Final
Phase II Remedial Investigation
Northeast Cape,
St. Lawrence Island, Alaska

Volume 1: Report Body

Contract No. DACA85-93-D-0011
Delivery Order No. 0017
and
Contract No. DACA85-98-D-0007
Delivery Order No. 5
Montgomery Watson Job Number: 1189098.050101

August, 1999

Prepared for:

Department of the Army
United States Army Engineer District, Alaska
Corps of Engineers
P.O. Box 898
Anchorage, Alaska 99506-0898

Prepared by:

Montgomery Watson
4100 Spenard Road
Anchorage, Alaska 99517

TABLE OF CONTENTS

VOLUME 1: REPORT BODY

VOLUME 2: APPENDICES A and C through H
VOLUME 3: APPENDIX B, SITES 1 - 14
VOLUME 4: APPENDIX B, SITES 15-31

APPENDICES

LIST OF FIGURES

LIST OF TABLES

List of Section 5 Tables (Bound Separately in Appendix B)

LIST OF ACRONYMS

^{0}C	Degrees Celsius
^{0}F	Degrees Fahrenheit
AAC	Alaska Administrative Code
AC&W	Aircraft Control and Warning
ACHP	Advisory Council on Historic Preservation
ACM	asbestos containing materials
AC&WS	Aircraft Control and Warning Station
ADEC	Alaska Department of Environmental Conservation
Air Force	United States Air Force
Alaska District	United States Army Engineer District, Alaska District
ANCSA	Alaska Native Claims Settlement Act
ARAR	applicable or relevant and appropriate requirements
AS	Alaska statute
AST	aboveground storage tank
BD/DR	building demolition and debris removal
BM	benchmark
BTEX	benzene toluene ethylbenzene xylenes
C&D	construction and demolition debris
CDAP	Chemical Data Acquisition Plan
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CON/HTRW	containerized hazardous toxic and radioactive waste
COPEC	chemicals of potential ecological concern
CQAR	Chemical Quality Assurance Report
DERP	Defense Environmental Restoration Program
DNR	Department of Natural Resources
DOD	United States Department of Defense
DOT	Department of Transportation
DRO	diesel range organics
DS-2	Decontamination Agent Number 2
E&E	Ecology and Environment, Inc.
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
FR	Federal Register
FUDS	Formerly Used Defense Sites
gpm	gallons per minute
GPS	geographical positioning system
GRO	gasoline range organics
IDW	investigative-derived wastes
mg/g	milligrams per gram
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MK	Morrison Knudsen
mR/h	millirads per hour
MSL	mean sea level

MW	monitoring well
NA	not applicable or not analyzed
NAVY	United States Department of the Navy
ND	not detected
NES	Northwest EnviroService, Inc.
NHPA	National Historic Preservation Act of 1966
NOAA	National Oceanographic and Atmospheric Administration
NPDL	North Pacific Division Laboratory
NR	not regulated
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
pH	hydrogen ion activity
PL	public law
PLO	Public Land Order
POL	petroleum, oil, and lubricants
ppm	parts per million
QA	quality Assurance
QA/QC	quality assurance/quality control
QC	quality control
RAAM	Remedial Action Alternatives Technical Memorandum
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI	Remedial Investigation and Feasibility Study
RRO	residual range organics
SARA	Superfund Amendments and Reauthorization Act
SHPO	State Historic Preservation Office
SQUIRT	Screening Quick Reference Tables
STB	super tropical bleach
SVOC	semivolatile organic compounds
TCLP	toxicity characteristic leachate procedure
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substance Control Act
µmho	$(\text{micro ohms})^{-1}$
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compound

EXECUTIVE SUMMARY

The U.S. Government established an Air Force military installation on St. Lawrence Island in 1952. Since that time the installation was used as a radar surveillance station. Over the years of operation, the installation or parts of it were operated by the U.S. Air Force and/or U.S. Navy. In 1969, most military operations ceased and personnel were demobilized from the installation. All military operations were shut down in 1972. This report presents the results of the Phase II Remedial Investigation (RI) performed at the Northeast Cape installation on St. Lawrence Island, Alaska during July and August of 1996. The Northeast Cape installation is located on St. Lawrence Island in the Bering Sea, near territorial waters of Russia, approximately 135 air miles southwest of Nome, Alaska. The Phase II RI was performed as part of the U.S. Army Engineer District, Alaska District (Alaska District) Defense Environmental Restoration Program (DERP) (Contract No. DACA85-93-D-0011, Delivery Order No. 0017 and Contract No. DACA85-98-D-0007, Delivery Order No. 5). Twenty-nine sites at the installation were identified as part of the Phase II RI effort. Table ES-1 itemizes by site those tasks which were completed during the Phase II RI.

The 1996 Phase II RI accomplished several tasks that advanced remedial efforts at the site toward closure. Other activities performed during the field work were designed to address specific community concerns or to fill data gaps associated with Containerized Hazardous Toxic and Radioactive Waste (CON/HTRW) and Removal and Building Demolition and Debris Removal (BD/DR) actions. Significant conclusions of the Phase II RI are:

- There is no evidence of elevated radiation levels at Northeast Cape.
- The fuel line leak (Site 8) cited as a concern by local residents was investigated and found to be localized.
- Evidence of an asbestos hazard was not found in privately-owned housing at the site as a result of use of salvaged military building materials by current residents.
- The fill pad on which the main operations complex is located contains approximately 140,000 cubic yards of potentially usable fill material.
- The borrow area at the site contains at least 50,000 cubic yards of fill material that could be utilized without blasting or additional environmental damage. However, this area should be the subject of a subsurface investigation if a landfill is planned at this location.
- Warning signs are now posted on all military-era buildings at Northeast Cape with known or suspected asbestos containing material (ACM).
- Petroleum constituents, such as gasoline range organics (GRO) and benzene, in the subsurface water at the site appear to be attenuating with time. Diesel range organics (DRO) in some cases have increased and in other cases have decreased in the four years between sampling events.

TABLE ES-1
SUMMARY OF PHASE II RI ACTIVITIES

		1996 Phase II RI Activities													1998 Phase II RI Activities									1999 Planned Phase II RI Activities
Site	**Description**	**Site Reconnaissance**	**Soil Sampling**	**Surface Water Sampling**	**Sediment Sampling**	**Biological Sampling**	**Storage Tank (AST or UST) Inventory and Sampling**	**Mechanics' Work Pit**	**Flooded Subterranean Structure Water Sampling and Discharge**	**Radiological Survey**	**Stream Flow Measurements**	**Posting of Potential Asbestos Hazards**	**Cable and Wire Hazard Mitigation**	**Assess Prospective C&D Monofill Sites and Borrow Areas**	**Site Reconnaissance**	**Soil Sampling**	**Surface Water Sampling**	**Sediment Sampling**	**Groundwater Sampling**	**Site Control and Survey**	**CON/HTRW Inventory Update**	**Building Demolition and Debris Inventory Update**	**Hazardous Waste Disposal**	**Biological Sampling**
All	Installation-Wide Activities													X						X	X	X		
Site 1	Burn Site Southeast of Landing Strip																							
Site 2	Airport Terminal and Landing Strip	X								X		X				X								
Site 3	Fuel Line Corridor and Pumphouse																		X					
Site 4	Subsistence Fishing and Hunting Camp	X					X			X									X					
Site 5	Cargo Beach									X														
Site 6	Cargo Beach Road Drum Field									X						X								
Site 7	Cargo Beach Road Landfill									X						X			X					
Site 8	POL Spill Site	X																						
Site 9	Housing and Operations Landfill									X						X			X					
Site 10	Buried Drum Field	X	X							X						X			X					
Site 11	Fuel Storage Tank Area	X																	X					
Site 12	Gasoline Tank Area																							
Site 13	Heat and Electrical Power Building	X					X			X		X				X			X					
Site 14	Emergency Power/Operations Building	X					X		X	X		X				X								
Site 15	Buried Fuel Line Spill Area	X																	X					

TABLE ES-. ntinued)
SUMMARY OF PHASE II RI ACTIVITIES

		1996 Phase II RI Activities													1998 Phase II RI Activities									1999 Planned Phase II RI Activities
Site	Description	Site Reconnaissance	Soil Sampling	Surface Water Sampling	Sediment Sampling	Biological Sampling	Storage Tank (AST or UST) Inventory and Sampling	Mechanics' Work Pit	Flooded Subterranean Structure Water Sampling and Discharge	Radiological Survey	Stream Flow Measurements	Posting of Potential Asbestos Hazards	Cable and Wire Hazard Mitigation	Assess Prospective C&D Monofill Sites and Borrow Areas	Site Reconnaissance	Soil Sampling	Surface Water Sampling	Sediment Sampling	Groundwater Sampling	Site Control and Survey	CON/HTRW Inventory Update	Building Demolition and Debris Inventory Update	Hazardous Waste Disposal	Biological Sampling
Site 16	Paint and Dope Storage Building	X					X			X		X							X					
Site 17	General Supply Warehouse and Mess Hall Warehouse	X								X		X												
Site 18	Housing Facilities and Squad Headquarters	X							X	X		X											X	
Site 19	Auto Maintenance and Storage Facilities	X						X		X		X							X					
Site 20	Air Force Aircraft Control Warning Building									X		X												
Site 21	Wastewater Treatment Facility	X								X		X												
Site 22	Water Wells and Water Supply Building	X								X		X												
Site 23	Power and Communication Line Corridors																							
Site 24	Receiver Building Area																							
Site 25	Direction Finder Area															X								
Site 26	Former Construction Camp Area																							
Site 27	Diesel Fuel Pump Island	X	X																X					
Site 28	Drainage Basin Area	X	X	X	X	X							X			X	X	X						X
Site 29	Suqi River	X	X	X	X	X										X	X	X						X
Site 30	Background Areas																X	X						X

- Total recoverable petroleum hydrocarbons (TRPH), residual range organics (RRO) and DRO were detected in background samples at levels often comparable to or exceeding selected regulatory criteria. A strategic or analytical procedure to identify and eliminate the contribution of background or site-specific interference is an important element of any Remedial Action Plan.

- As discussed in this report, TRPH exceeds the sum of DRO and GRO by a factor of five to ten in many instances (RRO samples were not collected in the past). Interpretation and use of the 1994 TRPH data will impact the extent of remediation.

As documented in the Final Work Plan (Montgomery Watson, 1998), biological sampling will be performed at the installation in July 1999 to document the environmental health of the Drainage Basin and the Suqi River. This information will be used to evaluate the impact of existing contamination and recommend appropriate remedial action.

Based on the results of the Phase II RI no further action was identified as the recommended remedial action at one site. CON/HTRW and/or BD/DR alone were identified as the recommended remedial actions for 10 sites. Of the remaining 18 sites, isolated areas of petroleum hydrocarbon contamination were identified in the gravel pads at eleven sites. Nine sites were identified where petroleum constituents in subsurface water exceeded the Alaska State Ground Water Cleanup Standard (18 AAC 75). Eight sites were identified where the concentration of petroleum constituents in tundra soils and/or surface water exceeded the Selected Alaska State Cleanup Standards.

Background concentrations of TRPH and DRO in soil are unexpectedly high, non-reproducible and exceed the proposed regulatory criteria for the site. In many cases, the sum of RRO, DRO and GRO detected using the State of Alaska laboratory methods (AK 103, AK 102, and AK 101) is far less than TRPH detected using the older EPA 418.1 method. This suggests that site-specific phenomenon are influencing detection and analysis of hydrocarbons. Arsenic in the background soil sample was detected at the proposed cleanup criteria.

Recommendations for remediation include:

- Removal and disposal/recycle of CON/HTRW.

- Implementation of BD/DR

- Excavation and off-site disposal of polychlorinated biphenyls (PCB)-contaminated soils

- Excavation or remediation of isolated areas of high levels of petroleum contamination in the gravel pads

- Amendment and revegetation of petroleum-impacted areas of tundra

Table ES-2 summarizes the recommendations and conclusions of the Phase II RI.

1. INTRODUCTION

The Alaska District retained Montgomery Watson to perform a Phase II RI at Northeast Cape, St. Lawrence Island, Alaska. These activities were authorized under Contract No. DACA85-93-D-0011, Delivery Order No. 0017 and Contract No. DACA85-98-D-0007, Delivery Order No. 5.

The Phase II RI is intended to supplement and complete environmental information in the Phase I RI performed at Northeast Cape in 1994 (Montgomery Watson, 1995a). The Phase II RI fieldwork was performed during two separate site visits, the first in August, 1996 and the second in September, 1998. A final phase of data collection is planned for July, 1999 and will involve collection of biological samples.

This Phase II RI has been prepared according to the guidelines of the United States Department of Defense (DOD) DERP for Formerly Used Defense sites (FUDS). It is a comprehensive collection of information collected in previous studies and current information on the environmental status of the former military installation at Northeast Cape. The report consists of six sections that describe RI activities, analytical results, data interpretation, and recommendations for remedial action. These sections are:

1. Introduction
2. Investigation Approach and Procedures
3. Hazard Mitigation Incidental to Investigation
4. Remedial Planning
5. Site Investigation and Remediation Summaries
6. Remedial Action
7. Conclusions and Recommendations

Section 1 (Introduction) contains information on project objectives, site background information, site characteristics and regulatory setting. Section 2 (Investigation Approach and Procedures) describes investigation methods and procedures. Section 3 (Hazard Mitigation Incidental to Investigation) describes the activities performed during the investigation to mitigate potentially hazardous situations. Section 4 (Remedial Planning) documents information collected during the investigation for remediation planning efforts. Section 5 (Site Investigation and Remediation Summaries) integrates findings of this study with previous studies, and discusses recommendations for remediation. Section 6 (Conclusions and Recommendations) summarizes report conclusions and recommendations.

1.1 PROJECT OBJECTIVES

The goal of the Phase II RI is to collect the additional data necessary to evaluate the extent of contamination and make remedial action decisions. The following project objectives are identified to meet this goal:

- Further characterize the extent of contamination at selected project sites

- Mitigate hazards due to ACM, discarded wire and cable, and hazardous waste
- Collect data necessary for closure of individual sites or planning remedial activities

1.2 PROJECT DESCRIPTION

The Phase II RI activities were planned to collect the data necessary to meet the project objectives. The 1996 Phase II RI field activities included the following tasks:

- Perform site reconnaissance
- Collect surface soil, surface water, and sediment samples
- Collect biological samples (e.g., benthic, phytoplankton, and zooplankton)
- Inventory tanks and sample any liquids and/or sludges in above-ground storage tanks (ASTs), the auto mechanic work pit, and underground storage tanks (USTs) to characterize for eventual waste disposal
- Sample water in flooded subterranean structures to characterize the liquids prior to discharge during this investigation
- Perform a radiological survey to investigate the potential for elevated levels of radiation at the site
- Characterize the quantity of water in the Suqi River and selected adjacent streams
- Post warning signs throughout the site where friable ACM is present or suspected
- Cut, collect, and store grounded communication antenna wires, support, and power cables which present a physical hazard
- Assess potential for using the Main Complex Area gravel pad and/or Former Borrow Area as a construction and demolition debris (C&D) monofill and/or source of monofill cover material

The 1998 Phase II RI field activities included the following tasks:

- Perform site reconnaissance
- Collect soil, subsurface water, surface water, and sediment samples
- Find or install two permanent control monuments and survey the site
- Update the CON/HTRW inventory

- Update the building and demolition debris inventory

- Dispose of containers of Decontamination Agent Number 2 (DS-2) and Super Tropical Bleach (STB) hazardous wastes

In July, 1999, additional biological samples will be collected to assess ecological health in parts of the installation. The planned activities are described in the Final Work Plan, (Montgomery Watson, 1998). Results of this study will appear as an addendum to this report.

1.3 PROJECT BACKGROUND

1.3.1 Location

The Northeast Cape installation is on St. Lawrence Island in the Bering Sea, near territorial waters of Russia, approximately 135 air miles southwest of Nome, Alaska (Figure 1-1). The island is accessible by boat, regularly scheduled commercial airlines (to Gambell and Savoonga) and chartered air flights out of the community of Nome, Alaska. The Northeast Cape Installation is approximately nine miles west of the northeastern cape of St. Lawrence Island, between Kitnagak Bay to the northeast and Kangighsak Point to the northwest (Figure 1-2). The Kinipaghulghat Mountains bound the southern portion of the site. The location of the site is 63 degrees, 20 minutes north latitude, by 168 degrees, 59 minutes west longitude, in Township 25 South, Range 54 West, Kateel River Meridian.

1.3.2 Site Description

The Northeast Cape installation encompasses approximately four square miles of the island, and extends from the base of the Kinipaghulghat Mountains, at an elevation of approximately 100 feet above mean sea level (MSL) to the Bering Sea. The land surface gently slopes from the mountains to the sea with few abrupt changes in elevation.

The installation (Figure 1-3) consisted of a Main Complex Area, radar antennas, an airport runway and terminal building area, a bulk fuel receiving and storage area near the beach, direction finder and receiver buildings, and a White Alice site. During the remedial investigations, approximately 25 structures in various states of decline were present throughout the site. Adverse weather conditions, such as high winds and blown snow, have damaged most of the buildings.

As is typical construction practice in the region, gravel from a local borrow pit was excavated and used to construct gravel pads on the tundra. Buildings and other structures were constructed on the gravel pads. The surrounding terrain is tundra and shallow ponds overlying permafrost.

MONTGOMERY WATSON

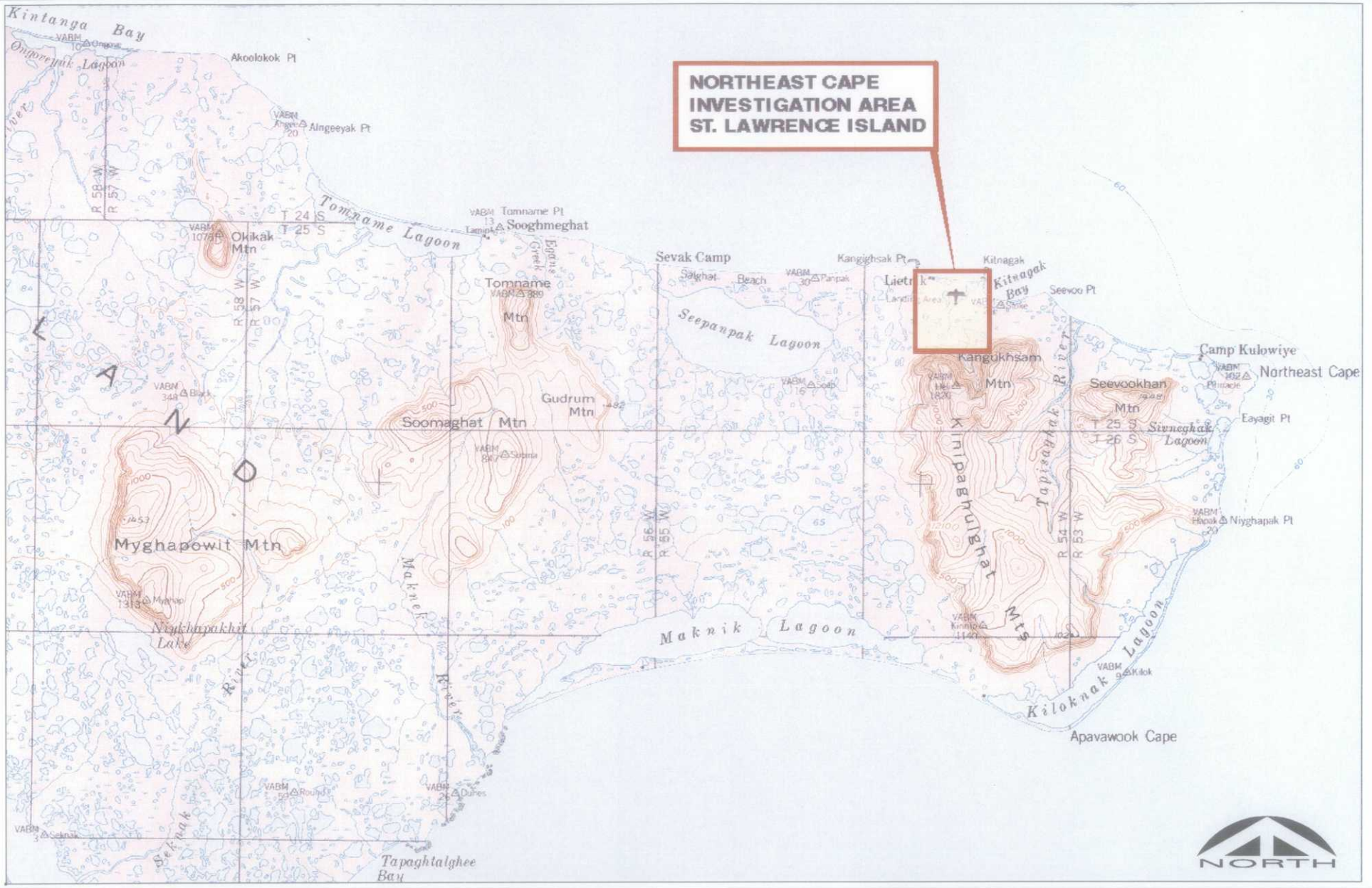
Anchorage, Alaska

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

FIGURE 1–1

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

VICINITY MAP
NORTHEAST CAPE



MONTGOMERY WATSON

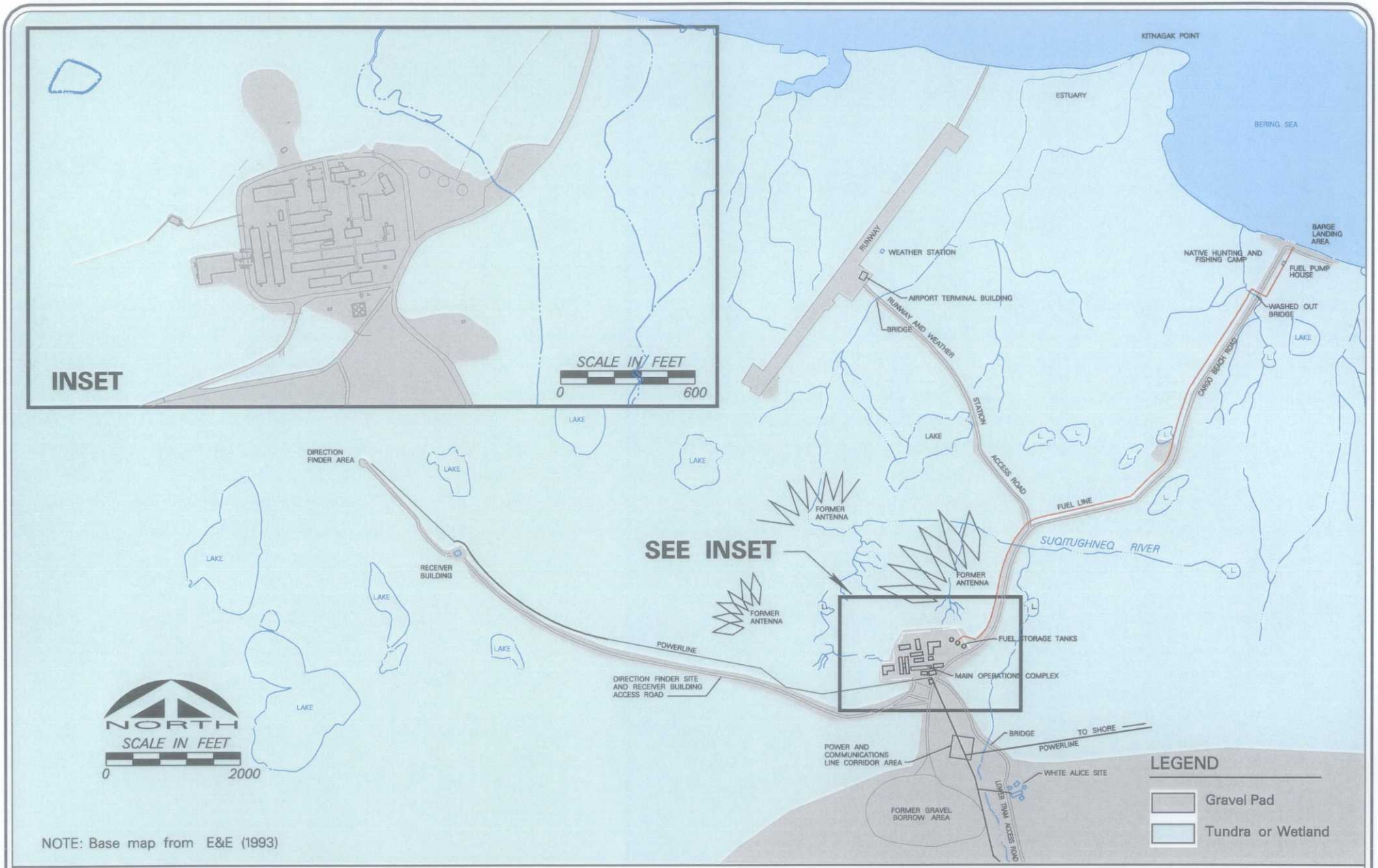
Anchorage, Alaska

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

FIGURE 1–2

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

LOCATION MAP
NORTHEAST CAPE INVESTIGATION AREA



NOTE: Base map from E&E (1993)

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 1–3
U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA
INSTALLATION MAP

A subsistence hunting and fish camp is located near the former bulk fuel receiving and storage area. In the past, surface water near the runway and the Main Operations Complex was used seasonally as a drinking water source by subsistence gatherers.

