS investigations.

In case of immediate hazard to any field team member, the Task Leader on the scene should take steps to minimize the hazard. This may include leaving the site. Follow-up consultation with the Project Manager and Safety Officer must then be made at the first opportunity. In such circumstances, the Project Manager must take, or cause to be taken, the necessary steps to ensure that the investigation can be completed safely. Such steps may include changes in the Safety Plan, removal of a hazard, or consultation with appropriate experts. In cases where the hazard is not immediate, the Task Leader should consult the Project Manager regarding appropriate corrective measures. Application of this rule requires exercising good judgment and common sense by the Task Leader.

4.1.2 Health

All employees who will engage in HWS field investigations must complete a comprehensive health examination, be shown to be free of residual effects of exposure to hazardous materials, and be in general good health and physical condition. The comprehensive examination is to be repeated at intervals no greater than one year for so long as the employee continues HWS investigative work. Additional biological monitoring may be required dependent upon materials encountered during specific projects.

This health examination is as described in Appendix A, Medical Surveillance Program.

4.1.3 Forbidden Practices

The following practices are expressly forbidden during operations on suspected or known hazardous waste disposal sites:

- o Smoking, eating, or drinking while on site.
- o Ignition of flammable or reactive materials.
- o Presence onsite of any individual with an open cut or wound.
- o Entry without proper safety equipment into areas or spaces where toxic or explosive concentrations of gases or dust may exist.
- o Conduct of operations on the site without backup personnel off site, unless informed judgment or repeated entrance and occupation of the site have demonstrated, beyond doubt, that an active site is "safe".
- o Conduct of operations in a contaminated area with less than two employees in constant communication.

4.1.4 Protective Equipment

Protective headgear, eyewear, footwear, and clothing as described in the site specific Health and Safety Plan are to be worn at all times on Hazardous Waste Sites. If upon performing onsite work there is any doubt to the adequacy of the level of protection specified in the Health and Safety Plan then personnel are directed to proceed to

the higher level of protection and to contact the Project Manager and inform him of their concern.

4.1.5 Onsite Monitoring

The purpose of onsite monitoring survey is to determine, on a real time basis, hazardous or potentially hazardous conditions. The main effort is to rapidly identify the immediate hazards that may affect the public, response personnel, and the environment. Of major concern are the real or potential dangers from, fire, explosion, airborne contaminants and to a lesser degree radiation and oxygen deficient atmospheres. A table for action levels for various monitoring instruments is presented in Appendix C.

A. Organic Vapors and Gases

If the type of organic substance involved in an incident is known and the material is volatile or can become airborne, air measurements for organics should be made with one or more appropriate, properly calibrated survey instruments.

When the presence or types of organic vapors/gases are unknown, instruments such as a photoionizer (HNU Systems) and/or a portable gas chromatograph (Foxboro Systems OVA), operated in the total readout mode, should be used to detect organic vapors.

Until specific constituents can be identified, the readout indicates total airborne substances to which the instrument is responding. Identification of the individual vapor/gas constituents may permit the instruments to be calibrated to these substances and used for more specific and accurate analysis.

Sufficient data should be obtained during the initial entry to map or screen the site for various levels of organic vapors. These gross measurements may be used on a preliminary basis to: 1)

determine levels of personnel protection, 2) establish site work zones, and 3) select candidate areas for more thorough qualitative and quantitative studies.

Very high readings on the HNU or OVA may also indicate the displacement of oxygen or the presence of combustible vapors.

B. Inorganic Vapors and Gases

The number of direct reading instruments with the capability to detect and quantify nonspecific inorganic vapors and gases is extremely limited. Presently, the HNU photoionizer has very limited detection capability while the Foxboro OVA has none. If specific inorganics are known or suspected to be present, measurements should be made with appropriate instruments, if available. Colorimetric tubes are only practical if substances present are known or can be narrowed to a few.

C. Radiation

Although radiation monitoring is not necessary for all responses, it should be incorporated in the initial survey where radioactive materials may be present - for example, fires at warehouses or hazardous material storage facilities, transportation incidents involving unknown materials, or abandoned waste sites.

Normal background exposure-rate for gamma radiation is approximately 0.01 to 0.02 milliroentgen per hour (mR/hr) on a gamma survey instrument. Work can continue with elevated radiation-exposure rates; however, if the exposure-rate increases to 3-5 times above gamma background, a qualified health physicist should be consulted. At no time should work continue with an exposure rate of 10 mR/hr or above without the advice of a health physicist. EPA's Office of Air, Noise and Radiation has radiation specialists in each Region, as well as at Headquarters, Montgomery, Alabama, and Las Vegas, Nevada, to assist. The absence of gamma readings above background should not be interpreted

as the complete absence or radioactivity. Radioactive materials emitting low-energy gamma, alpha, or beta radiation may be present, but for a number of reasons may not cause a response on the instrument. Unless airborne, these radioactive materials should present minimal hazard, but more thorough surveys should be conducted as site operations continue to completely rule out the presence of any radioactive material.