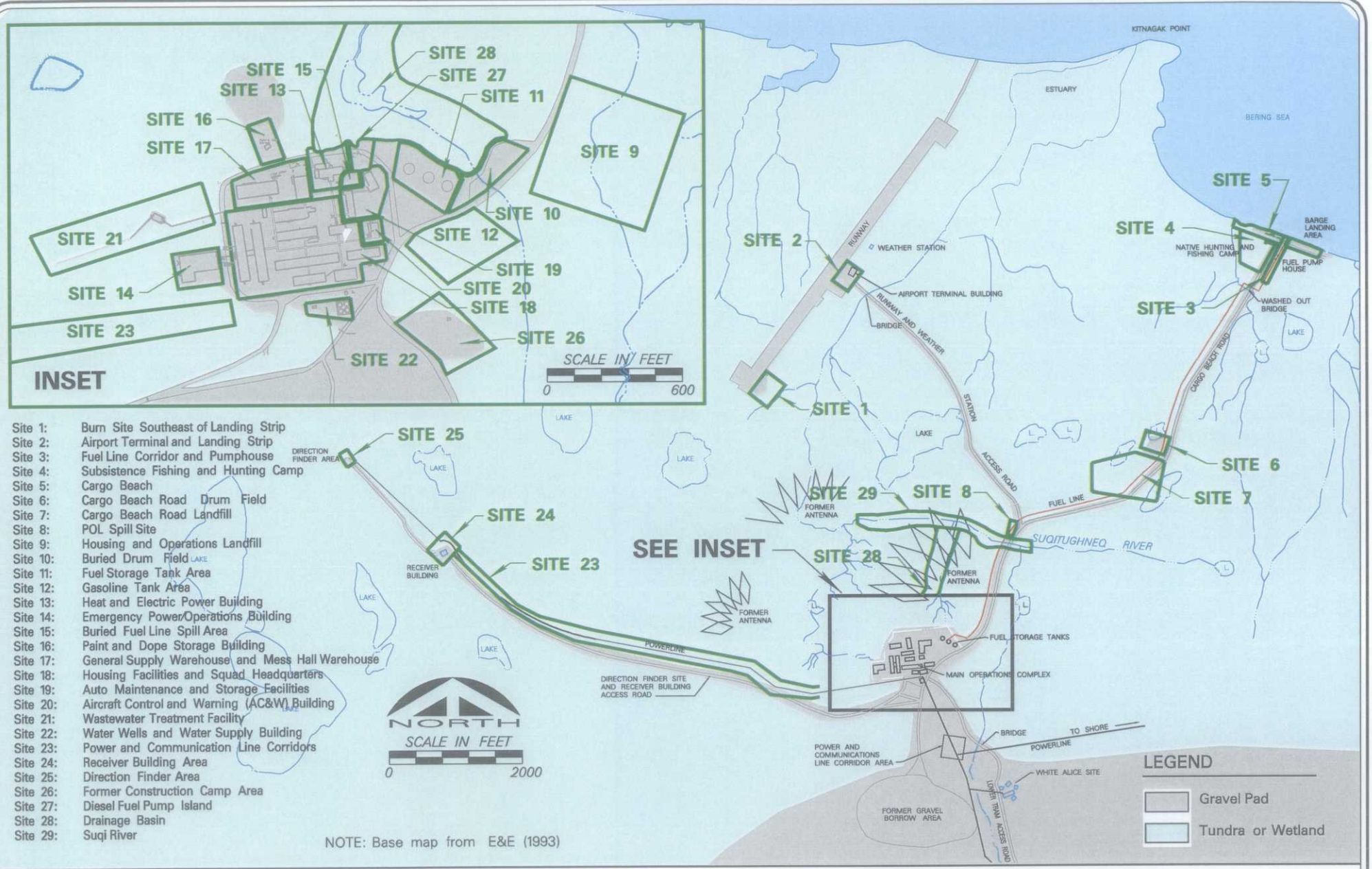
In the Chemical Data Acquisition Plan (CDAP) completed in 1993 (E&E, 1993), Ecology and Environment (E&E) identified 27 distinct sites at the installation for investigation. These sites are shown on Figure 1-4 and listed below.

Site Number	Description
1	Burn Site Southeast of the Landing Strip
2	Airport Terminal and Landing Strip
3	Fuel Line Corridor and Pumphouse
4	Subsistence Hunting and Fishing Camp
5	Cargo Beach
6	Cargo Beach Road Drumfield
7	Cargo Beach Road Landfill
8	Petroleum, Oil and Lubricants (POL) Spill Site
9	Housing and Operations Landfill
10	Buried Drum Field
11	Fuel Storage Tank Area
12	Gasoline Tank Area
13	Heat and Electrical Power Building
14	Emergency Power/Operations Building
15	Buried Fuel Line Spill Area
16	Paint and Dope Storage Building
17	General Supply Warehouse and Mess Hall Warehouse
18	Housing Facilities and Squad Headquarters
19	Auto Maintenance and Storage Facilities
20	Aircraft Control and Warning (AC&W) Building
21	Wastewater Treatment Facility
22	Water Wells and Water Supply Building
23	Power and Communication Line Corridors
24	Receiver Building Area
25	Direction Finder Area
26	Former Construction Camp Area
27	Diesel Fuel Pump Island

Since the CDAP was completed, subsequent studies by Montgomery Watson have identified three additional sites, which were investigated in the Phase II RI. These sites are:

Site Number	Description
28	Drainage Basin
29	Suqi River
30	Background Sampling Areas and Reference Creek

JOB No. 189098.050101 TIME: 24-AUG-1999 09:43 FILE: e:\usace\necape\99r1_fs\draft\fig1_04.dgn



Site 1: Burn Site Southeast of Landing Strip
Site 2: Airport Terminal and Landing Strip
Site 3: Fuel Line Corridor and Pumphouse
Site 4: Subsistence Fishing and Hunting Camp
Site 5: Cargo Beach
Site 6: Cargo Beach Road Drum Field
Site 7: Cargo Beach Road Landfill
Site 8: POL Spill Site
Site 9: Housing and Operations Landfill
Site 10: Buried Drum Field
Site 11: Fuel Storage Tank Area
Site 12: Gasoline Tank Area
Site 13: Heat and Electric Power Building
Site 14: Emergency Power/Operations Building
Site 15: Buried Fuel Line Spill Area
Site 16: Paint and Dope Storage Building
Site 17: General Supply Warehouse and Mess Hall Warehouse
Site 18: Housing Facilities and Squad Headquarters
Site 19: Auto Maintenance and Storage Facilities
Site 20: Aircraft Control and Warning (AC&W) Building
Site 21: Wastewater Treatment Facility
Site 22: Water Wells and Water Supply Building
Site 23: Power and Communication Line Corridors
Site 24: Receiver Building Area
Site 25: Direction Finder Area
Site 26: Former Construction Camp Area
Site 27: Diesel Fuel Pump Island
Site 28: Drainage Basin
Site 29: Suqi River

NOTE: Base map from E&E (1993)

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 1-4
U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA
SITE LOCATION MAP

In this report, the boundaries of some sites were modified to reflect our current knowledge of the site and extent of potential contamination.

1.3.3 History

St. Lawrence Island was established as a reindeer reserve by Executive Order on January 7, 1903. The Northeast Cape installation was acquired by the United States Air Force (Air Force) on January 16, 1952, under Public Land Order (PLO) 790, which removed 21,013 acres from the reindeer reservation to be used for a military installation. In 1952, the Aircraft Control and Warning Station (AC&WS) was formally activated by the assignment of the 712th AC&WS Air Force Squadron and the 6980th Security Squadron. The original site was designed to support 212 personnel. Throughout its existence, Northeast Cape served as a surveillance station providing radar coverage for the Alaskan Air Command and later, for the North American Air Defense Command, as part of an Alaska-wide system constructed to reduce a potential vulnerability to bomber attack across polar regions.

In 1954, the Air Force began construction of a White Alice radio relay, a communication system utilizing tropospheric scatter for transmission of information detected by the AC&WS Radar Facility. In 1958, 16,213 acres were restored to the reindeer reservation under PLO 1602, while 4,800 acres remained as an active military installation.

In June 1969, the radar operations ceased and most military personnel were demobilized from the site. Most of the facilities were left intact with minimal removal of equipment due to the high cost of transport from the site.

The White Alice station area remained in operation with minimal military staff until 1972. All lands were then withdrawn from the military under PLO 5187 for classification under Section 17(d)(1) of the Alaska Native Claims Settlement Act (ANCSA) of 1971, which entitled local community village corporations to select and receive tracts of federal land. Interim Conveyance No. 203 (June 1979) conveyed unsurveyed lands of St. Lawrence Island to Sivuqaq, Inc. and Savoonga Native Corporation. Excepted from transfer was surveyed land, easements, and land use permits effective prior to conveyance.

In 1982, the White Alice operations area was transferred to the United States Department of the Navy (Navy). The White Alice operations are not a part of this contract and are being addressed by the Navy via their Comprehensive Long-Term Environmental Action Navy (CLEAN) program. Therefore, the White Alice site is not within the scope of this Phase II RI).

1.3.4 Previous Investigations and Actions

In 1985, URS Corporation conducted an environmental assessment of the Northeast Cape Installation under the DERP. The assessment consisted of a file search and preliminary reconnaissance of the installation, which included an inventory of materials left by the military and collection of a limited number of soil and water samples (URS, 1985).

In 1991 and 1992, E&E conducted additional site reconnaissance and interviewed personnel who had resided at Northeast Cape when it was an active installation. In 1993, E&E prepared a CDAP to further investigate areas of concern. In 1994, Montgomery Watson, under Contract No. DACA85-93-D-0011, Delivery Order No. 0003, performed a Phase I RI in accordance with the CDAP. The results of the Phase I RI, chemical sampling and analysis and quality assurance/quality control (QA/QC) activities were presented in the Phase I RI report, (Montgomery Watson, 1995a).

Concurrent with the RI conducted by Montgomery Watson, Northwest EnviroService, Inc. (NES), under contract to the Alaska District, removed all electrical transformers and their contents from the Northeast Cape installation.

In 1995 and 1996 respectively, a Remedial Action Alternatives Technical Memorandum (RAAM) and an Engineering Evaluation/Cost Analysis (EE/CA) were completed by Montgomery Watson to evaluate and recommend future actions at Northeast Cape, with respect to BD/DR and CON/HTRW removal, respectively (Montgomery Watson, 1995b, 1996b).

In 1996, Montgomery Watson performed a Phase II RI that included collection of additional soil, water and biological samples, characterization of liquids in storage tanks and subterranean structures, a radiological survey, and posting of potential asbestos hazards.

In 1997, mitigation of physical hazards caused by grounded wire and cable on the tundra was completed.

Results of the 1996 Phase II RI and a human health and ecological risk assessment were documented in a draft Phase II RI report (Montgomery Watson, 1996c). Due to unresolved technical questions, additional data collection was performed in September 1998 prior to finalizing the draft Phase II RI.

1.4 REGULATORY SETTING

1.4.1 Authority for Cleanup

This work is being performed under the DERP-FUDS. Authority for DERP-FUDS is derived from the following legislation:

- The Comprehensive Environmental Restoration Compensation, and Liability Act of 1980 (CERCLA), Public Law (PL) 96-510, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, PL-99-499 (codified as 42 USC 9601-9675)

- Environmental Restoration Program, 10 USC 2701-2707

To qualify for these programs, a site must have been formerly owned by, leased to, possessed by or otherwise have been under the jurisdiction of the Secretary of Defense at the time of activities which resulted in hazards. DERP funds are authorized for DOD remediation of those hazards.

Section 121 of CERCLA (as amended by SARA) includes provisions impacting selection of remedial actions for an RI; specifics on the applicability of federal, state and local permits to cleanup actions; and providing for state involvement in development and selection of remedial actions. Generally, site cleanup provisions establish a preference for those response actions that are cost effective and which result in permanent, long-term solutions to risks posed by site contaminants. Under Section 121(e)(1), no federal, state or local permits are required for those portions of the removal/remediation action conducted entirely on-site. However, Section 121(e)(2) guarantees the state's right to enforce any federal or state standard, criteria, etc. Section 121(f) guarantees state involvement in the RI process. Typically, state regulations are identified as applicable or Relevant and Appropriate Requirements (ARARS).

This RI for Northeast Cape follows the CERCLA process. In accordance with the CERCLA process, the Alaska State Oil and Other Hazardous Substance Pollution Control Regulations (18 AAC 75) that govern the cleanup of contaminated sites in Alaska, were identified as ARAR for Northeast Cape.

1.4.2 Proposed Cleanup Criteria

Soil and Groundwater Action Levels. Over the course of the investigation at Northeast Cape, Alaska state cleanup regulations (18 AAC 75) have undergone significant review and revision. In 1996 when the draft RI for Northeast Cape was prepared, Alaska did not have numerical standard for substances other than petroleum. For petroleum, the numerical standards in the Interim Guidance for Non-UST Contaminated Soil Cleanup Levels (ADEC, 1991) represented the current Alaska Department of Environmental Conservation (ADEC) cleanup criteria for petroleum hydrocarbons from sources other than USTs. At the time, ADEC cleanup standards for petroleum in soil were based on the ADEC soil matrix, which set cleanup criteria based on:

- Depth to groundwater
- Soil type
- Precipitation
- Distance to drinking water wells
- Quantity of contaminated soil

Past studies at the site used, ADEC soil matrix levels were the criteria used to judge petroleum cleanup. Cleanup criteria for other hazardous substances in soil and groundwater contamination and approval of site-specific cleanup criteria was left to the discretion of the individual regulator. EPA Region III Risk-based Concentrations (RBC), which are referenced by EPA Region X were used as screening criteria for other substances. Prior studies used these criteria to make recommendations for site-specific cleanup. Table 1-1 presents the current EPA Region III RBC.

In 1997 and 1998, ADEC conducted an extensive effort to update the cleanup criteria for petroleum hydrocarbons as well as numerous other constituents. Initial draft regulations were published in May 1998. Additional revisions were issued internally in ADEC on July 2, 1998 and available to the public in August 1998. In January 1999, ADEC promulgated the final version of the Amendments to the Oil and Other Hazardous Substance Pollution Control Regulations (18 AAC 75).

TABLE 1-1
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
ACETALDEHYDE	75070		8.1E-01 C			
ACETOCHLOR	34256821	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ACETONE	67641	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ACETONITRILE	75058	2.2E+02 N	5.1E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ACETOPHENONE	98862	4.2E-02 N	2.1E-02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ACROLEIN	107028	4.2E-02 N	2.1E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ACRYLAMIDE	79061	1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
ACRYLONITRILE	107131	1.2E-01 C	2.6E-02 C	5.8E-03 C	1.1E+01 C	1.2E+00 C
ALACHLOR	15972608	8.4E-01 C	7.8E-02 C	3.9E-02 C	7.2E+01 C	8.0E+00 C
ALAR	1596845	5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
ALDICARB	116063	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDICARB SULFONE	1646884	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDRIN	309002	3.9E-03 C	3.7E-04 C	1.9E-04 C	3.4E-01 C	3.8E-02 C
ALUMINUM	7429905	3.7E+04 N	3.7E+00 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
AMINODINITROTOLUENES		2.2E+00 N	2.2E-01 N	8.1E-02 N	1.2E+02 N	4.7E+00 N
4-AMINOPYRIDINE	504245	7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
AMMONIA	7664417	2.1E+02 N	1.0E+02 N			
ANILINE	62533	1.9E+00 C !	1.1E+00 N	5.5E-01 C	1.0E+03 C	1.1E+02 C
ANTIMONY	7440360	1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY PENTOXIDE	1314609	1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
ANTIMONY TETROXIDE	1332816	1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY TRIOXIDE	1309644	1.5E+01 N	2.1E-01 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ARSENIC	7440382	4.5E-02 C	4.1E-04 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
ARSINE	7784421	1.0E-01 N	5.1E-02 N			
ASSURE	76578148	3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
ATRAZINE	1912249	3.0E-01 C	2.8E-02 C	1.4E-02 C	2.6E+01 C	2.9E+00 C
AZOBENZENE	103333	6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C
BARIUM	7440393	2.6E+03 N	5.1E-01 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
BAYGON	114261	1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
BAYTHROID	68359375	9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
BENTAZON	25057890	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
BENZALDEHYDE	100527	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BENZENE	71432	3.6E-01 C	2.2E-01 C	1.1E-01 C	2.0E+02 C	2.2E+01 C
BENZENETHIOL	108985	6.1E-02 N	3.7E-02 N	1.4E-02 N	2.0E+01 N	7.8E-01 N
BENZIDINE	92875	2.9E-04 C	2.7E-05 C	1.4E-05 C	2.5E-02 C	2.8E-03 C
BENZOIC ACID	65850	1.5E+05 N	1.5E+04 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
BENZYL ALCOHOL	100516	1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZYL CHLORIDE	100447	6.2E-02 C	3.7E-02 C	1.9E-02 C	3.4E+01 C	3.8E+00 C
BERYLLIUM	7440417	7.3E+01 N	7.5E-04 C	2.7E+00 N	4.1E+03 N	1.6E+02 N
BIPHENYL	92524	3.0E+02 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
BIS(2-CHLOROETHYL)ETHER	111444	6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	2.6E-01 C	1.8E-01 C	4.5E-02 C	8.2E+01 C	9.1E+00 C
**BIS(CHLOROMETHYL)ETHER	542881	4.8E-05 C	2.8E-05 C	1.4E-05 C	2.6E-02 C	2.9E-03 C
**BIS(2-ETHYLHEXYL)PHTHALATE	117817	4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
**BORON	7440428	3.3E+03 N	2.1E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
BROMODICHLOROMETHANE	75274	1.7E-01 C	1.0E-01 C	5.1E-02 C	9.2E+01 C	1.0E+01 C
**'BROMOETHENE	593602	1.1E-01 C	5.7E-02 C			
BROMOFORM	75252	2.3E+00 C	1.6E+00 C	4.0E-01 C	7.2E+02 C	8.1E+01 C
BROMOMETHANE	74839	8.5E+00 N	5.1E+00 N	1.9E+00 N	2.9E+03 N	1.1E+02 N
BROMOPHOS	2104963	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,3-BUTADIENE	106990	7.0E-03 C	3.5E-03 C			
1-BUTANOL	71363	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BUTYLBENZYLPHTHALATE	85687	7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
BUTYLATE	2008415	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
N-BUTYLBENZENE	104518	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
SEC-BUTYLBENZENE	135988	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TERT-BUTYLBENZENE	98066	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CADMIUM-WATER	7440439	1.8E+01 N	9.9E-04 C	6.8E-01 N	1.0E+03 N	3.9E+01 N
CADMIUM-FOOD	7440439	3.7E+01 N	9.9E-04 C	1.4E+00 N	2.0E+03 N	7.8E+01 N
CAPROLACTAM	105602	1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
CARBARYL	63252	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON DISULFIDE	75150	1.0E+03 N	7.3E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON TETRACHLORIDE	56235	1.6E-01 C	1.2E-01 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
CARBOSULFAN	55285148	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CHLORAL	75876	1.2E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
CHLORANIL	118752	1.7E-01 C	1.6E-02 C	7.9E-03 C	1.4E+01 C	1.6E+00 C
CHLORDANE	57749	1.9E-01 C	1.8E-02 C	9.0E-03 C	1.6E+01 C	1.8E+00 C
CHLORINE	7782505	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CHLORINE DIOXIDE	10049044	4.2E-01 N	2.1E-01 N			
CHLOROACETIC ACID	79118	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4-CHLOROANILINE	106478	1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
CHLOROBENZENE	108907	3.5E+01 N	1.8E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLOROBENZILATE	510156	2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
P-CHLOROBENZOIC ACID	74113	7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2-CHLORO-1,3-BUTADIENE	126998	1.4E+01 N	7.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1-CHLOROBUTANE	109693	2.4E+03 N	1.5E+03 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
1-CHLORO-1,1-DIFLUOROETHANE	75683	1.0E+05 N	5.1E+04 N			
CHLORODIFLUOROMETHANE	75456	1.0E+05 N	5.1E+04 N			
CHLOROETHANE	75003	3.6E+00 C	2.2E+00 C	1.1E+00 C	2.0E+03 C	2.2E+02 C
CHLOROFORM	67663	1.5E-01 C !	7.7E-02 C !	5.2E-01 C	9.4E+02 C	1.0E+02 C !
CHLOROMETHANE	74873	1.5E+00 C	1.0E+00 C	2.4E-01 C	4.4E+02 C	4.9E+01 C
4-CHLORO-2-METHYLANILINE	95692	1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
BETA-CHLORONAPHTHALENE	91587	4.9E+02 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
O-CHLORONITROBENZENE	88733	4.2E-01 C	2.5E-01 C	1.3E-01 C	2.3E+02 C	2.6E+01 C
P-CHLORONITROBENZENE	100005	5.9E-01 C	3.5E-01 C	1.8E-01 C	3.2E+02 C	3.5E+01 C
2-CHLOROPHENOL	95578	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
2-CHLOROPROPANE	75296	2.1E+02 N	1.1E+02 N			
O-CHLOROTOLUENE	95498	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLORPYRIFOS	2921882	1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
CHLORPYRIFOS-METHYL	5598130	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
**CHROMIUM III	16065831	5.5E+04 N	5.5E+03 N	2.0E+03 N	3.1E+06 N	1.2E+05 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
**CHROMIUM VI	18540299	1.1E+02 N	1.5E-04 C	4.1E+00 N	6.1E+03 N	2.3E+02 N
COBALT	7440484	2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
COKE OVEN EMISSIONS (COAL TAR)	8007452	5.7E-03 C	2.8E-03 C			
COPPER	7440508	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
CROTONALDEHYDE	123739	3.5E-02 C	3.3E-03 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
CUMENE	98828	6.6E+02 N	4.0E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CYANIDE (FREE)	57125	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CALCIUM CYANIDE	592018	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
COPPER CYANIDE	544923	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYANAZINE	21725462	8.0E-02 C	7.5E-03 C	3.8E-03 C	6.8E+00 C	7.6E-01 C
CYANOGEN	460195	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
CYANOGEN BROMIDE	506683	3.3E+03 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
CYANOGEN CHLORIDE	506774	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDROGEN CYANIDE	74908	6.2E+00 N	3.1E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
POTASSIUM CYANIDE	151508	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
POTASSIUM SILVER CYANIDE	506616	7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
SILVER CYANIDE	506649	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
SODIUM CYANIDE	143339	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
THIOCYANATE		3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ZINC CYANIDE	557211	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
CYCLOHEXANONE	108941	1.8E+05 N	1.8E+04 N	6.8E+03 N	1.0E+07 N	3.9E+05 N
CYHALOTHRIN/KARATE	68085858	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYPERMETHRIN	52315078	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DACTHAL	1861321	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DALAPON	75990	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DDD	72548	2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
DDE	72559	2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DDT	50293	2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DIAZINON	333415	3.3E+01 N	3.3E+00 N	1.2E+00 N	1.8E+03 N	7.0E+01 N
DIBENZOFURAN	132649	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
1,4-DIBROMOBENZENE	106376	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIBROMOCHLOROMETHANE	124481	1.3E-01 C	7.5E-02 C	3.8E-02 C	6.8E+01 C	7.6E+00 C
1,2-DIBROMO-3-CHLOROPROPANE	96128	4.7E-02 C !	2.1E-01 N	2.3E-03 C	4.1E+00 C	4.6E-01 C
1,2-DIBROMOETHANE	106934	7.5E-04 C	8.2E-03 C	3.7E-05 C	6.7E-02 C	7.5E-03 C
DIBUTYLPHTHALATE	84742	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
DICAMBA	1918009	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
1,2-DICHLOROBENZENE	95501	6.4E+01 N	3.3E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
1,3-DICHLOROBENZENE	541731	1.4E+01 N	7.3E+00 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
1,4-DICHLOROBENZENE	106467	4.7E-01 C	2.8E-01 C	1.3E-01 C	2.4E+02 C	2.7E+01 C
3,3'-DICHLOROBENZIDINE	91941	1.5E-01 C	1.4E-02 C	7.0E-03 C	1.3E+01 C	1.4E+00 C
1,4-DICHLORO-2-BUTENE	764410	1.3E-03 C	6.7E-04 C			
DICHLORODIFLUOROMETHANE	75718	3.5E+02 N	1.8E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
1,1-DICHLOROETHANE	75343	8.0E+02 N	5.1E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
1,2-DICHLOROETHANE	107062	1.2E-01 C	6.9E-02 C	3.5E-02 C	6.3E+01 C	7.0E+00 C
1,1-DICHLOROETHENE	75354	4.4E-02 C	3.6E-02 C	5.3E-03 C	9.5E+00 C	1.1E+00 C
CIS-1,2-DICHLOROETHENE	156592	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
TRANS-1,2-DICHLOROETHENE	156605	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
TOTAL 1,2-DICHLOROETHENE	540590	5.5E+01 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
2,4-DICHLOROPHENOL	120832	1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
2,4-D	94757	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,2-DICHLOROPROPANE	78875	1.6E-01 C	9.2E-02 C	4.6E-02 C	8.4E+01 C	9.4E+00 C
2,3-DICHLOROPROPANOL	616239	1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
1,3-DICHLOROPROPENE	542756	7.7E-02 C	4.8E-02 C	1.8E-02 C	3.2E+01 C	3.5E+00 C !
DICHLORVOS	62737	2.3E-01 C	2.2E-02 C	1.1E-02 C	2.0E+01 C	2.2E+00 C
DICOFOL	115322	1.5E-01 C	1.4E-02 C	7.2E-03 C	1.3E+01 C	1.5E+00 C
DICYCLOPENTADIENE	77736	4.4E-01 N	2.2E-01 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DIELDRIN	60571	4.2E-03 C	3.9E-04 C	2.0E-04 C	3.6E-01 C	4.0E-02 C
DIESEL EMISSIONS			5.1E+00 N			
DIETHYLPHTHALATE	84662	2.9E+04 N	2.9E+03 N	1.1E+03 N	1.6E+06 N	6.3E+04 N
DIETHYLENE GLYCOL, MONOBUTYL ETHER	112345		2.1E+01 N			
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
DI(2-ETHYLHEXYL)ADIPATE	103231	5.6E+01 C	5.2E+00 C	2.6E+00 C	4.8E+03 C	5.3E+02 C
DIETHYLSTILBESTROL	56531	1.4E-05 C	1.3E-06 C	6.7E-07 C	1.2E-03 C	1.4E-04 C
DIFENZOQUAT (AVENGE)	43222486	2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
1,1-DIFLUOROETHANE	75376	8.0E+04 N	4.0E+04 N			
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
3,3'-DIMETHOXYBENZIDINE	119904	4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
DIMETHYLAMINE	124403		2.1E-02 N			
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964	1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
2,4-DIMETHYLANILINE	95681	8.9E-02 C	8.3E-03 C	4.2E-03 C	7.6E+00 C	8.5E-01 C
N,N-DIMETHYLANILINE	121697	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
3,3'-DIMETHYLBENZIDINE	119937	7.3E-03 C	6.8E-04 C	3.4E-04 C	6.2E-01 C	6.9E-02 C
1,1-DIMETHYLHYDRAZINE	57147	2.6E-02 C	1.8E-03 C	1.2E-03 C	2.2E+00 C	2.5E-01 C
1,2-DIMETHYLHYDRAZINE	540738	1.8E-03 C	1.7E-04 C	8.5E-05 C	1.5E-01 C	1.7E-02 C
2,4-DIMETHYLPHENOL	105679	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
2,6-DIMETHYLPHENOL	576261	2.2E+01 N	2.2E+00 N	8.1E-01 N	1.2E+03 N	4.7E+01 N
3,4-DIMETHYLPHENOL	95658	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIMETHYLPHTHALATE	131113	3.7E+05 N	3.7E+04 N	1.4E+04 N	2.0E+07 N	7.8E+05 N
1,2-DINITROBENZENE	528290	1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
1,3-DINITROBENZENE	99650	3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
1,4-DINITROBENZENE	100254	1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4,6-DINITRO-2-METHYLPHENOL	534521	3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
2,4-DINITROPHENOL	51285	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
DINITROTOLUENE MIX		9.8E-02 C	9.2E-03 C	4.6E-03 C	8.4E+00 C	9.4E-01 C
2,4-DINITROTOLUENE	121142	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
2,6-DINITROTOLUENE	606202	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DINOSEB	88857	6.1E+00 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIOCTYLPHTHALATE	117840	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,4-DIOXANE	123911	6.1E+00 C	5.7E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
DIPHENYLAMINE	122394	9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
1,2-DIPHENYLHYDRAZINE	122667	8.4E-02 C	7.8E-03 C	3.9E-03 C	7.2E+00 C	8.0E-01 C
DIQUAT	85007	8.0E+01 N	8.0E+00 N	3.0E+00 N	4.5E+03 N	1.7E+02 N
DISULFOTON	298044	2.4E-01 N	1.5E-01 N	5.4E-02 N	8.2E+01 N	3.1E+00 N
1,4-DITHIANE	505293	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIURON	330541	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
ENDOSULFAN	115297	2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ENDRIN	72208	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
EPICHLOROHYDRIN	106898	6.8E+00 C	1.0E+00 N	3.2E-01 C !	5.8E+02 C !	6.5E+01 C !
ETHION	563122	1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-ETHOXYETHANOL	110805	1.5E+04 N	2.1E+02 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
ETHYL ACETATE	141786	5.5E+03 N	3.3E+03 N	1.2E+03 N	1.8E+06 N	7.0E+04 N
ETHYLBENZENE	100414	1.3E+03 N	1.1E+03 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ETHYLENE DIAMINE	107153	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ETHYLENE GLYCOL	107211	7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ETHYLENE GLYCOL, MONOBUTYL ETHER	111762		2.1E+01 N			
ETHYLENE OXIDE	75218	6.7E-02 C	1.8E-02 C	3.2E-03 C	5.7E+00 C	6.4E-01 C
ETHYLENE THIOUREA	96457	6.1E-01 C !	5.7E-02 C !	2.9E-02 C !	5.2E+01 C !	5.8E+00 C !
ETHYL ETHER	60297	1.2E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
ETHYL METHACRYLATE	97632	5.5E+02 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
FENAMIPHOS	22224926	9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
FLUOMETURON	2164172	4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
FLUORINE	7782414	2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
FOMESAFEN	72178020	3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
FONOFOS	944229	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
FORMALDEHYDE	50000	7.3E+03 N	1.4E-01 C	2.7E+02 N	4.1E+05 N	1.6E+04 N
FORMIC ACID	64186	7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
FURAN	110009	6.1E+00 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
FURAZOLIDONE	67458	1.8E-02 C	1.6E-03 C	8.3E-04 C	1.5E+00 C	1.7E-01 C
FURFURAL	98011	1.1E+02 N	3.7E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
GLYCIDALDEHYDE	765344	1.5E+01 N	1.1E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
GLYPHOSATE	1071836	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
HEPTACHLOR	76448	2.3E-03 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
HEPTACHLOR EPOXIDE	1024573	1.2E-03 C	6.9E-04 C	3.5E-04 C	6.3E-01 C	7.0E-02 C
HEXABROMOBENZENE	87821	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
HEXACHLOROBENZENE	118741	6.6E-03 C	3.9E-03 C	2.0E-03 C	3.6E+00 C	4.0E-01 C
HEXACHLOROBUTADIENE	87683	1.4E-01 C !	8.0E-02 C !	4.0E-02 C !	7.3E+01 C !	8.2E+00 C !
ALPHA-HCH	319846	1.1E-02 C	9.9E-04 C	5.0E-04 C	9.1E-01 C	1.0E-01 C
BETA-HCH	319857	3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
GAMMA-HCH (LINDANE)	58899	5.2E-02 C	4.8E-03 C	2.4E-03 C	4.4E+00 C	4.9E-01 C
TECHNICAL HCH	608731	3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
HEXACHLOROCYCLOPENTADIENE	77474	1.5E-01 N	7.3E-02 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
HEXACHLORODIBENZODIOXIN MIX	19408743	1.1E-05 C	1.4E-06 C	5.1E-07 C	9.2E-04 C	1.0E-04 C
HEXACHLOROETHANE	67721	7.5E-01 C !	4.5E-01 C !	2.3E-01 C !	4.1E+02 C !	4.6E+01 C !
HEXACHLOROPHENE	70304	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,6-HEXAMETHYLENE DIISOCYANATE	822060		1.1E-02 N			
HEXANE	110543	3.5E+02 N	2.1E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
2-HEXANONE	591786	1.5E+03 N	5.1E+00 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
HEXAZINONE	51235042	1.2E+03 N	1.2E+02 N	4.5E+01 N	6.7E+04 N	2.6E+03 N
HMX	2691410	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDRAZINE	302012	2.2E-02 C	3.7E-04 C	1.1E-03 C	1.9E+00 C	2.1E-01 C
HYDROGEN CHLORIDE	7647010		2.1E+01 N			
HYDROGEN SULFIDE	7783064	1.1E+02 N	1.0E+00 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
HYDROQUINONE	123319	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
IRON	7439896	1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOBUTANOL	78831	1.8E+03 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOPHORONE	78591	7.0E+01 C	6.6E+00 C	3.3E+00 C	6.0E+03 C	6.7E+02 C
ISOPROPALIN	33820530	5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
TETRAETHYLLEAD	78002	6.1E-04 N	3.7E-04 N	1.4E-04 N	2.0E-01 N	7.8E-03 N
LITHIUM	7439932	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALATHION	121755	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALEIC ANHYDRIDE	108316	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
MANGANESE-NONFOOD	7439965	7.3E+02 N	5.2E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MANGANESE-FOOD	7439965	5.1E+03 N	5.2E-02 N	1.9E+02 N	2.9E+05 N	1.1E+04 N
MEPHOSFOLAN	950107	3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
MEPIQUAT CHLORIDE	24307264	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
MERCURIC CHLORIDE	7487947	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
MERCURY (INORGANIC)	7439976		3.1E-01 N			
METHYLMERCURY	22967926	3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHACRYLONITRILE	126987	1.0E+00 N	7.3E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHANOL	67561	1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
METHIDATHION	950378	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHOXYCHLOR	72435	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYL ACETATE	79209	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
METHYL ACRYLATE	96333	1.8E+02 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2-METHYLANILINE	95534	2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (MCPP)	93652	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHYLCYCLOHEXANE	108872	6.3E+03 N	3.1E+03 N			
METHYLENE BROMIDE	74953	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
METHYLENE CHLORIDE	75092	4.1E+00 C	3.8E+00 C	4.2E-01 C	7.6E+02 C	8.5E+01 C
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	5.2E-01 C	4.8E-02 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611	1.5E+00 C	1.4E-01 C	6.9E-02 C	1.2E+02 C	1.4E+01 C
4,4'-METHYLENEDIPHENYL ISOCYANATE	101688		6.2E-01 N			
METHYL ETHYL KETONE (2-BUTANONE)	78933	1.9E+03 N	1.0E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
METHYL HYDRAZINE	60344	6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE)	108101	2.9E+03 N	7.3E+01 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
METHYL METHACRYLATE	80626	1.4E+03 N	7.3E+02 N	1.9E+03 N	2.9E+06 N	1.1E+05 N
2-METHYL-5-NITROANILINE	99558	2.0E+00 C	1.9E-01 C	9.6E-02 C	1.7E+02 C	1.9E+01 C
METHYL PARATHION	298000	9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
2-METHYLPHENOL	95487	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
3-METHYLPHENOL	108394	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
4-METHYLPHENOL	106445	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYLSTYRENE MIX	25013154	5.5E+01 N	3.7E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ALPHA-METHYLSTYRENE	98839	4.3E+02 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
METHYL TERT-BUTYL ETHER	1634044	6.3E+03 N	3.1E+03 N			
METOLACHLOR (DUAL)	51218452	5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
MIREX	2385855	1.2E+00 N	7.3E-01 N	2.7E-01 N	4.1E+02 N	1.6E+01 N
MOLYBDENUM	7439987	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
MONOCHLORAMINE	10599903	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NALED	300765	7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
NICKEL REFINERY DUST			7.5E-03 C			
NICKEL	7440020	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
NITRATE	14797558	5.8E+04 N	5.8E+03 N	2.2E+03 N	3.3E+06 N	1.3E+05 N
NITRIC OXIDE	10102439	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NITRITE	14797650	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2-NITROANILINE	88744		2.1E-01 N			
**NITROBENZENE	98953	3.5E+00 N	2.2E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
NITROFURANTOIN	67209	2.6E+03 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
NITROFURAZONE	59870	4.5E-02 C	4.2E-03 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
NITROGEN DIOXIDE	10102440	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
**NITROGLYCERIN	55630	4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
4-NITROPHENOL	100027	2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
**2-NITROPROPANE	79469	1.3E-03 C	6.7E-04 C			
N-NITROSO-DI-N-BUTYLAMINE	924163	1.2E-02 C	1.1E-03 C	5.8E-04 C	1.1E+00 C	1.2E-01 C
N-NITROSODIETHANOLAMINE	1116547	2.4E-02 C	2.2E-03 C	1.1E-03 C	2.0E+00 C	2.3E-01 C
N-NITROSODIETHYLAMINE	55185	4.5E-04 C	4.2E-05 C	2.1E-05 C	3.8E-02 C	4.3E-03 C
N-NITROSODIMETHYLAMINE	62759	1.3E-03 C	1.2E-04 C	6.2E-05 C	1.1E-01 C	1.3E-02 C
N-NITROSODIPHENYLAMINE	86306	1.4E+01 C	1.3E+00 C	6.4E-01 C	1.2E+03 C	1.3E+02 C
N-NITROSODIPROPYLAMINE	621647	9.6E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
N-NITROSO-N-ETHYLUREA	759739	4.8E-04 C	4.5E-05 C	2.3E-05 C	4.1E-02 C	4.6E-03 C
N-NITROSO-N-METHYLETHYLAMINE	10595956	3.0E-03 C	2.8E-04 C	1.4E-04 C	2.6E-01 C	2.9E-02 C
N-NITROSOPYRROLIDINE	930552	3.2E-02 C	3.0E-03 C	1.5E-03 C	2.7E+00 C	3.0E-01 C
M-NITROTOLUENE	99081	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
O-NITROTOLUENE	88722	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
P-NITROTOLUENE	99990	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
**NUSTAR	85509199	2.6E+00 N	2.6E+00 N	9.5E-01 N	1.4E+03 N	5.5E+01 N
ORYZALIN	19044883	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
OXADIAZON	19666309	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
OXAMYL	23135220	9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
OXYFLUORFEN	42874033	1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
PARAQUAT DICHLORIDE	1910425	1.6E+02 N	1.6E+01 N	6.1E+00 N	9.2E+03 N	3.5E+02 N
PARATHION	56382	2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
PENTACHLOROBENZENE	608935	4.9E+00 N	2.9E+00 N	1.1E+00 N	1.6E+03 N	6.3E+01 N
PENTACHLORONITROBENZENE	82688	4.1E-02 C	2.4E-02 C	1.2E-02 C	2.2E+01 C	2.5E+00 C
PENTACHLOROPHENOL	87865	5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C
PERMETHRIN	52645531	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
PHENOL	108952	2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
M-PHENYLENEDIAMINE	108452	2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
O-PHENYLENEDIAMINE	95545	1.4E+00 C	1.3E-01 C	6.7E-02 C	1.2E+02 C	1.4E+01 C
P-PHENYLENEDIAMINE	106503	6.9E+03 N	6.9E+02 N	2.6E+02 N	3.9E+05 N	1.5E+04 N
2-PHENYLPHENOL	90437	3.5E+01 C	3.3E+00 C	1.7E+00 C	3.0E+03 C	3.4E+02 C
PHOSPHINE	7803512	1.1E+01 N	3.1E-01 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
PHOSPHORIC ACID	7664382		1.1E+01 N			
PHOSPHORUS (WHITE)	7723140	7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
P-PHTHALIC ACID	100210	3.7E+04 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
PHTHALIC ANHYDRIDE	85449	7.3E+04 N	1.3E+02 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
POLYBROMINATED BIPHENYLS		7.5E-03 C	7.0E-04 C	3.5E-04 C	6.4E-01 C	7.2E-02 C !
POLYCHLORINATED BIPHENYLS	1336363	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1016	12674112	9.6E-01 C !	8.9E-02 C !	4.5E-02 C !	8.2E+01 C !	5.5E+00 N
AROCLOR-1221	11104282	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1232	11141165	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1242	53469219	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1248	12672296	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1254	11097691	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C !
AROCLOR-1260	11096825	3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
POLYCHLORINATED TERPHENYLS	61788338	1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
POLYNUCLEAR AROMATIC HYDROCARBONS:						
ACENAPHTHENE	83329	2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
ANTHRACENE	120127	1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZ[A]ANTHRACENE	56553	9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[B]FLUORANTHENE	205992	9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[K]FLUORANTHENE	207089	9.2E-01 C	8.6E-02 C	4.3E-02 C	7.8E+01 C	8.7E+00 C
BENZO[A]PYRENE	50328	9.2E-03 C	2.0E-03 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
CARBAZOLE	86748	3.3E+00 C	3.1E-01 C	1.6E-01 C	2.9E+02 C	3.2E+01 C
CHRYSENE	218019	9.2E+00 C	8.6E-01 C	4.3E-01 C	7.8E+02 C	8.7E+01 C
DIBENZ[A,H]ANTHRACENE	53703	9.2E-03 C	8.6E-04 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
**DIBENZOFURAN	132649	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
FLUORANTHENE	206440	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
FLUORENE	86737	1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
INDENO[1,2,3-C,D]PYRENE	193395	9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
**2-METHYLNAPHTHALENE	91576	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
**NAPHTHALENE	91203	7.3E+02 N	3.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
PYRENE	129000	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
PROMETON	1610180	5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
PROMETRYN	7287196	1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
PROPACHLOR	1918167	4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
PROPANIL	709988	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
PROPARGITE	2312358	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
N-PROPYLBENZENE		6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
PROPYLENE GLYCOL	57556	7.3E+05 N	7.3E+04 N	2.7E+04 N	4.1E+07 N	1.6E+06 N
PROPYLENE GLYCOL, MONOETHYL ETHER	52125538	2.6E+04 N	2.6E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	2.6E+04 N	2.1E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
PURSUIT	81335775	9.1E+03 N	9.1E+02 N	3.4E+02 N	5.1E+05 N	2.0E+04 N
PYRIDINE	110861	3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
QUINOLINE	91225	5.6E-03 C	5.2E-04 C	2.6E-04 C	4.8E-01 C	5.3E-02 C
RDX	121824	6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C
RESMETHRIN	10453868	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
**RONNEL	299843	3.0E+02 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
ROTENONE	83794	1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SELENIOUS ACID	7783008	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SELENIUM	7782492	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SILVER	7440224	1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SIMAZINE	122349	5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C
SODIUM AZIDE	26628228	1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SODIUM DIETHYLDITHIOCARBAMATE	148185	2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
STRONTIUM, STABLE	7440246	2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
STRYCHNINE	57249	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
STYRENE	100425	1.6E+03 N	1.0E+03 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746016	4.5E-07 C	4.2E-08 C	2.1E-08 C	3.8E-05 C	4.3E-06 C
1,2,4,5-TETRACHLOROBENZENE	95943	1.8E+00 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,1,1,2-TETRACHLOROETHANE	630206	4.1E-01 C	2.4E-01 C	1.2E-01 C	2.2E+02 C	2.5E+01 C
**1,1,2,2-TETRACHLOROETHANE	79345	5.3E-02 C	3.1E-02 C	1.6E-02 C	2.9E+01 C	3.2E+00 C
TETRACHLOROETHENE	127184	1.1E+00 C	3.1E+00 C	6.1E-02 C	1.1E+02 C	1.2E+01 C
2,3,4,6-TETRACHLOROPHENOL	58902	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
P,A,A,A-TETRACHLOROTOLUENE	5216251	5.3E-04 C	3.1E-04 C	1.6E-04 C	2.9E-01 C	3.2E-02 C
1,1,1,2-TETRAFLUOROETHANE	811972	1.7E+05 N	8.4E+04 N			
TETRYL	479458	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
THALLIC OXIDE	1314325	2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM	7440280	2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM ACETATE	563688	3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM CARBONATE	6533739	2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM CHLORIDE	7791120	2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM NITRATE	10102451	3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM SULFATE (2:1)	7446186	2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THIOBENCARB	28249776	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TIN	7440315	2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TITANIUM	7440326	1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TITANIUM DIOXIDE	13463677	1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TOLUENE	108883	7.5E+02 N	4.2E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
TOLUENE-2,4-DIAMINE	95807	2.1E-02 C	2.0E-03 C	9.9E-04 C	1.8E+00 C	2.0E-01 C
TOLUENE-2,5-DIAMINE	95705	2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TOLUENE-2,6-DIAMINE	823405	7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
P-TOLUIDINE	106490	3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
**TOXAPHENE	8001352	9.6E-03 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
1,2,4-TRIBROMOBENZENE	615543	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
TRIBUTYLTIN OXIDE	56359	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
2,4,6-TRICHLOROANILINE	634935	2.0E+00 C	1.8E-01 C	9.3E-02 C	1.7E+02 C	1.9E+01 C
1,2,4-TRICHLOROBENZENE	120821	1.9E+02 N	2.1E+02 N	1.4E+01 N	2.0E+04 N	7.8E+02 N

TABLE 1-1 (Continued)
EPA REGION III RISK-BASED CONCENTRATIONS
(JANUARY 1999)

Chemical	CAS	Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
1,1,1-TRICHLOROETHANE	71556	5.4E+02 N	1.0E+03 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,1,2-TRICHLOROETHANE	79005	1.9E-01 C	1.1E-01 C	5.5E-02 C	1.0E+02 C	1.1E+01 C
TRICHLOROETHENE	79016	1.6E+00 C	1.0E+00 C	2.9E-01 C	5.2E+02 C	5.8E+01 C !
TRICHLOROFLUOROMETHANE	75694	1.3E+03 N	7.3E+02 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
2,4,5-TRICHLOROPHENOL	95954	3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2,4,6-TRICHLOROPHENOL	88062	6.1E+00 C	6.3E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
2,4,5-T	93765	3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93721	2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,1,2-TRICHLOROPROPANE	598776	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,2,3-TRICHLOROPROPANE	96184	1.5E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
1,2,3-TRICHLOROPROPENE	96195	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	5.9E+04 N	3.1E+04 N	4.1E+04 N	6.1E+07 N	2.3E+06 N
1,2,4-TRIMETHYLBENZENE	95636	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
1,3,5-TRIMETHYLBENZENE	108678	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
TRIMETHYL PHOSPHATE	512561	1.8E+00 C	1.7E-01 C	8.5E-02 C	1.5E+02 C	1.7E+01 C
1,3,5-TRINITROBENZENE	99354	1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2,4,6-TRINITROTOLUENE	118967	2.2E+00 C !	2.1E-01 C !	1.1E-01 C !	1.9E+02 C !	2.1E+01 C !
URANIUM (SOLUBLE SALTS)		1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
VANADIUM	7440622	2.6E+02 N	2.6E+01 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
VANADIUM PENTOXIDE	1314621	3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
VANADIUM SULFATE	16785812	7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
VINCLOZOLIN	50471448	9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
VINYL ACETATE	108054	4.1E+02 N	2.1E+02 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
VINYL CHLORIDE	75014	1.9E-02 C	2.1E-02 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
WARFARIN	81812	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
M-XYLENE	108383	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
O-XYLENE	95476	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
P-XYLENE	106423					
XYLENES	1330207	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ZINC	7440666	1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ZINC PHOSPHIDE	1314847	1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
ZINEB	12122677	1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

Key:

Sources:
I = IRIS
H = HEAST
A = HEAST Alternate
W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value
O = other

Basis: Risk-based concentrations
C = Carcinogenic effects
N = Noncarcinogenic effects
! = RBC at HI of 0.1 < RBC-c

The January 1999 revisions to 18 AAC 75 provides four options for setting soil cleanup criteria:

- Method 1 is the ADEC matrix criteria that have been used in the past for petroleum contamination. The revised regulation add criteria to polynuclear aromatic hydrocarbons (PAH) and revise BTEX criteria. The ADEC matrix criteria are presented in Table 1-2.

- Method 2 sets numerical cleanup criteria for ranges of petroleum constituents (RRO, DRO and GRO), individual petroleum constituents (e.g., benzene, toluene, ethylbenzene and xylenes (BTEX) and PAH) and other common contaminants (e.g., solvents, metals) in soil and water. The criteria are set for three different geographical zones (i.e., arctic, over 40 inches rainfall per year and under 40 inches per year) and three exposure pathways (i.e., inhalation, ingestion, and migration to groundwater). Northeast Cape falls in the zone under 40 inches of precipitation. The cleanup criteria for constituents in soil and water, under 40 inches rainfall zone, are presented in Table 1-3. The under-40-inches-rainfall-per-year zone cleanup criteria for constituents in soil are presented in Table 1-3. Method 2 requires calculation of cumulative risk for chemicals detected at concentrations 1/10th of the cleanup table levels.

- Method 3 provides a method to modify the cleanup criteria in Method 2 using site-specific factors such as total organic carbon, grain size and bulk soil density. This method requires calculation of cumulative risk for chemicals detected at 1/10th the cleanup table level.

- Method 4 provides a method for performing a site-specific risk assessment.

Groundwater cleanup criteria are identified in 18 AAC 75.345, Table C and are shown in Table 1-4 of this report. At this time, ADEC considers groundwater to be a potential drinking water source. This document uses a combination of ADEC Method 1, 2 and 3 as cleanup criteria. For sites where contaminant levels fall below the ADEC matrix levels, Method 1 criteria are used to support a recommendation for no further action. For sites where petroleum levels exceed the ADEC matrix levels, Method 2 criteria are used. If Method 2 criteria are exceeded, site-specific information is used to develop cleanup criteria in accordance with Method 3 procedures, and these site-specific criteria are used to assess the need for cleanup.

The revised 18 AAC 75 regulations refer to site-specific cleanup levels for PCB, dioxin and lead. Site-specific levels for these three constituents are discussed and proposed below.

The 18 AAC 75 regulations state that PCB cleanup standards are determined on a site-specific basis under the U.S. Environmental Protection Agency (EPA) Spill Cleanup Policy (40 CFR 761.120- 40 CFR 761.135) or by a site-specific risk assessment. The EPA Spill Cleanup Policy is applicable to recent PCB releases. On June 29, 1998, EPA released a final rule significantly amending PCB regulations. Consistent with the EPA Spill Cleanup Policy, this rule, effective August 28, 1998, creates a new section in the Toxic Substance Control Act (TSCA) regulations that specifies disposal requirements for remediation wastes (40 CFR 761.61). Remediation wastes are defined under the regulation to include soil, rags, sediments, and debris contaminated by a spill of PCB. The rule allows for a choice between three remediation waste disposal approaches: self-implementing disposal, performance-based disposal and risk-based disposal.