D. Oxygen Deficiency

Normal air contains about 20.5% by volume of oxygen. At or below 19.5% oxygen air-supplied respiratory protective equipment is needed. Oxygen measurements are of particular importance for work in enclosed spaces, low-lying areas, or in the vicinity of accidents that have produced heavier-than-air vapors which could displace ambient air. These oxygen deficient areas are also prime locations for taking further organic vapor and combustible gas measurements, since the air has been displaced by other substances. Oxygen-enriched atmosphere increase the potential for fires.

E. Combustible Gases

The presence or absence of combustible vapors or gases must be determined. If readings approach or exceed 10% of the lower explosive limit (LEL), extreme caution should be exercised in continuing the investigation. If readings approach or exceed 25% any onsite activities, project personnel in consultation with experts in fire or explosion prevention must develop procedures for continuing operations.

F. Visual Observations

While onsite, the initial entry team should made visual observations which would help in evaluating site hazards, for example, dead fish or other animals; land features; wind direction; labels on containers indicating explosive, flammable, toxic, or corrosive

materials; conditions conducive to splash or contact with unconfined liquids, sludges, or solids; and other general conditions.

G. Direct-Reading Instruments

A variety of toxic air pollutants, (including organic and inorganic vapors, gases, or particulates) can be produced at, for example, abandoned waste sites; fires at chemical manufacturing, storage, reprocessing, or formulating facilities; or fires involving pesticides. Direct-reading field instruments will not detect or measure all of these substances. Thus, negative readings should not be interpreted as the complete absence of airborne toxic substances. Verification of negative results can only be done by collecting air samples and analyzing them in a laboratory.

4.2 Routes of Exposure to Toxic Materials

Personnel may be exposed to toxic materials via one of three routes. It is essential to beware of these routes of entry and to provide protection against exposure via each route. The three routes of exposure are inhalation, absorption, and ingestion. Details of these exposure mechanisms follow.

4.2.1 Inhalation

Exposure may result from the inhalation of contaminated air containing:

a. Gases such as volatile organics, acids, ammonia, pesticides, or other toxic materials.

b. Particulates on to which chemicals are attached (generally, dust).

c. Mists created by or composed of volatile chemicals, bacterial or viral pathogens, chemical products, or other toxic materials.

Rules for proper respiratory protection are found in Section 4.4 of this manual.

4.2.2 Absorption

Skin contact with materials encountered may allow chemicals to be absorbed through the skin. Different compounds vary in their ability to be absorbed through the skin. This absorption ability is to be addressed in the safety plan prior to initiation of site activities. Rules for proper skin protection are found in Section 4.4.

An especially dangerous situation arises with the presence of a wound. An open wound may act as a conduit to the lower tissue levels and circulatory system, and the body's natural epidermal (skin) defense system is bypassed. Material which normally cannot breach these natural defenses is allowed to move uninhibited through the wound. Individuals with open cuts are not permitted onsite in a contaminated area.

4.2.3 Ingestion

Exposure by ingestion may result from the consumption of contaminated food or drink or through the transfer of contamination to the mouth. At no time should personnel allow hand to mouth or hand to face contact while on a Hazardous Waste Site Investigation.

4.2.4 Exposure Scenarios

Exposure may result from the following instances:

o Failure to wear recommended protective equipment or observe procedures.

- Contact with liquids, vapors, or other materials present on contaminated sites.

- Improper use of personal protective equipment resulting from improper selection or fit.

- Failure of safety equipment.

- Inadequate training of personnel regarding safety procedures.

- Improper handling of samples.

- Insufficient time to put on protective equipment in an emergency situation.

- Failure to follow decontamination procedures after contact with contaminated materials.

- Improper evaluation of hazards present.

- Failure to use or improper use of appropriate sampling equipment.

- Unexpected hazards.

- Use of contaminated equipment or instruments.

Employees must be cognizant of the above possibilities. This list is not all inclusive. As stated previously, employees must maintain a high level of safety consciousness in ascertaining other potential hazards. All possible means should be taken to avoid any of the above scenarios from occurring.

4.3 Information Review

Developing a safety plan for HWS investigations must include a thorough evaluation of existing data. The information search may indicate possible hazard such as the types of concentrations of hazardous chemicals that may be present. This information will provide a basis for the level of Safety Protection required.

The safety precautions necessary in field investigations will normally become more complex as the following order of tasks brings investigative personnel progressively closer to actual contact with waste materials:

- Offsite Measurements

  Soil
  Ambient air
  Run-off
  Offsite wells

- Onsite Measurements (Accessible without entry)

  Soil
  Spilled material
  Ambient air
  Leachate
  Onsite wells
  Barrels

- Onsite Measurements (Entry required)

  Tanks
  Enclosed spaces
  Sewers and manholes

Before entry onto a suspected or known HWS, all investigative personnel must know the locations of emergency telephone numbers for the nearest medical facility, ambulance service, fire department, police department, and poison control center.

4.4 Field Sampling

Field sampling is required at all HWS investigations in order to characterize the type and extent of the contaminated onsite. Personnel must come into immediate contact with potentially hazardous material during this phase of the HWS investigation. It is therefore very important that personnel involved in this phase be thoroughly familiar with safety procedures as well as the site specific Health and Safety plan.