TABLE 1-2
PROPOSED SOIL CLEANUP CRITERIA, ADEC METHOD 1

		Points	Sites 9-22, 27, 28, 29	Sites 1-8, 23-26
1.	**Depth to Subsurface Water**			
	<5 feet	(10)		
	5 - 15 feet	(8)	8	8
	15 - 25 feet	(6)		
	25 - 50 feet	(4)		
	>50 feet	(1)		
2.	**Mean Annual Precipitation**			
	>40 inches	(10)		
	25 - 40 inches	(5)		
	15 - 25 inches	(3)	3	3
	<15 inches	(1)		
3.	**Soil Type**			
	clean, coarse-grained soils	(10)		
	coarse-grained soils with fines	(8)	8	8
	fine-grained soils (low organic carbon)	(3)		
	fine-grained soils (high organic carbon)	(1)		
4.	**Potential Receptors**			
	public well within 1,000 feet, or private well(s) within 500 feet	(15)	15	
	municipal/private well within 1/2 mile	(12)		
	municipal/private well within 1 mile	(8)		
	no known well within 1/2 mile	(6)		
	no known well within 1 mile	(4)		4
	non-potable groundwater	(1)		
5.	**Volume of Contaminated Soil**			
	>500 cubic yards	(10)	10	
	100 - 500 cubic yards	(8)		
	25 - 100 cubic yards	(5)		
	>De Minimis - 25 cubic yards	(2)		2
	De Minimis	(0)		
	Matrix Score		44	25
	Matrix Level		A	C
	ADEC Site Cleanup Level Estimate (mg/Kg)	**RRO**	2,000	2,000
		DRO	100	1,000
		GRO	50	500

		Cleanup Level Estimate in mg/Kg	
		Diesel	Gasoline/Unknown
Matrix Score		Diesel-Range Petroleum Hydrocarbons	Gasoline-Range Petroleum Hydrocarbons
Level A	>40	100	50
Level B	27-40	200	100
Level C	21-26	1,000	500
Level D	<20	2,000	1,000

RRO = 2,000 mg/Kg

Source: 18 AAC 75 (revised January 22, 1999)

TABLE 1-3
PROPOSED SOIL CLEANUP CRITERIA, ADEC METHOD 2

Constituent	Under 40 inches rainfall per year			
	Inhalation mg/kg	Ingestion mg/kg	Migration to Groundwater mg/kg	Limiting Level mg/kg
Residual Range Organics (RRO)	22,000	10,000	11,000	10,000
Diesel Range Organics (DRO)	12,500	10,250	250	250
Gasoline Range Organics (GRO)	1,400	1,400	300	300
1,1,1-Trichloroethane	460		1.0	1.0
1,1,2,2-Tetrachloroethane	5	42	0.02	0.02
1,1,2-Trichloroethane	10	150	0.02	0.02
1,1-Dichloroethane	890	10,000	12	12
1,1-Dichloroethene	0.9	14	0.03	0.03
1,2,4-Trichlorobenzene	570	1,000	2	2
1,2-Dichlorobenzene	110	9,100	7	7
1,2-Dichloroethane	5	91	0.02	0.02
1,2-Dichloropropane	17	120	0.02	0.02
1,3-Dichloropropane	2	30	0.02	0.02
1,4-Dichlorobenzene	8,000	350	0.8	0.8
2,4,5-Trichlorophenol		10,000	90	90
2,4,6-Trichlorophenol	1,500	750	0.6	0.6
2,4-Dichlorophenol		300	0.5	0.5
2,4-Dimethylphenol		2,000	4	4
2,4-Dinitrophenol		200	0.2	0.2
2,4-Dinitrotoluene		12	0.3	0.3
2,6-Dinitrotoluene		12	0.1	0.1
2-Chlorophenol		510	1.0	1.0
2-Methylphenol (o-cresol)		5,100	7	7
3,3-Dichlorobenzidine		18	0.02	0.02
Acenaphthene		6,100	210	210
Acetone		10,000	10	10
Aldrin	24	0.5	1.6	0.5
Anthracene		30,000	4,300	4,300
Antimony		41	0.02	0.02
Arsenic		5	0.1	0.1
Barium		7,100	5	5
Benzene	9	290	0.02	0.02
Benzo(a)anthracene		11	6	6
Benzo(a)pyrene		1	3	1
Benzo(b)fluoranthene		11	20	11
Benzo(k)fluoranthene		110	200	110
Benzoic acid		410,000	390	390
Beryllium		1.9	0.01	0.01
Bis(2-chlorethyl)ether	3	8	0.002	0.002
Bis(2-ethylhexyl)phthalate		590	1,200	590
Bromodichloromethane		130	0.4	0.4
Bromoform	500	1,050	0.4	0.4
Butanol		10000	10	10

TABLE 1-3 (continued)
PROPOSED SOIL CLEANUP CRITERIA, ADEC METHOD 2

Constituent	Under 40 inches rainfall per year			
	Inhalation mg/kg	Ingestion mg/kg	Migration to Groundwater mg/kg	Limiting Level mg/kg
Butyl benzyl phthalate		20,000	5,600	5,600
Cadmium		100	0.01	0.01
Carbazole		420	2.0	2.0
Carbon disulfide	120	10,000	17	17
Carbon tetrachloride	3	64	0.03	0.03
Chlordane	140	6	3	3
Chlorobenzene	110	2,000	0.6	0.6
Chlorodibromomethane		100	0.2	0.2
Chloroform	3	1,400	0.3	0.3
Chromium		510	0.3	0.3
Chromium +3		100,000	4,400	4,400
Chromium, Hexavalent		510	0.5	0.5
Chrysene		1,100	620	620
Cyanide		2,000	2	2
DDD		35	47	35
DDE		24	150	24
DDT	5,300	24	88	24
Di-n-butyl phthalate		10,000	1,700	1,700
Di-n-octyl phthalate		2,000	810,000	2,000
Dibenzo(a,h)anthracene		1	6	1
Dieldrin	8	0.5	0.02	0.02
Diethyl phthalate		81,000	90	90
Dimethyl phthalate		10,000,000	1,400	1,400
Endosulfan		610	7	7
Endrin		30	0.3	0.3
Ethylbenzene	89	10,000	6	6
Fluoranthene		4,100	2,100	2,100
Fluorene		4,100	270	270
Heptachlor	0.8	2	8	0.8
Heptachlor epoxide	33	0.9	0.2	0.2
Hexachlorobenzene	7	5	1.0	1.0
Hexachlorobutadiene	55	110	8	8
Hexachlorocyclopentadiene	7	710	130	7
Hexachloroethane	390	590	2	2
Indeno(1,2,3-cd)pyrene		11	54	11
Isophorone		8,700	3	3
Lead		400		400 [a]
Lindane		6	0.003	0.003
Mercury	18		0.006	0.006
Methoxychlor		510	52	52

TABLE 1-3 (continued)
PROPOSED SOIL CLEANUP CRITERIA, ADEC METHOD 2

Constituent	Under 40 inches rainfall per year			
	Inhalation mg/kg	Ingestion mg/kg	Migration to Groundwater mg/kg	Limiting Level mg/kg
Methyl bromide	14	140	0.2	0.2
Methylene chloride	180	1,100	0.02	0.02
Naphthalene		4,100	43	43
Nickel		2000	2	2
Nitrobenzene	90	51	0.06	0.06
Pentachlorophenol		35	0.01	0.01
Phenol		60,800	67	67
Pyrene		3,000	1,500	1,500
Selenium		510	0.1	0.1
Silver		510	0.5	0.5
Styrene	280	20,300	1.0	1.0
Tetrachloroethylene	80	160	0.03	0.03
Toluene	180	20,300	5	5
Toxaphene	620	8	4	4
Tribromomethane	500	1,050	0.4	0.4
Trichloroethylene	43	750	0.02	0.02
Vanadium		710	0.7	0.7
Vinyl Acetate	1,500	101,000	100	100
Vinyl chloride	0.5	4	0.009	0.009
Xylenes	81	203,000	78	78
Zinc		30,000	30	30
alpha-Hexachlorocyclohexane	6	1.3	0.003	0.003
beta-Hexachlorocyclohexane	43	5	0.009	0.009
cis-1,2-Dichloroethene		1,000	0.2	0.2
gamma-Hexachlorocyclohexane		6	0.003	0.003
n-Nitrosodi-n-propylamine		1.2	0.0004	0.0004
n-Nitrosodiphenylamine		1,700	3	3
p-Chloroaniline		410	0.5	0.5
trans-1,2-Dichloroethene		2,000	0.4	0.4

Key:
Blank space indicates that there is no criteria.
[a] Residential soil
Source: 18AAC75

Site-specific criteria

Constituent	Residential mg/Kg	Commercial/Industrial mg/Kg
Dioxin	0.001	--
Lead	400	1,000
PCB (ADEC surface soil)	1	10
PCB (ADEC subsurface soil)	10	25
PCB (Federal)	25 (low occupancy)	

TABLE 1-4
PROPOSED GROUNDWATER AND SURFACE WATER CLEANUP CRITERIA

Constituent	Groundwater 18AAC75[a] mg/L	Surface Water 18AAC70[b] mg/L
1,1,1,2-Tetrachloroethane	0.004	
1,1,1-Trichloroethane	0.2	0.200
1,1,2-Trichloroethane	0.005	9.400
1,1-Dichloroethane	3.7	
1,1-Dichloroethene	0.007	0.007
1,2,4-Trichlorobenzene	0.07	
1,2-Dichlorobenzene	0.6	0.763
1,2-Dichloroethane	0.005	0.005
1,2-Dichloropropane	0.005	
1,3-Dichloropropene	0.005	
1,3-Hexachlorobutadiene	0.01	
1,4-Dichlorobenzene	0.075	0.075
2,4,5-Trichlorophenol	3.7	
2,4,6-Trichlorophenol	0.08	0.970
2,4-Dichlorophenol	0.1	0.365
2,4-Dimethylphenol	0.7	2.12
2,4-Dinitrophenol	0.07	
2,4-Dinitrotoluene	0.07	0.230
2,6-Dinitrotoluene	0.04	
2-Chlorophenol	0.2	2
3,3-Dichlorobenzidine	0.002	
Acenaphthene	2.2	0.520
Acetone	3.7	
Aldrin	0.00005	0.003
Anthracene	11	0.010[d]
Antimony	0.006	1.6
Arsenic	0.05	0.050
Barium	2	1
Benzene	0.005	0.005
Benzo(a)anthracene	0.001	0.010[d]
Benzo(a)pyrene	0.0002	0.010[d]
Benzo(b)fluoranthene	0.001	0.010[d]
Benzo(k)fluoranthene	0.01	0.010[d]
Benzoic acid	146	
Beryllium	0.004	0.0053
Bis(2-chloroethyl)ether	0.0008	
Bis(2-ethylhexyl)phthalate	0.006	
Bromodichloromethane	0.1	
Bromoform	0.1	
Butanol	3.7	
Butyl benzyl phthalate	7.3	
Cadmium	0.005	0.0066[c]

TABLE 1-4 (continued)
PROPOSED GROUNDWATER AND SURFACE WATER CLEANUP CRITERIA

Constituent	Groundwater 18AAC75[a] mg/L	Surface Water 18AAC70[b] mg/L
Carbazole	0.04	
Carbon disulfide	3.7	
Carbon tetrachloride	0.005	0.005
Chlordane	0.002	0.0000043
Chlorobenzene	0.1	0.050
Chlorodibromomethane	0.06	
Chloroethene	0.002	
Chloroform	0.1	1.24
Chromium	0.1	
Chromium +3	36.5	0.12[c]
Chromium, Hexavalent	0.1	0.011
Chrysene	0.1	0.010[d]
Copper	1.3	0.00065[c]
Cyanide	0.2	0.0052
DDD	0.004	0.0006
DDE	0.003	1.05
DDT	0.003	0.000001
Di-n-butyl phthalate	3.7	
Di-n-octyl phthalate	0.7	
Dibenzo(a,h)anthracene	0.0001	0.010[d]
Dieldrin	0.00005	0.0000019
Diesel Range Organics	1.5	
Diethyl phthalate	29	
Dioxin	0.00000003	0.00000001
Endosulfan	0.2	0.000056
Endrin	0.002	0.0000023
Ethylbenzene	0.7	32
Fluoranthene	1.5	3.98
Fluorene	1.5	0.010[d]
Gasoline Range Organics	1.3	
Heptachlor	0.0004	0.0000038
Heptachlor Epoxide	0.0002	
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	0.0052
Hexachloroethane	0.06	0.54
Indeno(1,2,3-cd)pyrene	0.001	0.010[d]
Isophorone	0.9	117
Lead	0.015	0.0013[c]
Lindane	0.0002	0.00008
Mercury	0.002	0.000012
Methoxychlor	0.04	0.00003
Methyl bromide	0.05	
Methylene chloride	0.005	

TABLE 1-4 (continued)
PROPOSED GROUNDWATER AND SURFACE WATER CLEANUP CRITERIA

Constituent	Groundwater 18AAC75[a] mg/L	Surface Water 18AAC70[b] mg/L
Methylphenol (o-cresol)	1.8	
Naphthalene	1.5	0.620
Nickel	0.7	0.056
Nitrobenzene	0.02	27
Pentachlorophenol	0.001	0.0032
Phenol	22	2.56
Polychlorinated biphenyls (PCBs)	0.0005	0.000014
Pyrene	1.1	0.010[d]
Residual Range Organics	1.1	
Selenium	0.05	
Silver	0.2	0.00012
Styrene	0.1	
Tetrachloroethylene	0.005	0.840
Thallium	0.002	0.040
Toluene	1	0.010[d]
Total aqueous hydrocarbons (TaqH)		0.015
Total aromatic hydrocarbons (TAH)		0.010
Toxaphene	0.003	0.000013
Tribromomethane	0.1	
Trichloroethylene	0.005	0.005
Vanadium	0.3	
Vinyl Acetate	37	
Vinyl chloride	0.002	0.002
Xylenes	10	0.010[d]
Zinc	11	0.047
alpha-Hexachlorocyclohexane	0.0001	
beta-Hexachlorocyclohexane	0.0005	
cis-1,2-Dichloroethene	0.07	
gamma-Hexachlorocyclohexane	0.0002	
n-Nitrosodi-n-propylamine	0.0001	
n-Nitrosodiphenylamine	0.2	
p-Chloroaniline	0.1	
trans-1,2-Dichloroethene	0.1	

Key:

[a] 18 AAC 75

[b] 18 AAC 70, Freshwater Criteria

[c] At 50 mg/L $CaCO_3$

[d] Total aromatic hydrocarbons

Notes: TaqH = BTEX and PAH
TAH = BTEX

Self-implementing disposal requires 30-day advance notification to EPA of the cleanup. Self-implementing disposal criteria are based on two exposure scenarios, high-occupancy and low-occupancy, and up to four remediation options. The high-occupancy scenario assumes an unprotected individual occupies the area for more than 335 hours per year. The low-occupancy area assumes the area is occupied less than 335 hours per year. The low-occupancy criteria were selected for Northeast Cape because the area is covered by snow or ice most of the year (eliminating the exposure pathway) and traversed infrequently by local residents during the time the ground is exposed.

Remediation options and cleanup criteria for the low-occupancy scenario are shown in Table 1-5 below.

TABLE 1-5
PCB REMEDIATION WASTE CLEANUP CRITERIA
SELF-IMPLEMENTING DISPOSAL

Low-Occupancy

Cleanup/Disposal Method	Bulk PCB Remediation Waste Cleanup Level
Remove and dispose or decontaminate all wastes at concentrations greater than 25 ppm PCB	Less than or equal to 25 ppm PCB
On-site solvent extraction of PCB from remediation waste	Less than or equal to 25 ppm PCB
Secure site with fencing posted with a PCB warning sign	Less than or equal to 50 ppm PCB
Cap wastes on-site 10-inch thick soil cap for soils >1 but <10 ppm PCB. Alternative is a 6-inch concrete or asphalt cap meeting the design and monitoring requirements in Toxic Substance Control Act (TSCA) and Resource Conservation and Recovery Act (RCRA).	Less than or equal to 100 ppm PCB

In addition to the on-site cleanup options listed above, bulk PCB remediation wastes with less than 50 ppm PCB can be sent to a state-permitted lined, Class I non-hazardous waste landfill without the notification and manifesting requirements of Subpart K. However, the landfill permit may restrict the concentrations of PCB further and/or the landfill may choose to reject the waste.

The State of Alaska PCB cleanup criteria (18 AAC 75.341(c)) are more stringent than federal standards. State of Alaska cleanup levels for unrestricted land use are less than 1 mg/Kg in surface soil (top two feet) and less than 10 mg/Kg for subsurface soil. For industrial or commercial land use, the levels are 10 mg/Kg in surface soil and less than 25 mg/Kg in subsurface soil. Assumptions based on limited future land use require landowner consent and may require institutional controls (18 AAC 75.340(e)(3)).

In this report, State of Alaska criteria of 1 mg/Kg PCB in soil are used to identify potential contaminants of potential concern in soil. The Feasibility Study and/or future reports will identify proposed cleanup levels.

The 18 AAC 75 regulations state that dioxin cleanup standards are determined on a site-specific basis. In the past, ADEC has used EPA's Nation Dioxin Study (EPA/440/4-87-003) as precedent for developing site-specific cleanup levels for dioxins within the State of Alaska (ADEC, 1994). This document proposes a cleanup goal of 1 micrograms per kilogram (μg/Kg) of 2,3,7,8-TCDD in soil except in areas used to graze livestock. Site-specific factors could be used to further refine this number.

The 18 AAC 75 regulations state that lead cleanup standards be determined on a site-specific basis based on land use. The residential cleanup standard is 400 milligrams per kilogram (mg/Kg) lead in soil, while the industrial or commercial standard is 1,000 mg/Kg. On a site-specific basis, approved exposure models can be used to evaluate exposure. Alternative cleanup standards can also be proposed based on the speciation of lead present at the site. The site-specific level proposed for this site is 400 mg/Kg (i.e., residential use). Although residential use is not anticipated and is very conservative for this site, lead is not a major contaminant at the installation, and the conservative benchmark is not anticipated to result in additional remediation.

Water and gravel and/or tundra samples were collected from ephemeral ponds at many sites. These samples have always been referred to as surface water and sediment samples. However, the surface water at Sites 1 through 27 consist only of ephemeral ponds or puddles that dry up and reappear at other locations over the course of the short summer season. Due to their transient nature, they do not support fish. Therefore, the "sediments" are more accurately evaluated as soils. In this report, soil cleanup criteria are used to evaluate "sediments" collected from ephemeral ponds and puddles.

Sediments collected at Site 28, the Drainage Basin; Site 29, Suqi River; and Site 30, Background (Reference Creek) are properly referred to as sediments, because they are part of permanent drainage and could potentially support fish. No numerical sediment criteria are identified for the site at this time. Criteria will be developed in conjunction with the biological sampling planned for July 1999. The Screening Quick Reference Tables (SQUIRT) published by the National Oceanographic and Atmospheric Organization (NOAA) are used to provide some insight into which chemicals may be contaminants of concern at Site 28 and 29.

Tundra. Generalized numerical cleanup levels for contamination in tundra are not provided in the January 1999 revision of the regulations. Tundra cleanup levels are determined on a site-specific basis. Cleanup decisions are based on the potential adverse impact to the environment as a result of remedial activity. Factors that contribute to a decision on cleanup levels include whether there is permafrost below the tundra, thickness of permafrost, whether groundwater is present, whether downgradient surface water receptors are being impacted and whether the contamination is migrating through surface or subsurface soil. ADEC recognizes that excavation of tundra is typically undesirable because of the impact on permafrost and because tundra typically does not regrow after excavation.

1.4.3 Waste Disposal

Prior to disposal, wastes are characterized as hazardous or non-hazardous wastes in accordance with the Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261). Discarded commercial chemical products, off-specification products, container residues, and spill residues listed in 40 CFR 261.33 are designated as hazardous wastes. Wastes from non-specific and specific sources and listed in 40 CFR 261.31 and 40 CFR 261.32 are designated as hazardous wastes. A combination of generator knowledge and analytical testing is used to determine if the wastes exhibit any of the four hazardous waste characteristics: ignitability, reactivity, corrosivity or toxicity. If so, the waste is designated as a hazardous waste and the appropriate waste codes are assigned. If the waste is not a listed or is not a characteristic hazardous waste, it is designated as a solid waste.

Hazardous wastes are managed in accordance with RCRA and the applicable Department of Transportation (DOT) (49 CFR 170-179) requirements for packaging, labeling, marking, placarding and transportation.

Waste water, such as water accumulated in tanks or subterranean structures, is compared to the groundwater criteria in 18 AAC 75 and the freshwater surface water criteria in 18 AAC 70. The disposal recommendation for water meeting both these criteria is direct discharge to the ground.

1.5 SITE CHARACTERISTICS

1.5.1 Climate

St. Lawrence Island has a cool, moist, subarctic maritime climate with some continental influences during winter when much of the Bering Sea is capped with pack ice. Winds and fog are common; precipitation occurs approximately 300 days per year as light rain, mist or snow. Annual snowfall is about 80 inches per year. Annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 48° Fahrenheit (F) and 34° F, with a record high of 65°F. Winter temperatures range from -2°F to 10°F, with an extreme low of -30°F (URS, 1985). Freeze-up normally occurs in October or November, and break-up normally occurs in June.

The wind is generally in a northerly to northeasterly direction from September to June, and southwesterly in July and August. Winds exceeding 10 knots occur 70 percent of the time, and average 20 knots in winter months. The average wind speed is 18 miles per hour (USKH, 1993). Gusts in the Northeast Cape area have been measured as high as 110 miles per hour.

1.5.2 Topography

The installation acreage consists mainly of flat coastal plains, which gradually turn into rolling tundra towards the base of the Kinipaghulghat Mountains, which rise abruptly to a maximum elevation of approximately 1,800 feet above sea level about two miles south of the site. The majority of the former installation acreage is at an elevation of 20 to 80 feet above MSL.

1.5.3 Geology

St. Lawrence Island consists of isolated bedrock highlands of igneous, metamorphic, and older sedimentary rocks surrounded by unconsolidated surficial deposits overlying a relatively shallow erosional bedrock surface. In the immediate vicinity of this investigation area, shallow unconsolidated surficial materials overlie quartz monzonitic rocks of the Kinipaghulghat Pluton (Patton and Csejtey, 1980). The pluton forms the mountainous area south of the site, which includes Kangukhsam Mountain. Immediately south of the site, an unnamed drainage in the Kinipaghulghat Pluton has created an erosional valley and alluvial fan of unconsolidated sediments. The primary areas of this investigation are located on this alluvial fan, which progrades north from the mountain front toward the Bering Sea. Granitic bedrock materials are exposed at the coast north of the site at Kitnagak Bay, suggesting that quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform.

The unconsolidated alluvial materials exhibit a soil profile in areas, which has not been disturbed by man. In general, native soil stratigraphy at the site is characterized by silts near the surface, overlying more sand-dominated soils at depth. The silt may contain varying quantities of clay/sand/gravel, and may vary from zero to ten feet in thickness. The silt is dark brown to dark green, and sometimes exhibits a mottled texture. In some areas, the silt exhibits an aqua green or blue color. Dark brown silts are observed in outcrop. The sand at depth contains varying degrees of silt/gravel/cobbles and may vary from two feet to greater than twenty feet in thickness. These deeper, course-grained materials are generally unsorted and are likely to be of glaciofluvial origin. The depth to bedrock at the site is unknown.

1.5.4 Hydrogeology

Because of the relatively remote and undeveloped nature of St. Lawrence Island, there is little data on the regional groundwater regime. The bedrock materials south of the site (and underlying the unconsolidated deposits) are not expected to store and transmit significant quantities of groundwater. Typically, these types of granitic rocks are generally impermeable, and transmit groundwater only through localized fractures and weathered soil zones at the surface.

The primary potential aquifer at the Northeast Cape site is unconsolidated alluvial material, which underlies all of the areas examined during this investigation. The mountainous area south of the site provides an ideal recharge area for the unconsolidated materials, providing runoff from rain and snowmelt during the summer months. Based on the topography and geology of the site, the regional groundwater flow direction is expected to be from the mountainous recharge area south of the site, flowing north and eventually discharging to the Bering Sea.

However, a key factor influencing the flow of groundwater at the site is the existence of permafrost and frozen soils, which render the unconsolidated materials effectively impermeable in areas. The United States Geological Survey (USGS) has classified St. Lawrence Island as an area of "moderately thick to thin permafrost". Although the depth of permafrost at St. Lawrence Island is unknown, the base of permafrost on the mainland at Nome (135 air miles to the northeast) is estimated to be at a depth 120 feet (Ferrians, 1965). The deeper unconsolidated

deposits at the site are probably permanently frozen, and the shallow soils investigated during this investigation represent the active layer where soils are thawed only during portions of the year. Frozen soils are expected to have a profound effect in retarding groundwater flow during most of the year. Groundwater elevations have not been documented or used to confirm or refute the direction of ground water flow.

Northeast Cape apparently used groundwater as a source of water supply. There are four out-of-service production wells at the Northeast Cape installation, which are designated Wells 1 through 4 (E&E, 1993). Three wells are located within Site 22 (Water Wells and Water Supply Building) and the fourth well is located at Site 26 (Former Construction Camp). Little is known about the capacity or construction characteristics of these wells. The drilling log is available for one of the wells, indicating "coarse sand (water)" at a depth of 9 to 28 feet, underlying silty surficial deposits, and clean gravel and sand from a depth of 28 to 32 feet. The water wells at the installation were probably not very productive, given that the four wells were located in a small geographic area and a large water storage volume was required. These wells may have been subject to freezing in the winter months.

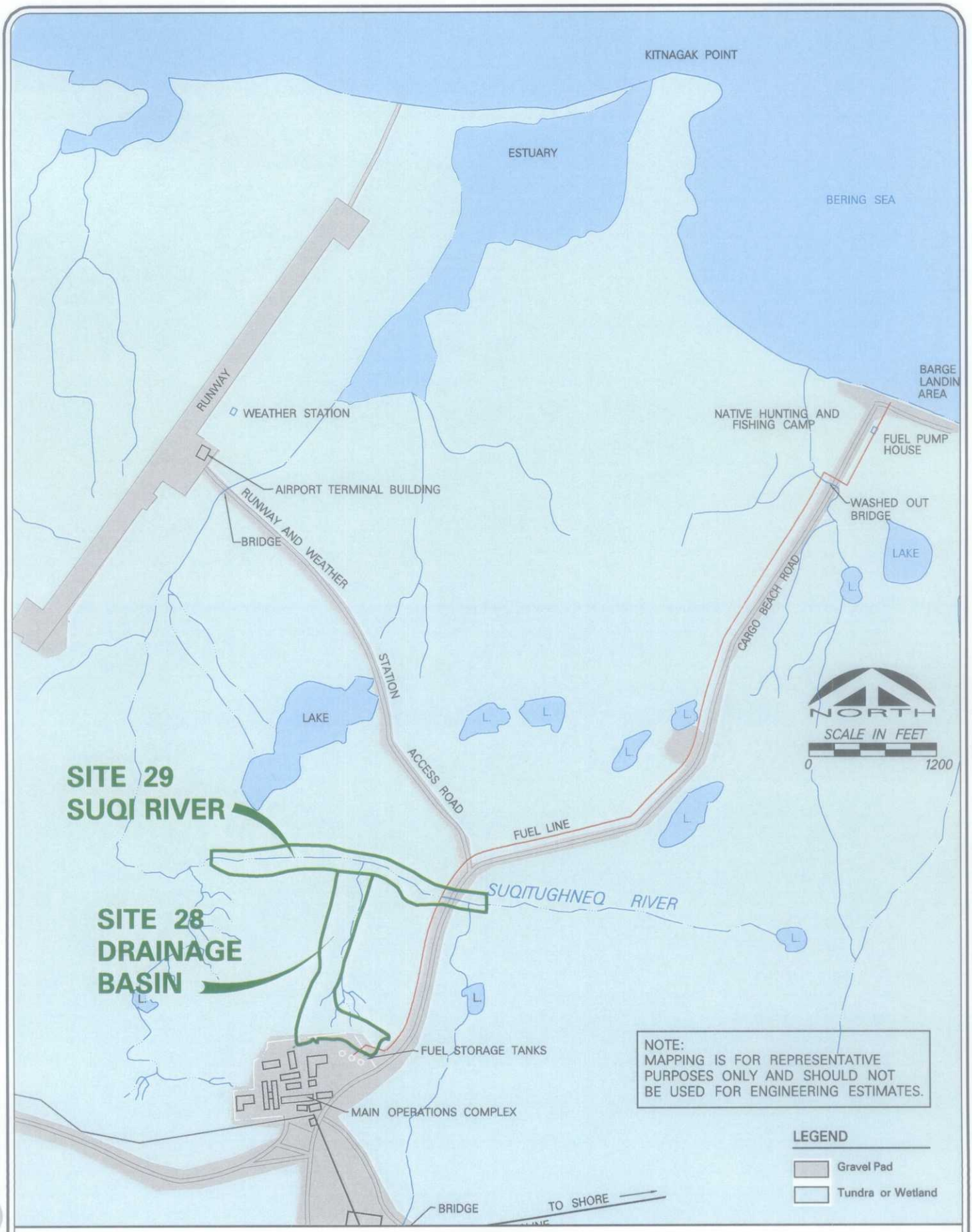
At the time the installation was in service, it appears that there was storage capacity for over 448,000 gallons of potable water (i.e., the 204,000-gallon tank at Site 13 and the four 60,000-gallon tanks at Site 22). The facilities for storing such vast quantities of water may indicate that groundwater was scarce or not available at times, perhaps over the winter.

1.5.5 Hydrology

Other than the Bering Sea north of the Northeast Cape facility, surface water in the vicinity of the study area consists of small streams, small- to moderate-sized lakes, and marshy areas. Surface water generally flows from the highland area south of the site in a northward direction. Small surface water bodies are common throughout the area. The primary stream drainage in the area is fed by runoff from the prominent drainage of a Kinipaghulghat Mountain valley south of the site. This stream drainage is fed by several smaller tributaries as it flows north to Kitnagak Point. The smaller tributaries originate from two small unnamed lakes (Figure 1-5).

In July and August of 1994, Montgomery Watson noted that surface water flow was highly dynamic, changing significantly over the course of a few days (Montgomery Watson, 1995a). For example, streamflow in the major drainage south of the site varied significantly, from several hundred gallons per minute during warm days, to no flow during relatively cold periods lasting more than a day (the runoff was primarily snowmelt from higher elevations). In other locations, small lakes and marshy areas created by recent snowmelt were observed to dry up and/or change shape over the course of a few days or weeks.

The most significant stream located in the area under investigation is the Suqi River, which receives drainage from the area east of the Cargo Beach Road and Main Operations Complex and the White Alice Site (Figure 1-4). This previously unnamed stream was identified by Marie Toolie in conversations with Montgomery Watson during the 1998 field work. Although the stream is not named on the USGS maps of the area, Mrs. Toolie cited the local name used for the stream.



JOB No. 189098.. DATE: 24-AUG-1999 09:47 FILE: e:\usace\necape\99rl_fs\draft\fig1_05.dgn

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 1–5

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

OVERVIEW OF DRAINAGE BASIN

The Suqi River is approximately 5 feet wide and 3 feet deep where it crosses the Cargo Beach Road, with a bottom of sand and gravel. Flow at this location is approximately 10 cubic feet per second. Where the Suqi River crosses Airport Road near Site 2, flow increases to approximately 12 cubic feet per second, and the stream is approximately 6 feet wide and 4 feet deep.

The Suqi River is significant because it is the drainage point for Site 9 (Housing and Operations Landfill), Sites 11 through 22 and Site 27 (Main Operations Complex). Drainage from the Main Operations Complex flows across a shallow wetlands area prior to joining the Suqi River. This drainage area has been designated Site 28 (Drainage Basin) in this report. The Suqi River has been designated as Site 29.

1.5.6 Demography and Land Use

The village of Savoonga is approximately 60 miles northwest of Northeast Cape and has a population of 514 people, as reported in the 1990 United States Census. There are currently no permanent residents at the Northeast Cape installation, but there is a small subsistence hunting and fishing village located at the site, inhabited primarily in the summer by residents of Savoonga.

1.5.7 Ecology, Wildlife and Endangered Species

The Northeast Cape area supports habitat for a variety of seabirds, waterfowl, and mammals that either breed in or migrate through the area. The ocean surrounding the Northeast Cape area is used for subsistence hunting of walrus, seal, sea birds and polar bear. Additionally, arctic fox, cross fox, and reindeer inhabit the area.

1.5.7.1 Vegetation

Vegetation in the Northeast Cape area is classified as alpine tundra. This type of vegetation is predominantly white mountain avens, mat forming herbs, grasses, and sedges. Shrubs include bearberry, dwarf birch, narrow leaf Labrador tea, willow, heaths, and cassiopes. The Northeast Cape area has many low-lying areas with lakes, bogs, and poorly drained soils. In these areas, vegetation is typically classified as wet tundra, which is dominated by heaths, sedges, mosses, lichens, and cotton grass (URS, 1985).

1.5.7.2 Birds

The only breeding seabird colony known to exist at the Northeast Cape Installation consists of 60 glaucous gulls on Seevookhan Mountain. This colony, cataloged as 93-19 by the United States Fish and Wildlife Service Catalog of Alaskan Seabird Colonies, is the most current known estimate of breeding seabirds in the area. Several other species of birds have been sighted in the vicinity of the Northeast Cape site, including common ravens, snow bunting, whistling swans, Lapland longspurs and sea gulls. No duck species have been observed in the Northeast Cape area. The areas around Northeast Cape have a very low habitat value, with relatively few birds, and the diversity of species appears low (URS, 1985).

1.5.7.3 Mammals

Large mammals are generally not abundant on St. Lawrence Island. However, polar bears can be seen on the island year round, especially when the ice pack is near shore. Grizzly bears have been reported on the island but are rarely seen. A dwindling population of several hundred reindeer can also be found on the island. Arctic fox, red fox, cross fox, and several small mammals (tundra shrew, arctic ground squirrel, the Greenland collared lemming, the red-backed vole, and the tundra vole) can also be seen on the island (URS, 1985).

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

1.5.7.4 Fish

There are ten primary species of fish that reside in the streams and tundra ponds of St. Lawrence Island. These include blackfish, nine-spined stickleback, grayling, Arctic char, and whitefish. Five of the six species of Pacific Salmon occur around the island. According to Savoonga inhabitants, the stream north of the main Northeast Cape facility complex (Figure 1-4) once supported large fish populations (including sockeye and silver salmon). The stream no longer supports these populations reportedly due to a large diesel oil spill emanating from the Fuel Storage Tank Area (Site 11), which entered one of the stream's tributaries. Juvenile and adult Arctic char have been observed in this stream approximately 250 feet downstream of the bridge leading from the Landing Strip to the Housing and Operations Complex (URS, 1985).

1.5.7.5 Threatened and Endangered Species

Endangered or threatened species of animals on St. Lawrence Island include the Spectacled eider (threatened), the Steller's eider (threatened), the Steller's sea lion (endangered) and the short-tailed albatross (candidate) (USFW, 1998). The prevalence of these with respect to the Northeast Cape Site is unknown. Polar bears are not an endangered or threatened species; however, they are protected under the Marine Mammal Protection Act. Alaska Natives are exempt from this act, and are allowed to hunt for polar bear for subsistence purposes or handicrafts, as long as the population is not depleted and the animals are not wasted. Vegetative species that have been proposed as threatened are the perennial plants *Rumex krausei* and *Primula tschuktschorum.*

1.5.8 Archaeological, Historical, and Cultural Resources

The Northeast Cape installation has the potential for significant archaeological, historical, and cultural resources. As such, excavation activities associated with the site should be undertaken only after the Section 106 process promulgated under the State Historic and Preservation Office (SHPO) has been completed. This process, although a federal regulation under 36 CFR 800 of

the National Historic Preservation Act of 1966 (NHPA), is administered by SHPO. The process entails the identification and evaluation of potential historical properties and federal review through the Advisory Council on Historic Preservation (ACHP). Section 106 of NHPA requires that every federal agency take into account how each of its undertakings could affect historic properties. A historic property is defined as any property listed in, or eligible for, the National Register of Historic Places. The Northeast Cape site has not been placed on the National Register; however, it is eligible for consideration. Additionally, the White Alice site adjacent to the Northeast Cape site has been placed on the National Register.

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

An archaeological and historical survey should be completed prior to any demolition or excavation work at the site. Some items, such as abandoned vehicles, buildings or other items associated with the military presence at Northeast Cape, may be of potential historical significance. The Alaska District should coordinate with SHPO to determine whether any items are of historical significance and should be preserved.

Also, the Alaska District should have an archaeologist on site during any construction activities to provide preconstruction briefings regarding the potential for archaeological artifacts to be found at the site.

2. INVESTIGATION APPROACH AND PROCEDURES

This section describes the scope of the 1996 RI and the 1998 RI activities, the specific methods and protocols employed to quantify and characterize the extent of contamination, QA/QC procedures, management of investigative derived wastes (IDW), and measurement of stream flow characteristics. The ultimate use of data collected, including sampling and analysis of environmental media, is:

- Identification of the potential source and migration of contamination
- Delineation of contamination
- Identification of disposal requirements for liquids in the storage tanks and subterranean building structures

2.1 SCOPE OF 1996 FIELD ACTIVITIES

The 1996 field activities were conducted July 31 through August 8, 1996. Table 2-1 summarizes the scope of the field activities during the 1996 Phase II RI. Soil, sediment, surface and groundwater samples were collected and analyzed as shown in Table 2-2. Field activities to further characterize areas of concern, identify potential obstacles to remediation, and better understand site conditions as described below:

- Surface soil, surface water, and sediment samples were collected to further delineate known areas of contamination.

- Biological sampling, including benthic, zooplankton and phytoplankton samples, were collected from the drainage basin to further characterize site conditions.

- CON/HTRW items previously identified to be either partially or completely full of liquid and/or sludge were sampled for waste characterization in order to plan future disposal.

Table 2-1 summarizes the scope of the field activities during the 1996 Phase II RI. Soil, sediment, surface and groundwater samples were collected and analyzed as shown in Table 2-2.

The analytical data produced by the project and quality assurance (QA) laboratories, and the information gathered during the Phase II RI which is pertinent to assessing the nature and extent of contamination is summarized in Section 5. The data are organized and presented by individual site. Pertinent sample results are provided for each site, with all sample results presented cumulatively in Appendix A.

2.2 SCOPE OF 1998 FIELD ACTIVITIES

The 1998 field activities were performed September 10 through September 16, 1998 and consisted of site reconnaissance, soil, groundwater, sediment and surface water sampling, and hazardous waste disposal. Table 2-1 also summarizes the scope of the field activities during the 1998 Phase II RI. Soil, sediment, surface and groundwater samples collected and analyzed are shown in Table 2-3.

TABLE 2-1
SUMMARY OF PHASE II RI ACTIVITIES

		1996 Phase II RI Activities													1998 Phase II RI Activities									1999 Planned Phase II RI Activities
Site	Description	Site Reconnaissance	Soil Sampling	Surface Water Sampling	Sediment Sampling	Biological Sampling	Storage Tank (AST or UST) Inventory and Sampling	Mechanics' Work Pit	Flooded Subterranean Structure Water Sampling and Discharge	Radiological Survey	Stream Flow Measurements	Posting of Potential Asbestos Hazards	Cable and Wire Hazard Mitigation	Assess Prospective C&D Monofill Sites and Borrow Areas	Site Reconnaissance	Soil Sampling	Surface Water Sampling	Sediment Sampling	Groundwater Sampling	Site Control and Survey	CON/HTRW Inventory Update	Building Demolition and Debris Inventory Update	Hazardous Waste Disposal	Biological Sampling
All	Installation-Wide Activities													X						X	X	X		
Site 1	Burn Site Southeast of Landing Strip																							
Site 2	Airport Terminal and Landing Strip	X								X		X				X								
Site 3	Fuel Line Corridor and Pumphouse																		X					
Site 4	Subsistence Fishing and Hunting Camp	X					X			X									X					
Site 5	Cargo Beach									X														
Site 6	Cargo Beach Road Drum Field									X						X								
Site 7	Cargo Beach Road Landfill									X						X			X					
Site 8	POL Spill Site	X																						
Site 9	Housing and Operations Landfill									X						X			X					
Site 10	Buried Drum Field	X	X							X						X			X					
Site 11	Fuel Storage Tank Area	X																	X					
Site 12	Gasoline Tank Area																							
Site 13	Heat and Electrical Power Building	X					X			X		X				X			X					
Site 14	Emergency Power/Operations Building	X					X		X	X		X				X								
Site 15	Buried Fuel Line Spill Area	X																	X					

TABLE 2-1 (continued)
SUMMARY OF PHASE II RI ACTIVITIES

		1996 Phase II RI Activities													1998 Phase II RI Activities									1999 Planned Phase II RI Activities
Site	**Description**	**Site Reconnaissance**	**Soil Sampling**	**Surface Water Sampling**	**Sediment Sampling**	**Biological Sampling**	**Storage Tank (AST or UST) Inventory and Sampling**	**Mechanics' Work Pit**	**Flooded Subterranean Structure Water Sampling and Discharge**	**Radiological Survey**	**Stream Flow Measurements**	**Posting of Potential Asbestos Hazards**	**Cable and Wire Hazard Mitigation**	**Assess Prospective C&D Monofill Sites and Borrow Areas**	**Site Reconnaissance**	**Soil Sampling**	**Surface Water Sampling**	**Sediment Sampling**	**Groundwater Sampling**	**Site Control and Survey**	**CON/HTRW Inventory Update**	**Building Demolition and Debris Inventory Update**	**Hazardous Waste Disposal**	**Biological Sampling**
Site 16	Paint and Dope Storage Building	X					X			X		X							X					
Site 17	General Supply Warehouse and Mess Hall Warehouse	X								X		X												
Site 18	Housing Facilities and Squad Headquarters	X							X	X		X											X	
Site 19	Auto Maintenance and Storage Facilities	X						X		X		X							X					
Site 20	Air Force Aircraft Control Warning Building									X		X												
Site 21	Wastewater Treatment Facility	X								X		X												
Site 22	Water Wells and Water Supply Building	X								X		X												
Site 23	Power and Communication Line Corridors																							
Site 24	Receiver Building Area																							
Site 25	Direction Finder Area															X								
Site 26	Former Construction Camp Area																							
Site 27	Diesel Fuel Pump Island	X	X																X					
Site 28	Drainage Basin Area	X	X	X	X	X							X			X	X	X						X
Site 29	Suqi River	X	X	X	X	X										X	X	X						X
Site 30	Background Areas																X	X						X

TABLE 2-2
1996 SAMPLE COLLECTION SUMMARY

Site	Description	Water		Soil and Sediment		
		Diesel Range Organics (8100M)	Polychlorinated Biphenyls (EPA 8080)	Diesel Range Organics (8100M)	Total Recoverable Petroleum Hydrocarbons (EPA 418.1)	Polychlorinated Biphenyls (EPA 8080)
10	Buried Drum Field			8	8	
27	Diesel Fuel Pump Area			7	3	4
28	Drainage Basin	6	6	7	2	12
29	Suqi River	2	2	5		5

Total of Primary Samples	8	8	27	13	21
Duplicate Samples	1	1	1		2
QA Split Samples	1	1	1		2
Total Samples	10	10	29	13	25

TABLE 2-3
1998 SAMPLE COLLECTION SUMMARY

Site	Description	Water													Soil and Sediment											
		Gasoline Range Organics (AK101)	Diesel Range Organics (AK102)	DRO aromatic and aliphatic fractions	Residual Range Organics (AK103)	RRO aromatic and aliphatic fractions	Polynuclear Aromatic Hydrocarbons (EPA 8270 SIM)	BTEX (EPA 8021A)	Volatile Organic Compounds (EPA 8260B)	Polychlorinated Biphenyls (EPA 8082)	Total Organic Carbon (EPA 415.1)	Lead (EPA 7421)	Manganese (6010)	Nitrate and Sulfate (EPA 300.0), Alkalinity (EPA 310)	Diesel Range Organics (AK102)	DRO aromatic and aliphatic fractions	Residual Range Organics (AK103)	RRO aromatic and aliphatic fractions	Polynuclear Aromatic Hydrocarbons (EPA 8270 SIM)	BTEX (EPA 8021A)	Polychlorinated Biphenyls (EPA 8082)	Dioxin (EPA 8290)	Total Organic Carbon (EPA 415.1)	Dry Soil Bulk Density	Soil Moisture Content
2	Airport Terminal and Landing Strip														2		2		1	2						
3	Fuel Line Corridor and Pumphouse		1				1	1																		
4	Subsistence Fishing and Hunting Camp		1				1	1																		
6	Cargo Beach Road Drum Field														2		2			1			1	1	1	
7	Cargo Beach Road Landfill		1				1	1															1			
9	Housing and Operations Landfill		3				3	3							1		1		1	1			1			
10	Buried Drum Field														1	1	1	1		1			1			
11	Fuel Storage Area		2		2			2																		
13	Heat and Electric Power Building		2		2			2													3					
14	Emergency Power/Operations Building														1	1	1	1		1			1			
15	Buried Fuel Line Spill Area		1		1			1																		
16	Paint and Dope Storage Building								2			2														
19	Auto Maintenance and Storage Facilities		2		2			2																		
25	Direction Finder Area																					1				
27	Diesel Fuel Pump Area	2	2		2		2	2					1	1												
28	Drainage Basin Area		2		2			2							9	9	9	9	2	3			3			
29	Suqi River	6	6	6	6	6	6	6		6					6	6	6	6	6	4	6					
30	Background Sampling Areas	1	3	2	3	2	3	3			2			1	3	3	3	3	3	3			3	1	1	
	Total of Primary Samples	9	26	8	20	8	17	26	2	6	2	2	1	2	25	20	25	20	13	16	9	1	11	2	2	
	Duplicate Samples	1	3	1	3	1	1	4	1	1		1			3	2	3	2	2	2	2					
	QA Split Samples	1	3	1	3	1	1	4	1	2		1			3	2	3	2	2	3	2					
	QA Split Samples MS																									
	QA Split Samples MSD																									
	Trip Blanks	2						4	2																	
	Primary Lab MS																									
	Primary Lab MSD																									
	Total Samples	13	32	10	26	10	19	38	6	9	2	4	1	2	31	24	31	24	17	21	13	1	11	2	2	

2.3 SITE RECONNAISSANCE

Site reconnaissance was performed to confirm current use and site conditions. This activity was to ensure that proposed field activities are commensurate with present field conditions. The following reconnaissance activities were performed at all areas included in the Phase II site activities:

- Visual observation and documentation in field notebooks
- Photographs taken of site conditions
- Qualitative assessment of potential exposure pathways
- Documentation of any site obstacles that would impede remediation
- Estimation of media volume based on visual observation and existing laboratory data
- Identification of a potential on-site source of low-permeability geologic materials

Vegetation surveys were also conducted in the Drainage Basin north of the Main Operations Complex, and at the proposed stream diversion area. The purpose of the vegetation survey was to document the presence or absence of vegetation that would prevent dermal contact, and to evaluate potential environmental impacts of remedial activities. The vegetation survey consisted of an estimate of percent cover, vegetation pattern, and speciation or vegetation type identification. Additional biological surveys are scoped for July, 1999 in the Drainage Basin. Site photographs are provided in Appendix A.

2.4 SAMPLE COLLECTION

This section discusses sample collection procedures used during Phase II RI field investigative activities at Northeast Cape. Standard field protocols are defined further in the CDAP (E&E, 1993a), the Phase II Work Plan (Montgomery Watson, 1996a) and the Final Work Plan, 1998-1999 Phase II (Montgomery Watson, 1998). Field work included surface soil, subsurface soil, surface water, sediment, and benthic, zooplankton and phytoplankton biological sampling. Sampling tasks also included liquid and sludge sampling from storage tanks, a mechanical pit and flooded cellar holes.

2.4.1 Soil, Water and Biological Sample Collection Procedures

All samples were collected in accordance with the following Work Plans: 1996 sampling was performed in accordance with the Northeast Cape Phase II Work Plan (Montgomery Watson, 1996a) and the CDAP (E&E, 1993), 1998 sampling was performed in accordance with the Final Work Plan, 1998-1999 Phase II RI (Montgomery Watson, 1998).

Sampling methodology in the work plans included:

- Surface soil sampling and field screening
- Subsurface soil sampling
- Surface water and sediment sampling
- Groundwater sampling

- Benthic sampling from streams
- Zooplankton and phytoplankton sampling from streams

Biological sampling locations are shown on Figure 2-4. Surface and subsurface soil sampling locations, subsurface water and surface water sampling locations are shown in the site maps provided in Section 5. All laboratory results are provided in Appendix B, and biological sampling results in Appendix D.

2.4.2 CON/HTRW Sample Collection Procedures

Some structures at the Northeast Cape installation contain fluids that would eventually require disposal in order to decommission the installation. These structures were identified and the liquids contained in the structures were sampled to determine appropriate disposal methods. Liquids sumpted in identified structures included:

- Liquid and sludge sampling from storage tanks

- Water sampling of flooded subterranean structures, such as a mechanical pit, subterranean room, and underground passages between buildings

2.4.2.1 Liquid and Sludge Sampling in ASTs and USTs

During the 1996 field investigation all identified ASTs and USTs were investigated to determine if they contained liquid and/or sludge. The storage tanks are shown in Figures 2-1 and 2-2 and listed below in Table 2-4.

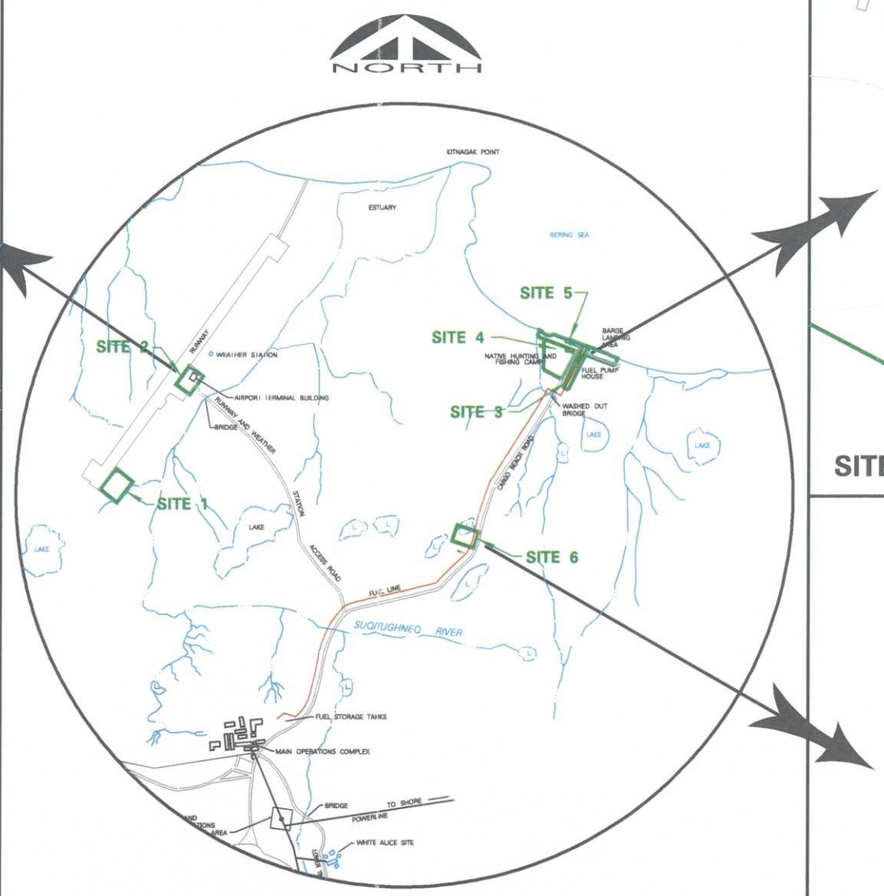
A sample of both liquid and sludge was collected from each storage tank that contained a liquid other than potable water, sludge or both. Liquid samples were analyzed for TRPH, BTEX and PCB to characterize wastes for future disposal. Sludges were analyzed for toxicity characteristic leachate procedure (TCLP) metals, and ethylene glycol. Results of the sampling and analyses are provided in Section 4.2, CON/HTRW Inventory.

2.4.2.2 Liquid and Sludge in Auto Mechanics' Work Pit

One water and one sludge sample were collected from the mechanics' work pit at the north end of the Auto Maintenance and Storage Facility, Building 109. The pit is approximately 28 inches wide, 24 feet long and 5 feet deep, within a volume of roughly 2,100 gallons. At the beginning of the 1994 field season, a snow drift in the building covered part of the auto mechanics' work pit. However, by the end of the 1994 field effort, the drift had melted and exposed the flooded pit. During the 1996 field season, the pit was approximately half-full of water and no snow was present. Miscellaneous debris was observed in the bottom of the pit, including three rubbish bins, tires, metal debris and insulation.

One water sample and one composite sludge sample were collected from the auto mechanics' work pit and analyzed, as shown in Table 2-5 below.