4.4.1 Sampling Equipment

When practical, sampling equipment used on an HWS should be disposable. Dippers, scoops, and similar devices for solid samples should be placed in plastic bags for disposal or later decontamination. Liquid samples from barrels or tanks should be withdrawn in inert tubing, such as glass, and the tubing should then be broken and abandoned within the barrel or tank.

Pumps, meters, augers, and other equipment should be decontaminated with appropriate solvents onsite. Sampling debris should be placed in plastic bags for disposal.

Detailed sampling methods and cautions will be presented in the Work/QA Project Plan and the site specific Health and Safety plan.

4.4.2 Levels of Protection

A. Introduction

The level of protective equipment shall be specified by the Project Manager as determined by the types and concentrations of wastes present at the site. It is of the utmost importance that the Task Leader implement the correct level of protective equipment for other field team members for each HWS investigation. In situations where the types of waste on the site are unknown or the hazards are not clearly established, the Task Leader, under the direction and guidance of the Project Manager, must make a reasonable determination of the level of protection that will assure the safety of investigators until the potential hazard have been characterized. The chosen level shall be maintained until the hazards have been determined.

Once the hazards have been determined, then protective levels commensurate with the hazard will be used.

The appropriate level of protection shall be determined prior to entering a hazardous waste site and shall be documented in the Project Safety Plan. The levels of protection are explained below:

Level A

Level A protection must be worn when the Project Manager makes a reasonable determination that the highest available level of respiratory, skin, and eye contact protection is needed. While Level A provides maximum available protection against exposure, it does not protect against all possible hazards. Consideration of the heat stress that can arise from wearing Level A protection must also enter into the decision.

Personal Protective Equipment for Level A includes the following:

- o Self-Contained Breathing Apparatus (SCBA), full face
- o Totally encapsulated suit
- o Gloves, inner (vinyl or latex surgical type)
- o Gloves, outer, chemical protective
- o Boots, steel toe
- o Overboots, neoprene rubber

Criteria for Level A

- o Sites known to contain hazards which require the highest level of respiratory protection.

- o The Project Manager makes a reasonable determination that personal exposure could occur during regular work activities.

- o Total organic vapors present in concentrations of greater than 500 ppm above background as measured by an HNU photoionizer or other organic vapor detector.

Level B

The Project Manager must select Level B protection when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (i.e., the back of the neck) is unlikely.

Personal Protective Equipment for Level B includes the following:

- o Self-Contained Breathing Apparatus (SCBA), full face
- o Chemical protective overalls
- o Gloves, inner (vinyl or latex surgical type)
- o Gloves, outer, chemical protective

- o Boots, steel toe
- o Overboots, neoprene rubber

Criteria for Level B:

- o Sites known to contain hazards which require the highest level of respiratory protection.

- o The Project Manager makes a reasonable determination that personnel exposure to areas of the body not covered while wearing Level B protective clothing is unlikely during regular work activities.

- o Total organic vapors present in concentrations of greater than 5 ppm but less than 500 ppm above background as measured by an HNU photoionizer or other organic vapor detector.

Level C

The Task Leader may select Level C when the required level of respiratory protection is known, or reasonably assumed to be, not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected area of the body (i.e., the back of the neck) is unlikely during regular work activities.

Personal Protective Equipment for Level C includes the following:

- o Full-face powered air-purifying respirator (positive pressure), or full-face air-purifying respiratory or half-face air-purifying respirator with full face shield and safety glasses

- o Chemical protective overalls
- o Gloves, inner (vinyl or latex surgical type)
- o Gloves, outer, chemical protective
- o Boots, steel toe
- o Overboots, neoprene rubber

Criteria for Level C:

- o Sites known to contain hazards which do not require a level of respiratory protection greater than that afforded by air purifying respirators.

- o The Project Manager makes a reasonable determination that personal exposure to areas of the body not covered while wearing Level C protective clothing is unlikely during regular work activities.

- o Total organic vapors present in concentrations of less than 5 ppm above background as measured by a HNU photoionizer or other organic vapor detector.

Level D

Level D is the basic work uniform. Investigators are not permitted to work in civilian street clothes.

Personnel Protective Equipment for Level D includes the following:

- o Coveralls, cotton or disposable
- o Boots, steel toe
- o Hard hat
- o Air purifying respirator (readily available)
- o Safety glasses (side shield)

Criteria for Level D:

- o Sites where the Project Manager makes a reasonable determination exposure to hazardous materials is unlikely.

- o No organic vapors above background as measured by an HNU photoionizer or other organic vapor detector.

NOTE: Most portable organic vapor detectors have detection limits of about 1.0 ppm (despite their claims that they are lower). The human sense of smell can detect some compounds in the low parts per billion range and many compounds of concern have threshold limit values (TLV) considerably lower than 1.0 ppm. Therefore, if there is any odor or any doubt, then it is advisable to go to Level C respiratory protection until the air can be checked by more precise sampling and analytical techniques.

4.4.3 SCBA/Respirators

A self-contained breathing apparatus (SCBA) must be worn on the site:

- o When in confined spaces, such as unventilated buildings or rooms, tanks and sewers or manholes, or any other situation which can be considered "Immediately Dangerous to Life and Health" (IDLH). Such spaces may have toxic vapors present and may also be deficient in oxygen (less than 19.5%).

- o Under circumstances where the free-flow of uncontaminated air is restricted.

In cases where the Task Leader or Project Manager has determined that work may proceed without use of SCBA, participating personnel must wear or carry respirators having organic vapor/acid protection cartridges. If free flow of ambient air is not obvious, an oxygen meter should be used to determine that at least 19.5% oxygen is present in the area where respirators are to be used. Respirators should be donned immediately upon experiencing breathing difficulty, dizziness, or other distress, strong taste or smell, or other judgment that precaution is in order. Cartridge respirators should not be relied upon for protection against a high concentration or organic vapors for extended periods for the following reasons:

- o Respirator cartridges for organic vapors function as adsorbants. Once adsorptive capacity is exceeded, the cartridge no longer functions.

- o Cartridge respirators do not supply oxygen. They are of no use in oxygen deficient atmospheres.

4.4.4 Respirator Selection and Fit Test

Respirators should be selected on the basis of comfortable fit. The shape of individual faces is highly variable, and it is often helpful to try on the respirators from several manufacturers to select one which most closely conforms to the face of each particular individual. This seems to be particularly true in the case of full face respirators, as the surface area over which the respirator must make continuous contact is greater than that for half-face respirators. Respirator selection should be done in conjunction with other necessary equipment intact (e.g. eyeglasses, hard hat).

The individual must be clean shaven in the facial area of respirator contact. It is essential that the respirator make continuous skin contact over the entire sealing surface. This continuous contact should be accomplished without excessive distortion or overtightening of

the respirator. Distortion and overtightening will lead to discomfort, and discomfort will lead to reluctance to wear the respirator.

The respirator cartridges used for most hazardous waste site investigations are organic-vapor and acid gas cartridges (color-coded yellow). These cartridges provide protection in atmospheres containing low levels of organic or acidic vapors and chlorine gas. In some cases it may be necessary to provide an organic and acid vapor cartridge with dust protection filters if particulates are of concern as, for example, during soil excavation operations.

It is imperative that each employee make initial and periodic tests to ascertain the proper fit of his or her respirator. This test should commence with a visual inspection of the respirator body and diaphragms. Signs of hardness, cracking or distortion should lead to immediate respirator replacement. The respirator should be cleaned with clean cotton balls and isopropyl alcohol. The actual fit test is accomplished with the use of a substance with a strong odor. The respirator is donned with the cartridges intact. An ampoule of isoamyl acetate (banana oil) is broken and placed next to the face of the individual. If the odor is detectable by the individual then the respirator selection and donning procedure must be repeated until the proper fit is obtained and no odor is detected. A vehicle lab is an excellent place to perform the respirator fit test as this provides an enclosed environment, and it prevents the wind from affecting the test.

4.4.5 Sampling Procedures

Sampling methods are described in publications to be made available by the Project Manager.

As indicated under "Field Sampling" above, disposable sampling equipment should be used whenever possible. The guiding safety

principle is to prevent exposure of personnel during sampling, packaging, and shipping.

Containers (drums, tanks, etc.) should be sampled with extreme caution. Opening drums or other sealed containers may be hazardous to sampling personnel unless proper safety procedures are followed. Gases can be released, or pressurized liquids can be expelled. A drum should not be moved or opened unless it can be ascertained beyond reasonable doubt that the drum is structurally sound. Drums standing on end, with bung up, should be opened with a bung wrench constructed of non-sparking materials. In those cases in which drums are bulged or show other signs of being under pressure, the drums should be opened with a pneumatic impact wrench operated by remote control. Drums on sides may be opened similarly if it is possible to safely rotate the drum so that the bung is high. Sampling of contained liquids may be safely accomplished by glass tube, which should be broken and discarded within the barrel.

4.4.6 Leaving the Site

Procedures for leaving the suspected contaminated area must be planned before entry. Provisions must be made for decontamination or disposal of protective clothing and sampling gear. Provisions for handling of samples and preparation of samples for shipment must also be planned.

4.4.7 Decontamination Station

For those situations in which gross contamination may occur, a personnel decontamination station is to be established. It should be designed to provide a controlled undressing area and washing system to avoid transfer of chemical contamination from protective clothing to personal inner clothing. All personnel are to be advised of appropriate decontamination procedures. All field personnel should shower after leaving a contaminated area. All chemically contaminated clothing should be disposed of properly. Decontamination solutions and wash

water should be collected and analyzed to determine the most suitable means of disposal.

4.4.8 Training

Personnel to be assigned field duties at a HWS investigation will be provided hands-on training to achieve competence in safety and operational aspects of the investigation. Preparation for on site investigations must include detailed briefings, particularly for inexperienced personnel. This preparation will include review of the site specific health and safety plan highlighting the hazardous materials and other potential hazards suspected of being present on-site.