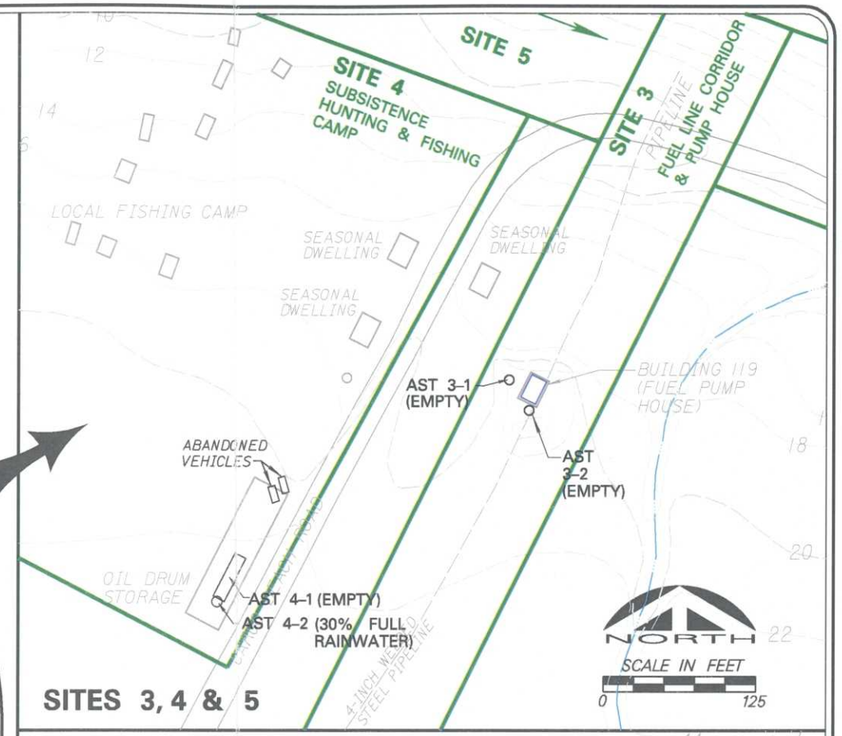
SITE 2



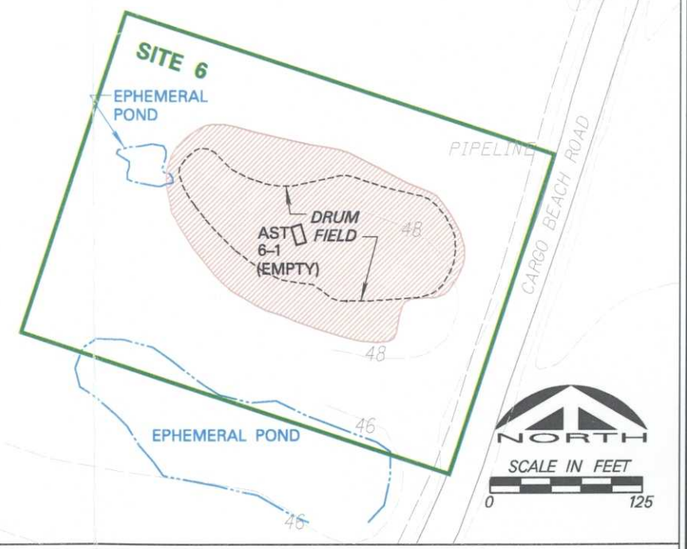
KEY MAP

SCALE IN FEET

0 2500



SITES 3, 4 & 5



SITE 6

LEGEND

Stained Soil or Distressed Vegetation

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 2–1

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

AST, UST, FULL DRUMS, FLOODED SUBTERRANEAN STRUCTURES (SITES 2 THROUGH 6)

JOB No. 189098.0; FILE: E:\usace\necape\99rl_fs\draft\fig2_01.dgn; DATE: 24-AUG-1999 09:58

NORTH
SCALE IN FEET
0 100

AST 16-1
(50% FULL
RAINWATER, SLUDGE,
& FLOATING PRODUCT)

SITE 16

AST 13-4

UST 13-3
(EMPTY)

AST 13-6
(EMPTY)

AST 13-1
(EMPTY)

AST 13-5
(EMPTY)

UST 13-2
(20,000 GAL.
RAINWATER)

SITE 13

SITE 15

SITE 17

SITE 27

24" CMP culvert

FUEL PIPELINE

AST 19-1
(20% FULL
ANTIFREEZE)

SITE 11

AST
11-3
(EMPTY)

AST
11-2
(EMPTY)

AST
11-1
(1.3% RAINWATER)

PIPELINE

AST 19-2
(EMPTY)

MECHANICS
WORK PIT

SITE 18

SITE 19

SITE 21

AST 21-1 (50% SEPTAGE)
AST 21-2 (50% SEPTAGE)

SUBTERRANEAN
ROOM
(DEWATERED)

AST 12-1
(EMPTY)

AST 12-2
(EMPTY)

SITE 20

SITE 12

SITE 14

AST 18-1
(EMPTY)

SUBTERRANEAN
CORRIDOR
(DEWATERED)

DRUM 14-2
(55 GAL. DRUM,
ANTIFREEZE)

AST 14-1
(50% FULL
RAINWATER)

AST 22-2
(EMPTY)

AST 22-3
(EMPTY)

AST 22-5
(EMPTY)

AST 22-4
(EMPTY)

UST 22-1
(EMPTY)

SITE 22

Power & Communication To Security B'ldg

DRINKING
WATER WELL
WELLHOUSE

MONTGOMERY WATSON
Anchorage, Alaska

JOB No. 189098.0 DATE: 24-AUG-1999 09:59 FILE: e:\usace\necape\99r1_fs\draft\fig2_02.dgn

FIGURE 2-2
U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA
AST, UST, FULL DRUMS, FLOODED SUBTERRANEAN STRUCTURES (SITES 10 THROUGH 27)

INSET

POWER AND COMMUNICATIONS LINE CORRIDOR AREA

BRIDGE

FORMER GRAVEL BORROW AREA

LOWER TRAM ACCESS ROAD

INSET

SITE 2

SITE 4

SITE 3

SITE 6

SITE 7

DETAIL

TERMINAL BLDG.

RUNWAY

AIRPORT TERMINAL BUILDING

LAKE

FUEL LINE

QUQITUGHNEQ RIVER

SITE 16

Paint & Dope Storage

SITE 27

24" CMP culvert

FUEL PIPELINE

Concrete Slab

filler pipes & risers

111 SUPPLY WAREHOUSE

107 MESS HALL W'HSE

SITE 17

POWER PLANT

SITE 13

SITE 15

108 STORAGE

SITE 18

SITE 19

PERIMETER ROAD

SITE 21

106 MESS HALL

105 REC. BLDG

104 ADM BLDG

AIRCRAFT CONTROL & WARNING

103

SITE 20

102 B.O.Q

101 EAST DORMITORY

101 WEST DORMITORY

100 N.C.O. QUARTERS

100 N.C.O. QRTS

GYM

Fire Alarm box

SUBTERRANEAN ROOM (DEWATERED)

AST 18-1 (EMPTY)

SUBTERRANEAN CORRIDOR (DEWATERED)

SITE 14

98 EMERGENCY POWER & OPERATION BLDG.

Corridor

M.H.

PP

WELL #3

WELL #2

WELL #1

Pump House

Water Storage Bldg.

SITE 22

F.H.

Tower & Communication To Security B'ldg

DRINKING WATER WELL WELLHOUSE

electric relay

conc. footing

Conc. Sewer Box

Culvert

MH

LEGEND

"DANGER" SIGN POSTED

RADIOLOGICAL SURVEY AREA

"DANGER" SIGN (TYPICAL)

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

NORTH

SCALE IN FEET

0 150

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 2-3

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

RADIOLOGICAL SURVEY AND ASBESTOS – POSTING LOCATIONS

JOB No. 18909 DATE: 24-AUG-1999 10:00 FILE: e:\usace\necape\99rl_fa\drafty\fig2_03.dgn

ZO/PL/BT 104
SF 4
ZO/PL/BT 102
ZO/PL/BT 103
SUQI RIVER
SITE 1
PIPELINE
SF 1
SF 3
POLE #2
SF 2
ZO/PL/BT 101
POLE #1
NOTE: STREAM SKETCHED FROM PHOTOGRAPHS.
SF 7
Lake
Storage Area
Power Line To Airstrip
W.L. 57.96
W.L. 60.92
SF 6
SF 5
SITE 28
SITE 11
SITE 10
SITE 9
CAPE BEACH ROAD
PIPELINE
POWER PLANT
Fuel & Dog Storage
Concrete Slab
Filler Pipes & Vents
24" CMP Culvert

INSET

NORTH
SCALE IN FEET
0 500

SITE 2
TO BERING SEA
RUNWAY
SF 8
SD113
FROM DRAINAGE BASIN

LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Zooplankton, Phytoplankton and Benthic Sample (ZO/PL/BT)
- Stream Cross-section (SF)
- Pole
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

NORTH
SCALE IN FEET
0 200

FILE: E:\usace\necape\99r1_fs\drafft\fig2_04.dgn
DATE: 24-AUG-1999 10:01
JOB No. 189098.05

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 2-4

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE - ST. LAWRENCE ISLAND, ALASKA

STREAM FLOW AND BIOLOGICAL SAMPLING LOCATIONS

TABLE 2-4
STORAGE TANK INVENTORY

Site	Tank Number	Past Contents	Current Contents	Size (gallons)
2	AST 2-1	Diesel	Empty	1,000
3	AST 3-1	Diesel	Empty	500
	AST 3-2	Diesel	Empty	335
4	AST 4-1	Potable water	Empty	15,000
	AST 4-2	Potable water	30% full (Potable/rain water)	400
6	AST 6-1	Potable water	Empty	500
11	AST 11-1	Diesel	1.3% full (Rainwater with sheen)	400,000
	AST 11-2	Diesel	Empty	400,000
	AST 11-3	Diesel	Empty	400,000
12	AST 12-1	Gasoline	Empty	15,000
	AST 12-2	Gasoline	Empty	30,000
13	AST 13-1	Diesel	Empty	1,000
	UST 13-2	Diesel	100% full (Rainwater with sheen)	20,000
	UST 13-3	Diesel	Empty	5,000
	AST 13-4	Diesel	Empty	5,000
	AST 13-5	Potable Water	Empty	500
	AST 13-6	Potable Water	Empty	204,000
14	AST 14-1	Fuel	50% full (Rainwater)	5,000
16	AST 16-1	Oil for roads (probably used oil)	50% full (Rainwater, sludge and floating product)	1,000
18	AST 18-1	Unknown	Empty	200
19	AST 19-1	Spent antifreeze	20% full (Spent antifreeze)	250
	AST 19-2	Potable Water	Empty	250
21	AST 21-1[a]	Septic	50% full (Septage)	Over 10,000
	AST 21-2[a]	Septic	50% full (Septage)	Over 10,000
22	UST 22-1	Diesel	Empty	500
	AST 22-2	Potable Water	Empty	60,000
	AST 22-3	Potable Water	Empty	60,000
	AST 22-4	Potable Water	Empty	60,000
	AST 22-5	Potable Water	Empty	60,000

a Concrete vault - not a metallic tank.

TABLE 2-5
SAMPLING AT AUTO MECHANICS' PIT

Site	Description	Sample Matrix	Analytes
19	Auto Maintenance and Storage Facilities	Water	TRPH, BTEX, PCB
		Sludge	TCLP metals, Fuel Identification, ethylene glycol

Results of the sampling are provided and discussed in Section 4.2, CON/HTRW Inventory.

2.4.2.3 Lead Based Paint

Core samples suspected of containing lead-based paint were collected from structures and one debris pile (Site 14; painted structural steel beams), and were analyzed for leachable lead. Results are summarized on Table 2-7, Summary of Lead-Based paint Investigation Results. One composite sample (95NE14401BD1) taken from painted structural steel beams at the Emergency Power/Operations Building Site (Site 14) exceeded the Resource Conservation and Recovery Act (RCRA) toxicity characteristic level of 5 mg/L. Based on the estimated total quantity of painted structural steel beams at Site 14, the debris pile would not exceed the toxicity characteristic. The calculations used to support this conclusion are shown on Table 2-7. The remaining 20 core samples were below the toxicity characteristic for lead. Complete information is provided in the Building Demolition and Debris Removal Technical Memorandum, Northeast Cape, Alaska (MW, 1995c).

2.4.3 Quality Assurance/Quality Control (QA/QC)

All analytical data for primary samples and QA/QC samples were reviewed for conformity with the QC criteria defined in the CDAP prepared for the 1994 RI at Northeast Cape (E&E, 1993) and the 1995 RI report (Montgomery Watson, 1995a). These two documents were prepared to establish general guidelines for QA associated with all work conducted as part of the Northeast Cape RI. ADEC, Alaska District, and the EPA quality assurance requirements were also met. Anomalies noted in the U.S. Army Corps of Engineers (USACE) Chemical Quality Assurance Report (CQAR) are presented in Appendix B. Montgomery Watson performed an independent review of the CQAR, laboratory data, and QC results. Qualifiers that were not already supplied with the data by either the project lab or QA lab were added. Data qualifiers were added in conformance with the methods described in the *National Functional Guidelines for Inorganic Data Review* (EPA, 1994a) and *National Functional Guidelines for Organic Data Review* (EPA, 1994b). Those anomalies, which required qualification, are noted in the full listing of analytical data in Appendix C.

All QC samples from 1996 fieldwork were submitted blind to the project laboratory, MultiChem Analytical Services (formerly Analytical Technologies, Inc.). The QA samples were submitted to the USACE North Pacific Division Laboratory (NPDL) in Troutdale, Oregon, for analysis.

All QC samples from 1998 field work were submitted to the project laboratory, Quanterra, Inc. The QA samples were submitted to Analytica, Inc. for analysis.

2.5 RADIOLOGICAL SURVEY

During a July, 1996 public meeting in Savoonga, several residents voiced concern regarding potential for unknown radioactive materials at the Northeast Cape Installation to be present. As part of the Phase II RI, a limited radiological survey was conducted at the sites listed below.

Site Number	Description	Area Surveyed
2	Airport Terminal and Landing Strip	Terminal and Transformer Shed, interiors
3	Fuel Line Corridor and Pumphouse	Fuel Pump, Piping
4	Subsistence Hunting and Fishing Camp	All currently used structures, interiors
5	Cargo Beach	Cargo Beach
6	Cargo Beach Road Drum Field	Cargo Beach Road Drum Field
7	Cargo Beach Road Landfill	Cargo Beach Road Landfill
9	Housing and Operations Landfill	Housing and Operations Landfill
10	Buried Drum Field	Drum Storage Area
13	Heat and Electrical Power Building	Building 110, interior
14	Emergency Power/Operations Building	Building 98, interior
18	Housing Facilities and Squad Headquarters	Buildings 99, 101W, 102, 104, 106, 109, interior
20	Air Force Aircraft Control Warning Building	Building 103, interior and exterior
21	Wastewater Treatment Facility	Wastewater Treatment facility and holding tanks, exterior
22	Water Wells and Water Supply Building	Water Storage Facility (Building 113)
27	Diesel Fuel Pump Area	Diesel Fuel Pump Island

Figure 2-3 shows the locations of all radiological surveys. Ground continuous monitoring was conducted using a Victoreen #41546 Radiacmeter, Model #450 of the U.S. Army Chemical School, Radiological Survey Manual. This meter detects beta and detects and measures gamma

radiation to a depth of one meter below ground surface. The gravel borrow area was chosen as the background site for Northeast Cape. Twenty readings were collected at 10-foot grid intersects and a mean average of 0.07 millirads per hour (mR/h) was calculated. In order to calculate the background for the site, the mean result from the background survey is multiplied by a factor of two (2). This results in an action level of 0.14 mR/h. The U.S. Army standard is one (1) mR/h. All areas surveyed resulted in readings less than the established background of 0.14 mR/h.

This historic use of radioactive materials at the site was not part of the scope of this investigation, and will be addressed in a separate document.

2.6 STREAM FLOW MEASUREMENTS

Stream flow measurements were taken from eight locations to characterize the Suqi River, the Drainage Basin and its tributaries. Figure 2-4 shows the locations of the stream flow measurements with respect to the Drainage Basin.

Stream flow measurements consisted of profiling the cross-sectional area of the streambed, and estimating the stream velocity at the time of the field measurement.

The stream bed was profiled by measuring the depth of the stream bed to an arbitrary, uniform height above the stream (generally the elevation of the highest bank). Depths were measured to the nearest 0.1-foot at 5 to 15 profiling points across the stream. A wading rod with 0.1-foot graduations was used to measure water depth. Stream bank elevation was measured using a hand level, and the distance between profiling points was measured using a fiberglass tape.

Velocity of the stream was estimated using a float. The time for the float to traverse a specified distance was measured for each profiling point. An average of three observations at each profiling point was recorded. The stream flow velocity was corrected by using a factor of 0.85 the surface float velocity and multiplying by the cross-sectional area of water. Bank-to-bank profiles were used to judge historic and future variations. High water and flood data were estimated in the field and used to calculate maximum flow.

Results of the streamflow measurements are provided and discussed in Section 5.28, Drainage Basin. Actual measurements and calculations are provided in Appendix E.

2.7 INVESTIGATION-DERIVED WASTE MANAGEMENT

IDW consisted of:

- Disposable protective clothing and supplies
- Groundwater resulting from purging existing monitoring wells
- Water in flooded subterranean building structures

In accordance with the Work Plans prepared for the Phase II RI, non-hazardous disposable protective clothing and supplies (including sampling spoons, sampling gloves, and disposable

Teflon bailers) were bagged and transported to Anchorage for disposal as solid waste. The quality of the purge water was documented in previous studies (Montgomery Watson, 1995 and Montgomery Watson, 1996) as containing up to 0.0021 milligrams per liter (mg/L) benzene, 0.95 mg/L DRO and 2.2 mg/L TRPH. As documented in the Work Plan (Montgomery Watson, 1998), purge water was returned to the ground at the site.

Two flooded subterranean building structures were identified for visual investigation and could not be observed without removing accumulated water. In both cases, samples of potentially-contaminated water were collected from the flooded area to determine if the water met applicable water quality criteria and could then be discharged to the ground surface, in order to examine and inventory the subterranean structures for CON/HTRW.

Table 2-6 shows the sampling and analysis performed at each of the two subterranean site.

TABLE 2-6
SAMPLING AT THE SUBTERRANEAN STRUCTURES

Site	Description	Sample Matrix/ Location ID	Sampling Results (mg/L)		Regulatory Criteria (mg/L)	
					Proposed 18 AAC 75 Groundwater	18 AAC 70 Freshwater
18	Emergency Power/Operations Building	Water/ SH01	Benzene	ND	0.005	0.005
			Toluene	ND	1.0	NR
			Ethylbenzene	ND	0.7	32
			Xylenes	ND	10.0	NR
			TRPH	ND	NR	NR
			PCB	ND	0.0005	0.000014
	Housing Facilities and Squad Headquarters	Water/ SH02	Benzene	0.0015	0.005	0.005
			Ethylbenzene	ND	1.0	NR
			Toluene	ND	0.7	32
			Xylenes	ND	10.0	NR
			TRPH	ND	NR	NR
			PCB	ND	0.0005	0.000014

Key: ND - Not detected
NR - Not regulated

Prior to removing the accumulated water, the water level of both subterranean structures was approximately 14 inches below ground level, and the structures were thought to be basements which were approximately the size of the rooms above them. On July 30, 1996 Mr. Kalu Kalu (ADEC) gave verbal authorization, based on the water sample results listed in Table 2-6, for removing the water from the subterranean structures and discharging it to the ground surface.

After removing the water, the structures at Site 18 were found to be connected and to be a subterranean corridor for utilities and personnel to travel easily between the Main Complex (Building 101) and the Emergency Power/Operations Building (Building 98) (Toolie, 1996). According to Eugene Toolie the corridor was constructed after the two buildings had already

been erected. Figure 2-2 shows the location of the flooded subterranean corridor and water discharge points.

The corridor was measured and found to be six feet wide, 12 feet tall, and 108 feet long. Approximately 67,000 gallons of water were pumped from the corridor and discharged to the ground immediately outside the two buildings. Less than 1 foot of water remained in the corridor after pumping ceased. No sludge or CON/HTRW was found in the corridor. In 1998, one to two feet of water was observed in the corridor.

An additional flooded subsurface structure was observed at Site 18. Over the course of the investigation, the water level in the underground structure was depleted and the field team was able to perform a visual inspection of the structure, which was found to be a subterranean room. This room, near the center of Building 101 (Figure 2-2), is under the boiler room and is an 8-foot high by 10-foot wide by 13-feet long area. The room was apparently a plumbing supply room, which contained miscellaneous plumbing supplies, galvanized and copper pipe, and an empty tank with dimensions of 1.5-foot diameter by 2-foot high. The room contained no sludge, odor, oil sheen, or other evidence of hazardous material.

TABLE 2-7 SUMMARY OF LEAD-BASED PAINT INVESTIGATION RESULTS

Site	Building No.	Building Name	Sample Identification	Wood Structure (%)	Corkwall (%)	Cement Board (%)	Metal (%)	Painted Area (%)	Roofing (%)	Roof Tar (%)	Wall Insulation (%)	ACM Siding (%)	Clay Tile (%)	Vinyl ACM (%)	Concrete (%)	Ceiling (%)	Total (%)	Leachable Lead Results (mg/L)	MRL (mg/L)
02	N/A	Airport Terminal with Tower	95NE02401BD1	60		10	10	2	3		2	10		3			100	0.14	0.05
03	119	Fuel Pumphouse	95NE03119BD1														0	0.13	0.05
13	110	Heat and Electrical Power Building	95NE13110BD1	52		10	1	1	15	1		20					100	0.22	0.05
14	98	Emergency Power Orperations Building	95NE14098BD1	10		2	30	3			5			5	45		100	ND	0.05
14	N/A	Steel Girder	95NE14401BD1				100	0									100	5.54*	0.05
14	N/A	Debris Pile	95NE14401BD2				100	0									100	4.41	0.05
14	N/A	Debris Pile	95NE14401BD3				100	0									100	4.2	0.05
16	112	Paint and Dope Building	95NE16112BD1	29		3	1	1	21	1	42	2					100	0.34	0.05
17	106	Mess Hall Building	95NE17106BD1	50.5	1.7	4	0.2	1	27	1	10	1.5	2.5	0.6			100	ND	0.05
17	107	Mess Hall Warehouse Building	95NE17107BD1	39	1	3	0.3	1	44	1	10	0.7					100	0.16	0.05
17	111	General Supply Warehouse Building	95NE17111BD1	33		3	0.5	1.5	49	1	10	1		1			100	0.3	0.05
18	99	Recreation Building	95NE18099BD1	48			50	2									100	ND	0.05
18	100	NCO Quarters - N&S Buildings	95NE18100BD1	45.5		20	0.5	1	20		1	10		2			100	0.09	0.05
18	101	Dormitory E&W Buildings	95NE180101BD1	39.5		18	0.5	1	19	1		20		1			100	2.85	0.05
18	102	BOQ Building	95NE18102BD1	50		5		1	18			3		3		20	100	0.15	0.05
18	104	Administration Building	95NE18104BD1	52		15	0.5	1	15		5	8		3.5			100	0.38	0.05
18	105	Theater Building	95NE18105BD1	25		5	1	1	25		1	12		5		25	100	0.07	0.05
19	108	Vehicle Storage Building	95NE19108BD1	37.3		2.8	0.4	1	26	1	30	1.5					100	0.57	0.05
19	108	Vehicle Storage Building	95NE19108BD2	37.3		2.8	0.4	1	26	1	30	1.5					100	0.34	0.05
19	108	Vehicle Storage Building	95NE19108BD3	37.3		2.8	0.4	1	26	1	30	1.5					100	0.27	0.05
19	109	Garage Building	95NE19109BD1	37.3		2.8	0.4	1	26	1	30	1.5					100	0.19	0.05
20	103	Aircraft Control and Warning Building	95NE20103BD1														0	ND	0.05
22	113	Water Supply Building	95NE22113BD1	60			19	1				20					100	ND	0.05
22	114	Pump Station Building	95NE22114BD1	30			1	30	19			20					100	0.2	0.05

* Adjusted leachable lead results taking into account the steel girders sampled at the debris pile in Building 98.
Assuming that the steel girders do not occupy more than 1/4 of the total quantity, the adjusted concentration of leachable lead is
3/4 (95NE14098BD1) + 1/4 (95NE14401BD1) = Leachable Lead
3/4 (ND) + 1/4 (5.54%) = 1.39% Leachable Lead

Component	Thickness (assumptions based on field observations)
Window	1/4"
Door Trim	1/2"
Interior Wallboard	1/2"
Wood Structure	2" x 6" w/16" centers
Roof Insulation (glass foam)	3"
ACM Siding	1/8"
Tarpaper	1/16"
Metal Flashing	1/32" (12" height for both fllor and roof)
Wall Insulataion	4"
Door	2"
Wood Siding	1"

3. HAZARD MITIGATION INCIDENTAL TO INVESTIGATION

During the field investigations, hazard mitigation incidental to the investigation was performed. Hazard mitigation involved three activities:

- Posting of "Danger" signs throughout the site where ACM was present
- Cutting fallen wire and cable that posed a physical hazard to wildlife and humans traversing the area
- Containerization and disposal of hazardous waste

3.1 POSTING OF POTENTIAL ASBESTOS HAZARDS

In 1994, Montgomery Watson prepared an inventory of ACM incidental to and part of the hazardous buildings and debris at the installation. The results of the survey are summarized below in Table 3-1.