All employees engaged in HWS field work will receive training in basic first aid, cardio-pulmonary resuscitation (CPR), and the use of protective clothing and equipment.

Before conducting a HWS investigation, the Project Manager must ensure that all employees have received training in HWS safety procedures. It is desirable that an individual has received training on a minimum of 3 separate field experiences before assuming the role of Task Leader on any job.

4.4.9 Training Outline

1. The Purpose of Training is as Follows:

   - To ensure that employees are aware of the hazards of their job and that they perform their work in a manner where risk to personal health and safety is reduced to the greatest extent feasible.

   - To ensure that regard for the health and safety of the employees is of the highest priority.

- To comply with all laws, rules, and regulations to safeguard the health and safety of employees.

- To increase the personal confidence of employees to react reponsibly and to handle emergency situations in a safe manner.

2. General Field Safety

   - Responsibilities

     - Project Manager
     - Safety Officer
     - Task Leader
     - Field Team Members

   - Vehicles (cars, trucks, mobile labs, boats)

     - Inspection
     - Operation
     - Mandatory rules
     - Checklist

   - Hazardous Materials in the Field

     - Hazards
     - Storage
     - Transportation

   - Use of Field Equipment and Supplies

     - Work tools
     - Testing equipment
     - Sampling equipment

- Checklist

o Buddy System

- Isolated areas
- Streams, rivers, lakes
- Hazardous waste sites
- Hazardous materials spills

o Work Limitations

- Weather (severe, inclement, hot, cold)
- Fatigue
- Hours of work

3. Personal Protective Equipment and Clothing

o General

o Availability

o Respirator protection

- Selection
- Fit test
- Donning and use

o Personal Protection Apparel

- Clothing (coveralls)
- Disposable suits
- Totally enclosed suits
- Eye protection
- Foot protection
- Head protection

- Hearing protection
- Hand protection

o Limitations of Clothing and Equipment

o Decontamination of Clothing and Equipment

o Disposal of Contaminated Clothing and Equipment

o Hands on Practical Exercise with Protective Clothing

4. Emergency Help and Self-Rescue

o Recommended Supplies

- First aid kit
- Portable eyewash station

o Principles of First Aid

- Restoration of breathing
- Control of bleeding
- Recognition and treatment of physical shock
- Open and closed wounds and burns
- Fractures and dislocations
- Transportation

o Cardiopulmonary Resuscitation (CPR)

o Availability of Emergency Services

- Poison control centers
- Hospitals and ambulance services
- Local fire and police departments

- How to Obtain Emergency Treatment in the Field
- How and when to File an Accident Report
- Employee Compensation Benefits

4.5 Survey Work

Personnel performing survey work at a HWS must follow the same precautions and wear the same protective clothing as personnel performing sampling as outlined in Section 4.4 of this Document.

The Task Leader for the survey work should be thoroughly familiar with the site specific health and safety plan prior to performing work on site.

5.0 DOCUMENTATION

5.1 Health

Documentation of baseline and periodic health assessment evaluations will be included in the individual records of each employee's personnel file.

The Task Leader must keep a file containing the Safety Plan and other appropriate written information describing the potential health and physical injury hazards of a HWS investigation. This file is to be continuously and readily available on-site to all employees. The Task Leader is to insure that all employees read and sign the Safety Plan prior to initiation of any activity on a site.

5.2 Training

Records of attendance and materials covered will be maintained by the Project Manager. In addition, training records will be included with each employee's personnel file.

An "Employee Meeting Record" is to be completed whenever any health and safety training is performed.

5.3 Safety Plan

The Health and Safety Officer must prepare and obtain approval of the Site Safety Plan before conducting a HWS investigation. The completed Safety Plan must be reviewed and approved by the Project Manager before the investigation can proceed at the site. The Project Manager must place the approved Safety Plan in the project file. The Project Manager must provide a copy of the Safety Plan to each employee participating in the HWS investigation.

An outline for completion of a site specific Safety Plan is presented in Appendix.

5.4 Accident Reporting

The Task Leader must coordinate the reporting of any incident involving injury or exposure (inhalation, dermal contact, ingestion) to a hazardous material. A copy of the accident report must be forwarded to the Project Manager and to the Personnel Department to be placed in employee's personnel file.

This reporting is to be done within twenty-four hours of any accident or of incident of exposure.

APPENDIX A

MEDICAL SURVEILLANCE PROGRAM

MEDICAL SURVEILLANCE PROGRAM

Pre-Employment Examinations

All offers of employment to personnel assigned to hazardous waste site investigations will be contingent upon their passing a comprehensive pre-employment medical exam. This exam will include a comprehensive physical as outlined below.

Subsequent Examinations

Preliminary and follow-up examinations are required for all URS and subcontractor personnel involved in field work during hazardous waste site investigations. The preliminary examinations will include the following:

- Previous personal/family medical history, with specific reference to smoking, use of steriods, cancer history
- Previous or interval work history, including hazardous waste site (HWS) sampling activities, site investigations, industrial hygience survey reports
- Standard physical examination
- Pulmonary function screening testing by trained personnel to record forced vital capacity (FVC) and forced expiratory volume in one second (FEV_1)
- Resting electrocardiogram
- Routing urinalysis, including occult blood
- 14" x 17" posterior-anterior chest x-ray

- o Complete to blood count

- o SMAC-23 profile which includes calcium, phosphorus, glucose, uric acid, BUN, creatinine, albumin, SGPT, SGOT, LDH, gloublin, A/G ratio, alkaline phosphatase, total protein, total bilirubin, GGT sodium potassium, chloride, CO_2, triglycerides, cholesterol, and creatinine/BUN ratio.

If a chest x-ray has been taken within the last 2 years, none will be required for the preliminary exam. Smokers may require more frequent chest x-rays.

The follow-up examination will take place six months to one year after URS field activities have ceased. The blood profile may be performed shortly after field activities have been completed. Additional examinations will occur in the event of accident, illness, or suspected exposure to toxic materials.

Exit Physical

All employees coming into contact with hazardous waste materials during the course of their employment will be required to have a complete medical exam upon termination of employment with URS.

APPENDIX B

ACTION LEVELS FOR MONITORING INSTRUMENTS

ATMOSPHERIC HAZARD GUIDELINES

Monitoring Equipment	Hazard	Ambient Level	Action
Combustible gas indicator	Explosive atmosphere	< 10% LEL	Continue investigation with cautions.
		10%-25%	Continue on-site monitoring with extreme caution as higher levels are encountered.
		> 25% LEL	Explosion hazard; withdraw from area immediately.
Oxygen concentration meter	Oxygen	< 19.5%	Monitor wearing SCBA. NOTE: Combustible gas readings are not valid in atmospheres with < 19.5% oxygen.
		19.5%-25%	Continue investigation with caution. SCBA not needed, based on oxygen content only.
		> 25.0%	Discontinue inspection; fire hazard potential. Consult specialist.
Radiation survey meter	Ionizing Radiation	< 1 mR/hr	Continue investigation. If radiation is detected above background levels, this signifies the presence of possible radiation sources; at this level, more thorough monitoring is advisable. Consult with a health physicist.
		> 10 mR/hr	Potential radiation hazard; evacuate site. Continue monitoring only upon the advice of a health physicist.
Colorimetric tubes	Organic and inorganic vapors/gases	Depends on chemical	Consult standard reference manual for air concentrations/ toxicity data.
Photoionization detector (PID)	Organic vapors/gases	1) Depends on species	Consult standard reference manuals for air concentrations/ toxicity data.
		2) Total response mode	Consult EPA Standard Operating Safety Guides.
Flame ionization detector (FID)	Organic vapors/gases	1) Depends on chemical	Consult standard reference manuals for air concentrations/toxicity data.
		2) Total response mode	Consult EPA Standard Operating Safety Guides.

APPENDIX C

SITE SPECIFIC HEALTH AND SAFETY PLAN OUTLINE

SITE SPECIFIC HEALTH AND SAFETY PLAN OUTLINE

1.0 INTRODUCTION
- 1.1 Purpose and Scope

2.0 KEY PERSONNEL AND ORGANIZATION

3.0 HAZARD EVALUATION OF SITE
- 3.1 Chemical
- 3.2 Heat and Cold Stress
- 3.3 Physical Hazards

4.0 WORK ZONES
- 4.1 Clean Zone
- 4.2 Contamination Reduction Zone
- 4.3 Exclusion Zone
- 4.4 Offsite Areas

5.0 SITE ACCESS

6.0 FIELD MONITORING

7.0 DECONTAMINATION PROCEDURES

8.0 EMERGENCIES
- 8.1 Escape Routes
- 8.2 Signal for Evacuation
- 8.3 Other Signals
- 8.4 Emergency Communications (include map of route to hospital)
- 8.5 Fire

9.0 RECORD KEEPING
- 9.1 Personnel Record
- 9.2 Protective Equipment
- 9.3 Incident Reports

10.0 SAMPLE HANDLING TRANSPORTATION AND SHIPMENT
- 10.1 Handling
- 10.2 Transport
- 10.3 Shipping

11.0 MEDICAL SURVEILLANCE

12.0 TRAINING

13.0 SELECTION OF PROTECTIVE EQUIPMENT

14.0 SELECTION OF RESPIRATORY EQUIPMENT

15.0 GENERAL SAFETY RULES

15.1 Personal Precautions

15.2 Operations

APPENDIX 1 Emergency Response Agencies

APPENDIX 2 Decontamination Procedures

APPENDIX 3 Atmospheric Hazard Guideline (including appropriate responses to specific conditions)

Appendix C

Quality Assurance & Control

APPENDIX C

Quality Assurance and Control

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APPENDIX C: QUALITY ASSURANCE AND CONTROL

1.0 Quality Assurance Objectives

The objectives of this analytical plan include production of legally defensible data for samples collected from St. Lawrence Island. The data generated from the sampling and analysis program will be used to assess the risks associated with these former military sites and to delineate areas requiring mitigation measures.