TABLE 3-1
INVENTORY OF ASBESTOS CONTAINING MATERIALS

		Confirmed ACM											Potential ACM							
Site	Building	Pipe insulation	Pipe joint insulation	Exterior siding	Floor tile and mastic	Boiler insulation	Wall and ceiling spackle	Incinerator door lining	Exterior shingles	Roofing mastic	Transite pipe	Wainscot	Pipe insulation	Exterior siding	Floor tile and mastic	Equipment insulation	Debris	Pipe lagging (stack)	Wall and ceiling tile	Cans of asbestos cement
2	Terminal Building	X	X	X	X					X			X		X					
3	Fuel Pump House (Building 119)			X					X											
7	Debris Pile					X														
13	Power Plant Building 110												X	X		X	X			
14	Operations Building (Building 98)	X			X		X													
16	Oil and Paint Storage Building 112													X						
17	Warehouse Building (Building 111)	X						X						X						
	Mess Hall Building 107												X					X		
18	Building 99														X					
	Building 100														X					
	Dormitory (Building 101)	X			X															
	Building 102														X					
	Building 104														X					
	Recreation Building (Building 105)	X			X				X											
	Building 106														X					
	Building 125														X					
	Building 130														X					
19	Vehicle Storage Building (Building 108)			X																
	Garage Building (Building 109)	X	X		X					X	X									
20	AC&W Building 103												X	X	X				X	
21	Wastewater Treatment Building												X							
22	Water Supply Building 113													X						X
	Pump Station (Building 114)		X	X																
24	Receiver Building											X								

In 1996, the field team posted asbestos warning signs on all doors of all buildings identified as having a friable asbestos hazard potentially requiring Class C Personal Protection for site workers. The signs read: "DANGER - Asbestos cancer and lung disease hazard present".

Sign placement locations are shown below in Table 3-2 and on Figure 3-1.

3.2 WIRE AND CABLE HAZARD MITIGATION

Fallen telephone wires, power lines, and antenna wires pose a threat to the reindeer that feed in the area and to local residents traversing the area on snow machine. Where possible, these cables were snipped and placed inside covered areas (Montgomery Watson, 1997). Several reindeer racks were observed at the installation that were tangled with cable or wire. Apparently, the reindeer were grazing and became entangled in loose wire and died when they could not free themselves. Due to the limited field season, wire cutting activities were conducted only at the limited areas listed below:

- Southwest of Building 98
- Wires crossing road east of Water Tank Building
- Power lines extending from south of Water Tank Building toward White Alice
- Power lines north of White Alice Site leading eastward to the Bering Sea
- Vicinity of Operations Building
- Road from Operations Building to Pump House
- Vicinity of Mess Hall Warehouse
- Antenna field south of Heat and Electric Building
- Drainage basin west of Airport Road and south of Suqi River
- Airport Road

Approximately 6 miles of wire was cut, coiled and stored at the Airport Terminal Building (Site 2) and the Pumphouse (Site 22). Areas from which wire was removed are shown on Figure 3-1. Photographs of entangled reindeer racks and wire cutting activities are provided in Appendix A.

3.3 HAZARDOUS WASTE DISPOSAL

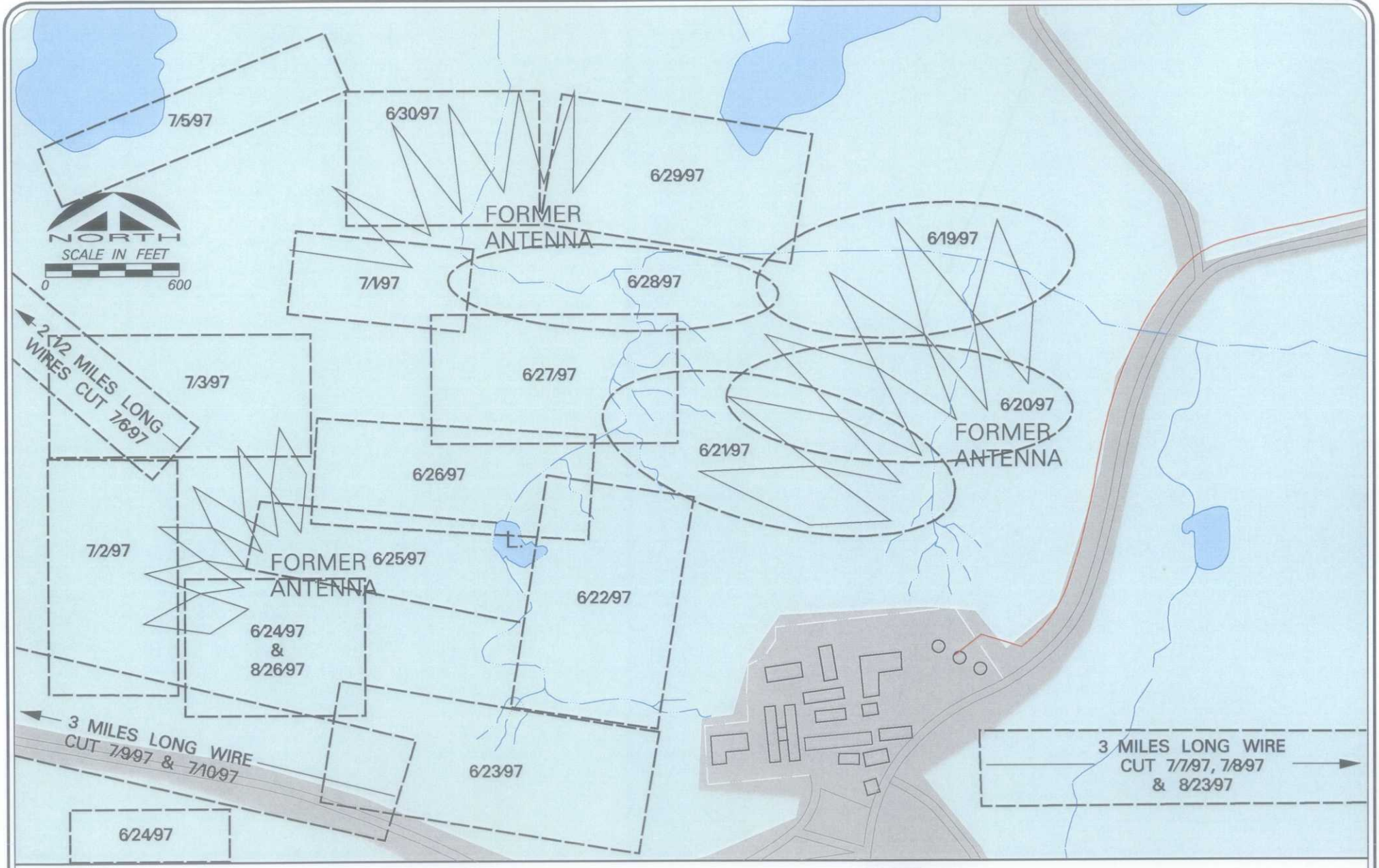
Containers of DS-2 and STB (supertropical bleach) were found at the site. These two materials are decontamination agents for a wide variety of chemical weapons. They were routinely issued to military bases as a contingency against chemical warfare agents. The presence of these containers at Northeast Cape does not necessarily suggest that chemical weapons were stored or used at the site.

Two hazardous wastes were containerized, marked, labeled and transported off-site for disposal. The wastes, DS-2 and STB, were containerized, marked, labeled, placarded, transported and disposed in accordance with the applicable regulations 49 CFR 170-177 and 40 CFR 260-268. Specific procedures for hazardous waste disposal were described in the Work Plan (Montgomery Watson, 1998) and were followed in the field.

TABLE 3-2
LOCATIONS OF ASBESTOS WARNING SIGNS

Site	Building	Sign Placement
2	Terminal Building	Northwest garage doors North middle door East door South middle door South garage door Door to office area from garage
13	Building 110	Northeast door North door South garage door
14	Building 98	Northeast door Northwest door East door Northeast door South middle door Southwest door West door
16	Building 112	East side West side
17	Building 107	East dock Northwest dock edge
	Building 111	Northeast dock door South door North door
18	Building 99	South wall North door
	Building 100	South door Southeast door
	Building 100S	West door
	Building 100N	West landing
	Building 101E	North door South door
	Building 101W	North door South door West door
	Corridor between Building 101 and 111	South door Middle west door Southwest door
	Building 102	East door
	Building 105	South door Southeast dock
	Building 106	Northeast dock
19	Building 108	East door Northwest door
	Building 109, Auto Maintenance	East door Garage door
	Corridor between Building 108 and 109	South side
20	Building 103	West door
18 & 20	Corridor between Squad Headquarters and Building 103	North side
22	Building 113	North door
26	Drinking Water Well House	East door

JOB No. 1189098.050 TIME: 24-AUG-1999 10:05 FILE: E:\usace\necape\99r1_fs\draft\fig3_01.dgn



MONTGOMERY WATSON
Anchorage, Alaska

LEGEND
OR AREA AND DATE WIRE WAS CUT AND REMOVED

FIGURE 3-1
U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

WIRE REMOVAL SITE MAP

Due to poor weather at the site, the first leg of transportation was modified to include removal from St. Lawrence Island to Nome, Alaska by Bering Air (EPA ID number AK0000662189). Each of the two wastes was put on a separate flight to maintain separation of incompatible wastes. In Nome, the wastes were transferred to Northern Air Cargo, and transported according to the original plan. For logistical reasons, DS-2 was transported to the Chemical Waste Management facility in Henderson, Colorado (EPA ID Number COD980591184) for transshipment to the final disposal facility in Sauget, Illinois.

DS-2 was disposed in the Chemical Waste Management hazardous waste incinerator at Sauget, Illinois (EPA ID No. ILD098642424).

The STB was disposed by deactivation at the Chemical Waste Management Facility in Arlington, Oregon (EPA ID No. ORD089452353). Copies of the completed hazardous waste manifests, required notifications to ADEC and certificates of disposal are included in Appendix G.

4. REMEDIAL PLANNING

4.1 SITE CONTROL AND SURVEY

The surveying work for the Phase II RI was conducted at Northeast Cape on September 14 and 15, 1998. The purpose of the survey was to accurately locate monitoring wells, soil and water sampling sites and photographic identification points and report these locations on the same coordinate system as previous surveys conducted by Lounsbury and Associates during the Phase I RI in 1994.

The 1998 surveying was conducted by Mullikin Surveys (Donald E. Mullikin, P.L.S.) of Homer, Alaska. Trimble 4000 SSI GPS survey units were used in Real Time Kinematic mode. The basis of coordinates was the USACE Benchmark (BM) B. The basis of the bearing was from the ALASKA DISTRICT BM B to BM H. Elevations were based on a 1994 aluminum cap marked #4, set by Lounsbury and Associates and extended using the 1996 geoid undulation model. The elevation of #4 was checked with ties to Lounsbury aluminum cap #9, as well as to two previously-tied monitoring wells (Mullikin Surveys 1998 points 2014 and 2015). Surveying results from the 1998 field work are provided in Appendix F.

4.2 CON/HTRW INVENTORY

The Montgomery Watson field team compiled an inventory of containerized toxic, hazardous and radioactive waste at the Northeast Cape installation. In accordance with the FUDS program, CON/HTRW can include USTs, ASTs, transformers, hydraulic systems, abandoned inactive monitoring wells, and contaminated soils from a leaking UST or other container.

4.2.1 Tank and Pit Inventory and Waste Characterization

Of the ASTs, USTs and the pits inventoried at the site, seven ASTs, one UST, and the mechanics' work pit were found to contain liquid and therefore, to potentially qualify as CON/HTRW.

The contents of the tanks and the work pit are listed below in Table 4-1.

TABLE 4-1
INVENTORY OF TANKS AND PITS CONTAINING LIQUIDS

Site	Tank Number	Past Contents	Current Contents	Tank/Pit Size (gallons)
4	AST 4-2	Drinking water	30% full (Potable/Rain Water)	400
11	AST 11-1	Diesel	1. 3% full (Rainwater with sheen)	400,000
13	UST 13-2	Diesel	100% full (Rainwater with sheen)	20,000
14	AST 14-1	Fuel	50% full (Contaminated rainwater)	5,000
16	AST 16-1	Oil for roads (Probably used oil)	50% full (Contaminated rainwater, sludge and floating product)	1,000
19	AST 19-1	Spent antifreeze	20% full (Spent antifreeze)	250
	Mechanics' Work Pit	None	50% full (Rainwater and sludge)	2,100
21	AST 21-1[a]	Septic	50% full (Septage)	Over 10,000
	AST 21-2[a]	Septic	50% full (Septage)	Over 10,000

a Concrete vault

4.2.1.1 AST 4-2 Waste Characterization

Based on information from Eugene Toolie, who was at the installation during the 16 years of operation and is a continual summer occupant of the subsistence camp at cargo beach, the field team concluded that AST 4-2 was used solely for potable water storage. Since the time the tank was taken out of service, some rainwater appears to have accumulated in the tank. One sample was collected from the tank and results are presented in Table 4-2 below.

TABLE 4-2
AST 4-2 CONTENTS WASTE CHARACTERIZATION
Sample ID: 96NE13TK101
Matrix: Water

Analysis	Results (mg/L)	Selected Regulatory Criteria		
		Toxicity Characteristic Limit (mg/L)	Proposed 18 AAC 75 Groundwater (mg/L)	18 AAC 70, Freshwater (mg/L)
Benzene	ND (0.001)	1.0	0.005	0.005
Toluene	ND (0.001)	NR	1.0	NR
Ethylbenzene	ND (0.001)	NR	0.7	32
Xylenes	ND (0.001)	NR	10.0	NR
TRPH	ND (1)	NR	NR	NR
RRO	NA	NR	1.1	NR
DRO	NA	NR	1.5	NR
GRO	NA	NR	1.3	NR

Analytical results, and visual and olfactory indicators support the conclusion that the current tank contains potable/rain water. The estimated quantity of potable/rain water for disposal is approximately 120 gallons. Direct discharge to the ground is recommended.

4.2.1.2 AST 11-1 Waste Characterization

AST 11-1 was used to store diesel fuel in the past. Currently the tank is approximately 1.3% full of rainwater that exhibits sheen. Field waste characterization was performed in 1994 (Montgomery Watson, 1995a). Results are shown in Table 4-3.

TABLE 4-3
AST 11-1 RCRA CHARACTERISTICS FIELD RESULTS

	AST 11-1 Tank Contents
Ignitability	
Organic vapors (ppm)	Non-detect
Flammability (Yes/No)	No
Corrosivity	
pH	6
Reactivity	
Water reactive (Yes/No)	No
Oxidative(Yes/No)	No
Sulfide reactive (Yes/No)	No
Cyanide reactive (Yes/No)	No

No sample was collected for analysis. The estimated quantity of potentially contaminated water is approximately 5,200 gallons. Carbon filtration to remove any potential petroleum constituents, then direct discharge to the ground, is recommended.

4.2.1.3 UST 13-2 Waste Characterization

Aside from the presence of sheen there was no indication of multi-phase layering or sludge. Field waste characterization was performed in 1994 (Montgomery Watson, 1995a). Results are shown in Table 4-4.

TABLE 4-4
UST 13-2 RCRA CHARACTERISTICS FIELD RESULTS

	UST 13-2 Tank Contents
Ignitability	
Organic vapors (ppm)	2
Flammability (Yes/No)	No
Corrosivity	
pH	5.5
Reactivity	
Water reactive (Yes/No)	No
Oxidative(Yes/No)	No
Sulfide reactive (Yes/No)	No
Cyanide reactive (Yes/No)	No

The tank contents were analyzed for TRPH and BTEX to characterize the liquid for disposal in the future. UST 13-2 was covered with its tank lid and wired shut to prevent further accumulation of precipitation. Sample results for UST 13-2 are provided in Table 4-5.

TABLE 4-5
UST 13-2 CONTENTS WASTE CHARACTERIZATION
Sample ID: 96NE13TK101
Matrix: Water

Analysis	Results (mg/L)	Selected Regulatory Criteria		
		Toxicity Characteristic Limit (mg/L)	Proposed 18 AAC 75 Groundwater (mg/L)	18 AAC 70, Freshwater (mg/L)
Benzene	0.002	1.0	0.005	0.005
Toluene	0.051	NR	1.0	NR
Ethylbenzene	0.050	NR	0.7	32
Xylenes	0.350	NR	10.0	NR
TRPH	25	NR	NR	NR
RRO	NA	NR	1.1	NR
DRO	NA	NR	1.5	NR
GRO	NA	NR	1.3	NR

NA = Not analyzed.
NR = Not regulated as this constituent under this regulation

Based on these results, the aqueous contents of UST 13-2 would be classified as non-hazardous. The estimated quantity of contaminated water is approximately 20,000 gallons. Based on the concentration of total petroleum hydrocarbons, carbon treatment is recommended prior to direct discharge to the ground.

4.2.1.4 AST 14-1 Waste Characterization

Field waste characterization of the contents of AST 14-1 was performed in 1994 (Montgomery Watson, 1995a). Results are shown below in Table 4-6.

TABLE 4-6
AST 14-1 RCRA CHARACTERISTICS FIELD RESULTS

	AST 14-1 Tank Contents
Ignitability	
Organic vapors (ppm)	1.6
Flammability (Yes/No)	No
Corrosivity	
pH	5
Reactivity	
Water reactive (Yes/No)	No
Oxidative(Yes/No)	No
Sulfide reactive (Yes/No)	No
Cyanide reactive (Yes/No)	No

One water sample was collected from the tank and analyzed for BTEX, TRPH, and PCBs to characterize the tank contents for disposal. One composite sludge sample was collected and analyzed for TCLP metals and ethylene glycol. AST 14-1 was covered with its lid and wired shut to prevent further accumulation of precipitation. Sample results for AST 14-1 are provided below in Table 4-7.

TABLE 4-7
AST 14-1 CONTENTS WASTE CHARACTERIZATION
Sample ID: 96NE14TK101
Matrix: Water

Analysis	Results	Selected Regulatory Criteria		
	(mg/L)	Toxicity Characteristic Limit (mg/L)	Proposed 18 AAC 75 Groundwater (mg/L)	18 AAC 70, Freshwater (mg/L)
Benzene	ND (0.001)	1.0	0.005	0.005
Toluene	ND (0.001)	NR	1.0	NR
Ethylbenzene	ND (0.001)	NR	0.7	32
Xylenes	0.002	NR	10.0	NR
TRPH	130	NR	NR	NR
RRO	NA	NR	1.1	NR
DRO	NA	NR	1.5	NR
GRO	NA	NR	1.3	NR
PCB	ND (0.007)	NR	0.0005	0.000014

Sample ID: 96NE14TK102
Matrix: Sludge

Analysis	Results (mg/L)	Toxicity Characteristic Limit (mg/L)	18 AAC 75 Under 40 inches Zone (mg/Kg)
Arsenic	ND(0.1)	5.0	NR
Barium	0.21	100.0	NR
Cadmium	ND (0.005)	1.0	NR
Chromium	ND (0.01)	5.0	NR
Lead	ND (0.03)	5.0	NR
Mercury	ND (0.0002)	0.2	NR
Selenium	ND (0.03)	1.0	NR
Silver	ND (0.005)	5.0	NR
Ethylene glycol	ND (5 mg/Kg)	NR	NR

ND = Non-detect. Detection limit is provided in parenthesis.
NA = Not analyzed.
NR = Not regulated as this constituent under this regulation.

Based on these results, the aqueous contents in AST 14-1 are classified as non-hazardous. The estimated quantity of contaminated water is approximately 2,000 gallons. Based on the concentration of total petroleum hydrocarbons, carbon treatment is recommended prior to direct discharge to the ground.

Based on these results, the sludge in AST 14-1 is also classified as non-hazardous. The estimated quantity is 500 gallons. Due to the elevated levels of petroleum in the aqueous phase, treatment of the sludge in conjunction with the treatment of other petroleum-contaminated soil at the installation is recommended.

4.2.1.5 AST 16-1 Waste Characterization

According to Eugene Toolie (1996), this tank contained oil used for oiling the roads as a dust control measure during the summer months. Field waste characterization was performed in 1994 (Montgomery Watson, 1995a). Results are shown in Table 4-8.

TABLE 4-8
AST 16-1 RCRA CHARACTERISTICS FIELD RESULTS

	AST 16-1 Tank Contents
Ignitability	
Organic vapors (ppm)	1.2
Flammability (Yes/No)	No
Corrosivity	
pH	5
Reactivity	
Water reactive (Yes/No)	No
Oxidative(Yes/No)	No
Sulfide reactive (Yes/No)	No
Cyanide reactive (Yes/No)	No

Three water samples (primary; duplicate, QC; and split, QA) were collected from the tank and analyzed for BTEX, PCBs and TRPH. Three sludge samples were also collected from the tank (primary; replicate, QC; and split, QA) and analyzed for TCLP metals, fuel identification, and glycol. These samples were collected for waste characterization prior to the removal of the tank and disposal of the tank contents. In addition to the water and sludge samples, an effort to retrieve a third sample of the approximately 1/8 inch layer of floating product present in the tank was unsuccessful. After the samples were collected, AST 16-1 was covered with its lid and wired shut to prevent further accumulation of precipitation. Sample results for AST 16-1 are presented below in Table 4-9.

TABLE 4-9
AST 16-1 CONTENTS WASTE CHARACTERIZATION
Sample ID: 96NE16TK101, 201 (QC), 301 (QA)
Matrix: Water

Analysis	Results (mg/L)			Selected Regulatory Criteria		
	Primary	QC	QA	Toxicity Characteristic Limit (mg/L)	Proposed 18 AAC 75 Groundwater (mg/L)	18 AAC 70, Freshwater (mg/L)
Benzene	ND (0.001)	ND (0.001)	ND (0.002)	1.0	0.005	0.005
Toluene	ND (0.001)	ND (0.001)	ND (0.002)	NR	1.0	NR
Ethylbenzene	ND (0.001)	ND (0.001)	ND (0.002)	NR	0.7	32
Xylenes	0.001	0.002	0.0033	NR	10.0	NR
TRPH	15	36	11.1	NR	NR	NR
RRO	NA	NA	NA	NR	1.1	NR
DRO	NA	NA	NA	NR	1.5	NR
GRO	NA	NA	NA	NR	1.3	NR
PCBs	ND (0.007)	ND (0.007)	ND (0.007)	NR	0.0005	0.000014

Sample ID: 96NE16TK102, 202 (QC), 302 (QA)
Matrix: Sludge

Analysis	Results (mg/L)			Selected Regulatory Criteria	
	Primary (mg/L)	QC (mg/L)	QA (mg/L)	Toxicity Characteristic Limit (mg/L)	18 AAC 75, Under 40 inches Zone (mg/Kg)
Arsenic	ND (0.1)	ND (0.1)	0.028	5.0	0.1
Barium	ND (0.2)	0.25	0.17	100.0	5
Cadmium	0.013	0.024	0.018	1.0	0.01
Chromium	0.019	0.027	0.013	5.0	0.3
Lead	0.056	0.046	0.03	5.0	
Mercury	ND (0.0002)	ND (0.0002)	ND (0.0005)	0.2	0.006
Selenium	ND (0.1)	ND (0.1)	ND (0.08)	1.0	0.1
Silver	ND (0.005)	ND (0.005)	ND (0.01)	5.0	0.5
Fuel ID (heavier than gasoline)	NA	NA	280 mg/Kg	NR	NR
RRO	NA	NA	NA	NR	10,000
DRO	NA	NA	NA	NR	250
Fuel ID (gasoline)	NA	NA	ND (14,000 mg/Kg)	NR	NR
GRO	NA	NA	NA	NR	300
Ethylene Glycol	10 (mg/Kg)	15 (mg/Kg)	7.1 (mg/Kg)	NR	NR

ND = Non-detect. Detection limit is provided in parenthesis.
NA = Not analyzed.
NR = Not regulated as this constituent under this regulation.

Based on these results, the aqueous contents in AST 16-1 are classified as non-hazardous. The estimated quantity of contaminated water is approximately 450 gallons. Based on the concentration of total petroleum hydrocarbons, carbon treatment is recommended prior to direct discharge to the ground.

Based on these results, the sludge in AST 16-1 is also classified as non-hazardous. The estimated quantity is 50 gallons. Due to the elevated levels of petroleum in the aqueous phase, treatment of the sludge in conjunction with the treatment of other petroleum-contaminated soil at the installation is recommended.

4.2.1.6 AST 19-1 Waste Characterization

AST 19-1 was used to store spent antifreeze in the past. Currently, the tank is approximately 20% full-spent antifreeze. Field waste characterization was performed in 1994 (Montgomery Watson, 1995a). Results are shown below in Table 4-10.

TABLE 4-10
AST 19-1 RCRA CHARACTERISTICS FIELD RESULTS

	AST 19-1 Tank Contents
Ignitability	
Organic vapors (ppm)	19.6
Flammability (Yes/No)	No
Corrosivity	
pH	7
Reactivity	
Water reactive (Yes/No)	No
Oxidative(Yes/No)	No
Sulfide reactive (Yes/No)	No
Cyanide reactive (Yes/No)	No

No sample was collected for laboratory analysis. The estimated quantity of spent antifreeze is approximately 50 gallons. Containerization and off-site disposal is recommended.

4.2.1.7 AST 21-1 and AST 21-2 Waste Characterization

AST 21-1 and AST 21-2 were used to process sewage from the installation. Currently, the tanks are approximately 50% full septage. No sample was collected for analysis. The estimated quantity of septage is over 10,000 gallons. Burial on-site or containerization and off-site disposal are recommended.

4.2.1.8 Mechanics' Work Pit Waste Characterization

One water and one sludge sample was collected from the mechanics' work pit (approximately 2,100 gallons) in the north end of the auto maintenance facility, Building 109. During the 1996 field investigation, the pit was approximately one half full of liquid, exposing miscellaneous debris including three rubbish bins, tires, metal debris, and insulation.

One water sample was collected from the pit and analyzed for BTEX, PCBs, and TRPH. One composite sludge sample was collected from the grease pit and analyzed for TCLP metals, fuel identification, and antifreeze (ethylene glycol). The sludge sample itself consisted primarily of paint chips, various kinds of insulation and other unidentifiable materials. Sample results for the mechanics' work pit are provided below in Table 4-11.