Field quality assurance/quality control (QA/QC) procedures will include the following:

- o duplicate, split, background, and blank sample collection;
- o sample container quality control;
- o sample preservation, packaging, and shipment;
- o sampling equipment decontamination;
- o field documentation protocols, including chain-of-custody, packaging, shipment, and storage of samples; and
- o archiving of discrete soil, sediment, wipe/scrape and water samples.

The procedures outlined above will assure sample integrity in the field and during shipment to the designated analytical laboratory. Detailed QA/QC procedures will be developed as a portion of the field sampling program.

2.0 Quality Assurance/Quality Control Samples

Quality assurance and control (QA/QC) samples will be an important aspect of this sampling program. These additional samples will be a reserve in the event of container breakage or if the need to confirm analytical results arises. The QA/QC samples required for this sampling program are discussed below. Table 2-1 lists the types of quality assurance and control samples required for each sample shipment.

The procedures used for sample collection will be as outlined in Section 5.0 of the Sampling Plan. The types of samples to be collected are indicated in Sections 4.2.1 and 4.2.2 of the Sampling Plan.

2.1 Duplicate Samples

Duplicate samples are samples collected at the same time and essentially in the same location as the principal samples. To assure that each duplicate sample is representative of its counterpart sample, all soil sample material collected will be homogenized. Disposable paper buckets and wooden spatulas will be used to mix soils for Type 1 samples; when homogenizing Type 2 soil samples, stainless steel or teflon-coated bowls and spatulas will be used to avoid potential organic or phenol contamination which may occur with the use of paper products. Duplicate samples will be packaged, preserved, transported, and labeled in the same manner as their counterpart samples and in such a way that the laboratory is unaware of which samples are duplicates. This procedure serves as a check on the reproducibility of the laboratory data.

Table 2-1

QUALITY ASSURANCE AND CONTROL SAMPLES
REQUIRED PER DAY OF FIELD SAMPLING

Matrix	Type of Sample
Soil/Sediment	1 - Background 1 - Duplicate (1) 1 - Equipment Rinsate
Water	1 - Background 1 - Duplicate (1) 1 - Field Blank 1 - Equipment Blank (2)

(1) At least one duplicate sample will be collected per day; 10% of all samples will be duplicates.

(2) At least one equipment blank sample will be collected per day. Therefore, a sample shipment collected over several days will have more than one equipment blank sample per shipment.

Based on EPA QA/QC format, at least one sample or 10 percent of the total number of samples collected daily (whichever is greater) per matrix (soil or water) will be designated as duplicates.

2.2 Split Samples

Split samples are also duplicate samples except these samples are retained for possible analyses by another lab. This procedure provides another check on the accuracy of lab data, as well as assuring an archival or back-up sample is available in case of breakage or loss of the original sample. Splits from each location sampled will be collected and retained as archival samples. In addition, splits from 10% of the samples collected will be provided to the Army Corps of Engineers for analysis by a second laboratory, at their discretion.

2.3 Background Samples

Background samples will be collected to provide baseline data about the environment outside the area impacted by military activities. Based on EPA guidelines, one background sample will be collected per sample shipment. The sites designated for collection of background samples will be indicated as a portion of the field sampling program.

2.4 Blank Samples

Two types of blank samples will be used for this assessment: field blanks and equipment blanks. Field blanks for groundwater and surface water samples will consist of certified organics-free water for organic analysis samples and metals-free water for inorganic analysis samples. There will be no field blanks for soil, since no such standard exists. Equipment blanks will consist of deionized water or solvent (hexane, etc.) that has been used in the final rinse during decontamination of soil or water sample collection tools.

These samples will be collected, packaged, preserved and shipped in the same manner as all other samples. They will be used to detect possible sources of cross-contamination within the sampling program. Based on EPA guidelines, at least one equipment blank sample will be collected per day. Field blanks will equal 10% of the total number of groundwater samples collected.

3.0 Handling of Samples

3.1 Sample Volumes and Containers

Based on the assumption that one laboratory will perform all analyses for soil and sediments, approximately 1 liter of soil or sediment will be required in each sample. These samples will be collected in 1 liter glass sample jars. Volume requirements will be verified with the selected laboratory prior to implementation of the sampling plan.

Assuming that one laboratory will perform all groundwater and surface water analyses, approximately one gallon of water for the organic (including PCBs) analyses is required. For the inorganic analysis, approximately one pint (16 ounce) of water is required. The one-gallon organic water samples will be collected in four 1-liter or two half-gallon amber glass bottles. The inorganic water sample will be collected in one 16-ounce polyethylene bottle. The inorganic water samples will be field-filtered with a 0.45 micron millipore filter and acidified with nitric acid (Ultrex or equivalent) to a pH of less than 2.0. All soil and water sample containers will have Teflon-lined lids. Volume requirements will be verified with the selected laboratory prior to implementation of the sampling plan.

3.2 Sample Preservation, Packaging and Shipment

Sample preservation will be in accordance with laboratory recommendations and instructions, and as per EPA standards and methods, as available. For packaging purposes, the USEPA considers any sample with a concentration of priority pollutants that either singularly or in combination is less than 10 ppm to be a low hazard sample. A medium hazard sample is one that contains a concentration of priority pollutants that either singularly or in combination is greater than 10 ppm but does not exceed 15 percent. Based upon observations during the preliminary reconnaissance, it is felt that the majority of water samples will be classified as low hazard materials; soil samples will be treated as medium hazard materials. All samples will be cooled with ice to approximately 4°C. All packaging and shipping requirements will be in accordance with U.S. Department of Transportation regulations, as outlined under Title 49 of the Code of Federal Regulations.

The packaging procedure for these samples is as follows:

- sample containers are taped shut with fiberglass tape and sealed with a USEPA or "other" suitable custody seal;
- the sealed sample is placed in a Ziploc plastic bag and taped shut with fiberglass tape;
- low hazard samples are wrapped in bubble pack, while medium hazard samples are placed in paint cans packed with vermiculite. The paint can is labeled with the sample identification number, a "peligro" (danger) sticker, a "this-side-up" sticker, and applicable U.S. Department of Transportation (DOT) identification stickers. The paint can is sealed using fiberglass tape;
- the packaged low- and medium-hazard samples will be placed in a vermiculite-packed Coleman cooler labeled with the required DOT placards. All appropriate sample-shipping paperwork (i.e., traffic reports, sample data sheets, and chain-of-custody forms) are included in each cooler;
- all coolers are shipped to the labs via the most expedient method (i.e., Federal Express, DHL, air cargo services, etc.); and

- o proper chain-of-custody according to Enforcement Considerations For Evaluation of Uncontrolled Hazardous Waste Disposal Sites (EPA, 1979) will be maintained at all .times during collection, packaging, shipment and storage of samples. EPA-approved custody documents will be used during all sampling operations.

All field activities will be documented in serialized field log books. This will include all observations and pertinent data collected in the field. All entries will be objective, legible, and dated and signed by the person recording the information.

Copies of all shipping forms and other documentation will be on file at the Anchorage office of URS Corporation.

3.3 Sample Containers and Equipment Decontamination

In general, due to the remoteness of the project areas and limited availability of water for decontamination, disposable sampling equipment will be used to the largest possible extent. When infeasible, the use of non-disposable soil and water sampling equipment will require a thorough decontamination of this equipment before the collection of each sample. In addition, sample containers must be decontaminated prior to removal from the sampling sites. The decontamination procedure involves:

- o preliminary rinse to remove gross contamination or soil particles;
- o wash with soapy water;
- o rinse with tap water;
- o second rinse with deionized water;
- o initial solvent rinse with a suitable solvent (acetone, etc.);
- o final solvent rinse with laboratory-grade hexane; and
- o air-drying and wrapping in foil.

3.4 Waste Material and Storage

All potentially hazardous waste material (disposable protective clothing, tools, and waste solvent) generated during this sampling program will be separated according to DOT-regulations and packed in DOT-approved steel drums. Based on the analytical results of samples collected from this waste, final determination will be made on the proper disposal procedures. All drums of waste material will be stored on-site until proper disposal arrangements are made.

All wash water used to decontaminate sampling equipment and non-disposable protective clothing will be disposed of daily on-site. Decontamination of vehicles and any other large equipment used on-site during sampling will be such that all rinse water from this decontamination will remain on-site.

4.0 Sampling Documentation

4.1 Chain-of-Custody Protocol

On-site sample custody will be maintained by storage of samples in a lockable container immediately following decontamination. Custody will be maintained in accordance with the guideline of

EPA's Enforcement Considerations for Evaluation of Uncontrolled Hazardous Waste Disposal Sites (1973). The samples will be identified by unique sample numbers, records maintained concerning sample container preparation and integrity, log book entries during sample collection, and enclosure of chain-of- custody record sheets during shipment to the laboratory for analysis.

The laboratory will maintain the chain-of-custody records upon receipt, checking samples against the record, and maintaining the sign-offs for every transfer of the samples. A copy of this custody record will be provided to URS when sample results are returned.

4.2 Sample Label

Sample labels will be filled out and affixed to appropriate containers immediately prior to sample collection. The label is filled out in indelible ink and includes the following information on the portion affixed to the bottle sample location: sample I.D. number, analyses, preservatives, field-measured parameters or comments and sampler's initials. The subsequent history of the sample is recorded on the chain-of-custody form.

4.3 Logs and Manifests

URS field personnel will maintain daily field logs concerning sampling locations and procedures. Logs will be initialed after all entries. Manifests will be maintained concerning sample handling, packaging and shipping.

4.4 Laboratory Quality Control

The selected laboratory will be an Army Corps of Engineers' approved analytical testing laboratory. The laboratory will be responsible for maintaining complete records of the analysis, and provide a detailed documentation of the methodologies used, how the analysis was performed, any variations from the standard protocol, and procedures used if options exist within the protocols. All manipulations of the samples will be recorded in a laboratory note book. Any calculations made in determining final concentrations will be documented and archived. The laboratory will be required to conform to all procedures and requirements inherent to its original Army Corps of Engineers' approval.