TABLE 4-11
MECHANICS WORK PIT CONTENTS WASTE CHARACTERIZATION
Sample ID: 96NE19TK101
Matrix: Water

Analysis	Results	Selected Regulatory Criteria		
	(mg/L)	Toxicity Characteristic Limit (mg/L)	Proposed 18 AAC 75 Groundwater (mg/L)	18 AAC 70, Freshwater (mg/L)
Benzene	ND (0.001)	1.0	0.005	0.005
Toluene	ND (0.001)	NR	1.0	NR
Ethylbenzene	ND (0.001)	NR	0.7	32
Xylenes	ND (0.001)	NR	10.0	NR
TRPH	1	NR		NR
RRO	NA	NR	1.1	NR
DRO	NA	NR	1.5	NR
GRO	NA	NR	1.3	NR
PCBs	ND (0.007)	NR	0.0005	0.000014

Sample ID: 96NE19TK102
Matrix: Sludge

Analysis	Results (mg/L)	Toxicity Characteristic Limit (mg/L)	18 AAC 75, Under 40 inches Zone Adoption draft (mg/Kg)
Arsenic	0.19	5.0	0.1
Barium	0.31	100.0	5
Cadmium	0.035	1.0	0.01
Chromium	0.078	5.0	0.3
Lead	**49**	5.0	
Mercury	ND (0.0002)	0.2	0.006
Selenium	ND (0.1)	1.0	0.1
Silver	ND (0.005)	5.0	0.5
Ethylene Glycol	ND (2 mg/Kg)	NR	NR

ND = Non-detect. Detection limit is provided in parenthesis.
NA = Not analyzed.
NR = Not regulated as this constituent under this regulation.
Bold figures represent exceedence of toxicity characteristic limit

Based on these results, the aqueous contents in the mechanics' work pit are classified as non-hazardous. The estimated quantity of contaminated water is approximately 1,050 gallons. Based on the concentration of total petroleum hydrocarbons, carbon treatment does not appear necessary prior to direct discharge to the ground.

Based on these results, leachable lead concentration of 49 mg/L in the sludge in the mechanics' work pit, the sludge will be classified as hazardous waste once it is removed from the pit and designated for disposal. The estimated quantity is 50 gallons.

4.2.1.9 Summary of Tank Contents and Disposition

Table 4-12 summarizes the liquids and solids in the tanks at the site, their RCRA waste classification and proposed disposal.

TABLE 4-12
INVENTORY OF TANKS WASTES, CLASSIFICATION AND PROPOSED DISPOSAL

Site	Tank Number	Past Contents	Current Contents	Quantity of Waste (gallons)	RCRA Classification	Proposed Disposal
4	AST 4-2	Drinking water	Potable water/rain water	120	Non-hazardous	Direct discharge to ground
11	AST 11-1	Diesel	Rainwater with sheen	5,200	Non-hazardous	Process through carbon absorption unit then discharge to ground.
13	UST 13-2	Diesel	Rainwater with sheen	20,000	Non-hazardous	Process through carbon absorption unit then discharge to ground.
14	AST 14-1	Fuel	Contaminated rainwater	2,000	Non-hazardous	Process through carbon absorption unit then discharge to ground.
			Petroleum-contaminated sludge	500	Non-hazardous	Treat with other petroleum-contaminated soils
16	AST 16-1	Oil for roads (probably used oil)	Contaminated rainwater	450	Non-hazardous	Process through carbon absorption unit then discharge to ground.
			Petroleum-contaminated sludge floating product	50	Non-hazardous	Treat with other petroleum-contaminated soils
19	AST 19-1	Spent antifreeze	Spent antifreeze	50	Non-hazardous	Off-site disposal
	Mechanics' Work Pit	None	Contaminated rainwater	1,050	Non-hazardous	Direct discharge to the ground
	Mechanics' Work Pit	None	50% full (rainwater and sludge)	50	Hazardous waste - Lead (D008)	Off-site disposal at permitted hazardous waste treatment facility

TABLE 4-12 (continued)
INVENTORY OF TANKS WASTES, CLASSIFICATION AND PROPOSED DISPOSAL

Site	Tank Number	Past Contents	Current Contents	Quantity of Waste (gallons)	RCRA Classification	Proposed Disposal
21	AST 21-1	Septic	Septage	5,000	Non-hazardous	On-site burial or disposal off-site
	AST 21-2	Septic	Septage	5,000	Non-hazardous	On-site burial or disposal off-site

4.2.2 Summary of CON/HTRW

Based on the inventory prepared for Northeast Cape and the laboratory results discussed in the previous section, Table 4-13 summarizes the CON/HTRW at the site. In many instances, the field team was unable to access areas of the buildings and drum or debris piles. Therefore, the quantity of CON/HTRW should be considered a best-guess estimate. The construction contractor for the removal should be contacted to make a more accurate assessment of the quantity of material, impediments to demolition and removal and disposal.

4.3 BUILDING DEMOLITION AND DEBRIS INVENTORY

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

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

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

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

3. Falling hazards

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

4. Climbing hazards

- Any structure ten feet or higher which is readily climbable through any internal parts of the structure

TABLE 4-13
INVENTORY OF FUDS ELIGIBLE CONTAINERIZED HAZARDOUS AND TOXIC WASTE

Site Description	Debris	Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 1 - Burn Site Southeast of Landing Strip							
	No visible sources of CON/HTW						
Site 2 - Airport Terminal and Landing Strip							
	Diesel tank (AST 2-1)	Diesel, now empty	1	item		1,000 gallon	
Site 3 - Fuel Line Corridor and Pumphouse							
	Diesel tanks (AST 3-1)	Diesel, now empty	1	item		500 gallon	
	Diesel tanks (AST 3-2)	Diesel, now empty	2	item		335 gallon	
	Lead acid auto battery	Lead acid	1	item			
	Fuel hose	Diesel, empty	3	item		6-inch diameter, Rubber (20' sections)	
	Paint container	Paint, now open to rain	1	gallon			
	Fuel Pipeline	Fuel	8,500	linear feet		4-inch steel fuel pipeline	
Site 4 - Subsistence Fishing and Hunting Camp							
	Batteries and fluids in vehicles; abandoned (per BD/DR inventory)	Battery and fluids	2	items			Could be under jurisdiction of SHPO - Totally ruined
Site 5 - Cargo Beach							
	Battery and fluids in Bulldozer (D-8) (per BD/DR inventory)	Battery, fluids	1	item			Could be under jurisdiction of SHPO - totally rusted and destroyed
Site 6 - Cargo Beach Road Drum Field							
	Battery	Lead acid	1	item			
Site 7 - Cargo Beach Road Landfill							
	Batteries	Lead acid	7	item			
Site 8 - POL Spill Site							
	Aboveground POL pipeline	Fuel					POL pipe inventoried under Site 3
Site 9 - Housing and Operations Landfill							
	Containerized chemical; powder 2 quart-size	Unknown Chemical	1	item			
	Battery	Lead acid	1	item			
Site 10 - Buried Drum Field							
	No visible sources of CON/HTW						
Site 11 - Fuel Storage Tank Area							
	Diesel Tank (AST 11-1)	Water with petroleum sheen	1	item		400,000 gallon; 28 ft. tall, 50 ft. diameter	On concrete foundation
	Contaminated-water in AST 11-1	Diesel contaminated water, RCRA non-hazardous	5,200	gallons			
	Diesel Tanks (AST 11-2, AST 11-3)	Diesel, now empty	2	item		400,000 gallon; 28 ft. tall, 50 ft. diameter	On concrete foundation
	Misc. valves, piping, pipe racks	Diesel, now empty	1500	lbs.	1,500		

TABL. .-13
INVENTORY OF FUDS ELIGIBLE CONTAINERIZED HAZARDOUS AND TOXIC WASTE

Site Description	Debris	Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 12 - Gasoline Tank Area							
	Gasoline Tank (AST 12-1)	Gasoline, now empty	1	item		15,000 gallon	
	Gasoline Tank (AST 12-2)	Gasoline, now empty	1	item		30,000 gallon	
	Fuel valves and piping	Gasoline, now empty	500	lbs.	500		
Site 13 - Heat and Electrical Power Building							
	Cummins diesel generators	Diesel, now empty	4	item			3.5 ft. wide x 12 ft. long x 6 inches high
	Diesel tank (AST 13-1)	Diesel, now empty	1	tank		1,000 gallon	
	Diesel tank (UST 13-2)	Diesel, rainwater infiltrated	1	tank		20,000 gallon	
	Diesel tank (AST 13-4)	Diesel, now empty	1	tank		5,000 gallon	
	Rainwater in UST 13-2	Diesel contaminated water, RCRA non-hazardous	20,000	gallons			
	Diesel tank (UST 13-3)	Diesel, now empty	1	tank		5,000 gallon	
	Transformer Pad	PCB	1	pad		10 ft. x 20 ft.	Concrete pad
	Transformer Pad	PCB	2	pad		5 ft. x 10 ft.	Concrete pad
Site 14 - Emergency Power Operations Building							
	Diesel tank (AST 14-1)	Diesel, now 50% full of contaminated rainwater	1	item		5,000 gallon	
	Contaminated water in AST 14-1	Diesel-contaminated water; RCRA non-hazardous	2,000	gallons			
	Containerized sludge in AST 14-1	Diesel-contaminated sludge; RCRA non-hazardous	500	gallons			
	Containers; military grease	Grease	5	item			
	Drum	Antifreeze - full	1	item			Outside (south side)
	Transformer Pad	PCB	1	pad		10 ft. x 15 ft.	Concrete pad
Site 15 - Buried Fuel Line Spill Area							
	Underground fuel pipeline	Fuel	50	linear feet		50 ft. tall x 4-inch diameter	
Site 16 - Paint and Dope Storage Building							
	Solvents, paints, POLs, dielectric fluids, cleaners and other liquids	Now empty. Potentially toxic chemicals.	150	gallons			
	Oil Tank (AST 16-1)	Used oil, now 50% full of contaminated water	1	item		1,000 gallon steel	
	Liquid in Oil Tank (AST 16-1)	Petroleum-contaminated water; RCRA non-hazardous	450	gallons			
	Sludge in Oil Tank (AST 16-1)	Petroleum-contaminated sludge; RCRA non-hazardous	50	gallons			
	Overpack Container	Unknown, Marked 16-5, 16-6	2	item		15 gallon	Contents unknown - overpacks left by NES
	Overpack Container	Unknown Marked 16-2, 16-3, 16-4	3	item		8 gallon	Contents unknown - overpacks left by NES
Site 17 - General Supply Warehouse and Mess Hall Warehouse							
	Containers; miscellaneous cleaners	Miscellaneous cleaners (25 lb./tub)	22	tubs			Believed to be dishwashing powder
	Compressed gas cylinder	Unknown	??	cylinder			Building 111
	Drum(s)	Unknown	8	item			
	Drum(s)	Unknown	1	item			Unknown contents

TABLE 4-13
INVENTORY OF FUDS ELIGIBLE CONTAINERIZED HAZARDOUS AND TOXIC WASTE

Site Description	Debris	Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 18 - Housing Facilities and Squad Headquarters							
	Compressed gas cylinders	Unknown	1	cylinder			Northwest of Building 101 West
	Compressed gas cylinder	Unknown	1	cylinder			In "AM" barracks
	Containerized fluids or cleaners	Potentially toxic chemicals	10	item			Located in Mess Hall
	Incinerator	Potential incineration by-products	1	item			
	Electrical panels with switches	PCB in switch fluid	4	switches			In Building 99. Suspect about 8 gallons dielectric fluid.
Site 19 - Auto Maintenance and Storage Facilities							
	Generator with trailer	Fuel	1	item			2 ft. wide x 4 ft. tall x 6 ft. long with trailer
	Cylindrical air compressor tank	Compressed gas	1	item			2-1/2 ft. x 6 ft.
	Containers; foaming liquid type-5	Potentially toxic chemicals	39	item		5 gallon	Empty
	Smudge pots	Diesel, solvents	24	item			Drain liquid - Probably diesel-contaminated water
	Mechanics' work pit	Falling and Drowning hazard: open work pit > 5 ' deep, accessible to rain and snow melt run-off with hazardous sludge.		cubic feet			
	Water in mechanics work pit	Contaminated water	1,050	gallons			
	Sludge in mechanics work pit	Sludge, hazardous waste for lead	50	gallons			
	Antifreeze Tank (AST 19-1)	25% full, spent antifreeze	1	item		250 gallon	
	Contents of Tank AST 19-1	Antifreeze (spent)	50	gallons			
	Military Aircraft Washing Powder	Washing powder	72	buckets		5 gallon buckets	
Site 20 - Aircraft Control and Warning Building							
	Battery	Lead acid	6	item		6 volt	
	Compressed gas cylinder	Unknown	1	item			
	Freon cylinder	Freon	1	cylinder		4 ft. high, 1 ft. diameter	Northwest side of Building 117
Site 21 - Wastewater Treatment Facility							
	Piping; influent/effluent	Septage	500	linear feet		8-inch cast iron	
	Wastewater Treatment Tank (AST 21-1)	Falling and Drowning hazard: open cistern filled with water. Septage.	1	item		Over 10,000 gallons	
	Waste water cistern (AST 21-2)	Septage falling and drowning hazard: open cistern filled with water and septage.	1	tank		Over 10,000 gallons	3 ft. x 4 ft.
	Septage in AST 21-1 and AST 21-2	Septage, non-hazardous	10,000	gallons			
Site 22 - Water Wells and Water Supply Building							
	Generator and pump	Fuel	1	item			
	Containerized ACM cement	Asbestos	150	gallons			
	Asbestos cement	Asbestos	10	50 lb. bags			
	Diesel Tank (UST 22-1)	Diesel, now empty	1	tank		500 gallons	
	Drinking water wells	Contaminant migration pathway	3	wells		Nominal 12-inch diameter	Decommission per ADEC guidelines

TABL 13
INVENTORY OF FUDS ELIGIBLE CONTAINERIZED HAZARDOUS AND TOXIC WASTE

Site 23 - Power and Communication Line Corridors							
	Drums	Unknown	5	Drums			
Site 24 - Receiver Building Area							
	No visible CON/HTW						
Site 25 - Direction Finder Area							
	Transformer casing	PCB	1	item			
Site 26 - Former Construction Camp Area							
	No visible sources of CON/HTW	N/A	N/A	N/A			
Site 27 - Diesel Fuel Pump Area							
	Fuel pump shed	Diesel	Unknown	N/A		4 ft. x 6 ft. x 8 ft. high	Needs to be removed to provide access to fuel lines
	Concrete sump	Diesel				3 ft. x 3 ft. with piping and faucets	
	Fuel pump	Diesel	1	pump			
	Pipeline; buried and fuel pump	Diesel	1	item			

Excluded Items:

Site 7	Landfill
Site 9	Landfill
Site 10	Estimated 29,500 buried drums with lube oil grease
Site 19	Drain (Auto maintenance)
Site 24	Drum field
All	Items removed during the 1994 removal

KEY:

ACM - Asbestos-containing material
BD/DR - Building demolition/debris removal
CON/HTW - Containerized hazardous or toxic waste
DERP - Defense Environmental Restoration Program
FUDS - Formerly Used Defense Site
N/A - Not applicable
NE - Northeast Cape
PCB - Polychlorinated biphenyls
POL - Petroleum, oil and lubricants
SHPO - State Historic Preservation Office
TCLP - Toxic characteristic leaching procedure
UST - Underground storage tank

NOTE:

(a) - Combined estimated quantity of building material at Site NE 18.

5. **Drowning hazard**

   - Any pit, depression or tank which can collect or contain standing water

6. **Other hazards**

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

Table 4-14 presents the inventory of BD/DR at the Northeast Cape installation. In many instances, the field team was unable to access areas of the buildings and drum or debris piles. Therefore, the quantity of BD/DR should be considered a best-guess estimate. The construction contractor for the removal should be contacted to make a more accurate assessment of the quantity of material, impediments to demolition and removal and disposal options.

4.4 RECONNAISSANCE FOR PROSPECTIVE C&D WASTE MONOFILL SITE AND COVER MATERIAL

4.4.1 Reconnaissance of Gravel Fill Pads

The main operations complex is built upon an gravel pad most likely constructed from gravel from the borrow area located along the mountain front of the Kinipaghulghat Mountains south of the installation. The dimensions, thickness, and geotechnical parameters of the gravel pad are of interest because this pad may represent an appropriate location for construction of an inert C&D monofill in which inert building debris can be disposed during remediation.

During the 1996 site reconnaissance, the dimensions of the gravel pad at the Main Operations Complex were estimated by visual observation. This data was combined with historical data from the 1994 Phase I RI to produce an isopach map of the gravel pad, as illustrated in Figures 4-1 and 4-2. The isopach map was created by:

- observation of the thickness of the borders of the pad during field efforts
- projection of contours of equal elevation of native topography under the pad and notation of pad surface topography (based on historical topographic mapping)
- boring log information from the 1994 RI

TABLE 4-14
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 1 - Burn Site Southeast of Landing Strip							
	No visible sources of BD/DR			N/A			
Site 2 - Airport Terminal and Landing Strip							
	Airport Terminal with Tower	Structural hazard: unprotected openings > 8" x 8" in roof and tower wall, missing front stairs and railings; Climbing hazard: tower readily climbable from main floor; Other: numerous exposed nails, broken timbers, and openings > 8" x 8", collapsed tower	1,600	square feet		Estimate building size at 25 ft. x 75 ft. Also has 15 ft. x 15 ft. second story tower.	Radio antenna (steel) has fallen over
	Roller	Collision hazard	1,000	pounds	1,000	4 ft. long by 4 ft. diameter steel cylinder	
	Drag frame	Collision hazard	200	pounds	200	8 ft. by 15 ft. "L" steel drag frame for runway grading	
	Cable	Entanglement hazard	25	feet			Steel tow cable
	Cable	Collision/Entanglement	10,500	feet		Cable - 2 strand copper with 3/4" rubber coating and 3/8" wire rope to main operations complex	Cable - 2 strand copper with 3/4" rubber coating and 3/8" wire rope to main operations complex
	Hoist assembly	Collision hazard	1,500	pounds	1,500	Hoist assembly 18 ft. tall x 8 ft. wide	
	Sled	Collision hazard	1	sled		1 sled 10 ft. long x 3 ft. wide - 1 pipe frame	
	Power lines/Poles	Collision and entanglement hazard for snow machine traffic	9	item			
	Tractor	Collision hazard for snow machine traffic	1	item			Could be under jurisdiction of SHPO - poor condition
	Drum(s)	Empty	5	item			Empty, deteriorated condition
	Fire extinguisher	Empty	1	item			
Site 3 - Fuel Line Corridor and Pumphouse							
	Bldg. 119 - Fuel Pumphouse	Structural: opening west end (15 ft. by 30 ft.)	448	square feet			Will need to be removed for contaminated soil removal - Has concrete foundation and tank pad
	Debris; metal	Other: sharp metal edges protruding, collision hazard from fish camp housing to beach by snow machines	5,200	pounds	5,200		
	Rusted drums	Empty	15	drums			
Site 4 - Subsistence Fishing and Hunting Camp							
	Vehicles; abandoned	Collision and entanglement hazard for snow machine traffic	2	items			Could be under jurisdiction of SHPO - Totally ruined
	Drum(s)	Empty	275	drums			
	Water Tank (AST 4-1)	Empty	1	tank		15,000 gallon; 27 ft. long x 10 ft. diameter	Steel
	Water Tank (AST 4-2)	30% full of potable water	1	tank		400 gallon; 5.5 ft. long x 3.6 ft. diameter	Double-walled, insulated; aluminum

TABLE 4-1 (Continued)
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 5 - Cargo Beach							
	Bulldozer (D-8)	Collision hazard for snow machine traffic	1	vehicle			Could be under jurisdiction of SHPO - totally rusted and destroyed
	Cable	Collision and entanglement hazard for snow machine traffic	1,000	linear feet		2-inch diameter	
	Marston mats	Other: protruding sharp metal edges; collision hazard for snow machine traffic	265	mats			
	Aluminum siding	Other: protruding sharp metal edges; collision hazard for snow machine traffic	1,000	linear feet			
	Drum(s)	Empty	275	item			
Site 6 - Cargo Beach Road Drum Field							
	Debris; metal (small mats)	Other: protruding sharp metal edges; collision hazard for snow machine traffic	200	cubic yards	500		
	Drum(s)	Empty	1,500	item			Estimated quantity
	Water Tank (AST 6-1)	Empty	1	item		500 gallon	Trailer mounted
Site 7 - Cargo Beach Road Landfill							
	Boiler	Collision hazard for snow machine traffic	1	item			Located in pond, with ACM liner
	Copper cable on spools	Collision hazard for snow machine traffic	3	item			
	Caterpillar cab	Collision hazard for snow machine traffic	1	item			
	Drum(s)	N/A	2,300	item			Estimated quantity
	Aluminum Radio antenna		2	towers			1 SE and 1 NE side of site
	Misc. metal debris		10,000	pounds	10,000		
Site 8 - POL Spill Site							
	No visible sources of BD/DR						
Site 9 - Housing and Operations Landfill							
	Aluminum	Other: protruding sharp metal edges; collision hazard for snow machine traffic	40	linear feet		40 feet	
	Truck frame	Other: protruding sharp metal edges; collision hazard for snow machine traffic	1	item			
	Cable; steel	Other: collision and entanglement hazard for snow machine traffic	100-500	linear feet			
	Drum(s); POL	Empty	50	item			
Site 10 - Buried Drum Field							
	Drum(s); surface	Empty	10	item			
Site 11 - Fuel Storage Tank Area							
	Drums	Empty	5	drums			
Site 12 - Gasoline Tank Area							
	No visible sources of BD/DR						
Site 13 - Heat and Electrical Power Building							
	Bldg. 110 - Heat and Electrical Power	Structural hazard: unprotected openings > 8" x 8" in roof and tower wall, missing front stairs and railings; Climbing hazard: 2nd floor readily climbable from main floor; Other: numerous exposed nails, broken timbers, and openings > 8" x 8"	7400	square feet			

TABLE 4-1 (Continued)
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 13 - Heat and Electrical Power Building							
	Water (pressure) tank (AST 13-5)		1	item		500 gallon	
	Water tank (AST 13-6)	Climbing hazard, tank is >8' from ground, the rack allows the tank readily climbable for children	1	item		204,000 gallon	
Site 14 - Emergency Power Operations Building							
	Bldg. 98 - Emergency Power Operations	Other: roof, floor, and ceilings are collapsing from weathering. Drowning hazard: the basement contains water.	16,250	square feet			Aluminum roofing (mostly blown off). This building has ~ 6 inch concrete exterior walls and steel girder roof. Steel stud/wire mesh/cement grout interior.
	Antenna, triangular	Other: entanglement and collison hazard	1	item		25 feet high	
	Debris, miscellaneous building	Other: exposed nails & sharp metal protruding debris	2 est.	cubic yards			
	Power lines/Power poles	Other: entanglement hazard for ATV and snow machine traffic	9	item			
	Loose 3-wire cable	Entanglement hazard	200	linear feet			
	Wooden spools with copper cable	Collision hazard	2	spools		5 ft. diameter	
Site 15 - Buried Fuel Line Spill Area							
	No visible sources of BD/DR						
Site 16 - Paint and Dope Storage Building							
	Bldg. 112 - Paint and Dope Building	Climbing hazard: exterior provides easy access to roof > 10' above ground	N/A	N/A			
	Drum(s); rollers	Other: collision hazard for ATV and snow machine traffic	2	item		3.5 ft. diameter x 4 ft. long, for compacting drums	
	Cable (spool)	Other: collision hazard for ATV and snow machine traffic	1	spool		7 wire, 3/4 inch	
	Cable (spool)	Other: collision hazard for ATV and snow machine traffic	1	spool		20 wire, 1.5 inch	
	Antenna (triangular)	Other: collision hazard for ATV and snow machine traffic	1	item		12-feet	
	Steel girders	Other: collision hazard for ATV and snow machine traffic	2,000	pounds	2,000		
	Marston matting	Other: collision hazard for ATV and snow machine traffic	500	pounds	500	8 ft. x 1.5 ft. (176 item)	
	Crates, silica sand	Other: collision hazard for ATV and snow machine traffic	6	crates		4.4 ft x 2 ft.	
	Galvanized metal	Other: collision hazard for ATV and snow machine traffic	200	pounds			Culvert material
	Corrugated copper steel half rounds	Other: collision hazard for ATV and snow machine traffic	150	item		12-inch radius	
	Pipe	Other: collision hazard for ATV and snow machine traffic	2	item		4-inch diameter x 20 ft. long	
	Pipe	Other: collision hazard for ATV and snow machine traffic	1	item		4-inch diameter x 12 ft. long	
	Masonry bricks	Other: collision hazard for ATV and snow machine traffic	200	item			
	Fire Extinguisher, empty	Other: collision hazard for ATV and snow machine traffic	1	item			Empty
Site 17 - General Supply Warehouse and Mess Hall Warehouse							
	Bldg. 111 - General Supply Warehouse	Structural hazard: roof, floor, and ceiling are collapsing from weathering	9900	square feet			

TABLE 4-1 (Continued)
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 17 - General Supply Warehouse and Mess Hall Warehouse							
	Bldg. 107 - Mess Hall Warehouse Building	Structural hazard: roof, floor, and ceiling are collapsing from weathering	10,200	square feet			Concrete slab
Site 18 - Housing Facilities and Squad Headquarters							
	Unknown Tank (AST 18-1)	Empty, climbing hazard	1	tank		200 gallons	In subterranean room
	Bldg. 99 - Recreation Building	Structural hazard: roof, floor, and ceilings are collapsing from weathering, numerous openings > 8"x 8". Climbing hazard: 2nd floor readily climbable from interior and exterior.	72050[a]	square feet (NE 18)			Unpainted steel building; recycle possibility. No roof. Laminated 6-inch hardwood floor.
	Bldg. 100 - NCO Quarters - N&S buildings	Structural hazard: roof, floor, ceilings, and load-bearing walls are collapsing from weathering, numerous openings > 8" x 8". Climbing hazard: 2nd floor readily climbable from interior and exterior.	72050[a]	square feet (NE 18)			Debris near all buildings at Site 18
	Bldg. 101 - Dormitory E&W	Structural hazard: roof, floor, ceilings, and load-bearing walls are collapsing from weathering. Drowning hazard: the basement is full of water > 8' deep.	72050[a]	square feet (NE 18)			Building lumber; recycle possibility.
	Bldg. 102 - BOQ	Structural hazard: roof is sagging and floors are collapsing, and weakening load-bearing walls are collapsing from weathering.	72050[a]	square feet (NE 18)			ACM; too dangerous to abate
	Cables, and power lines	Other: entanglement hazard for ATV and snow machine traffic	unknown	N/A			
	Utility Corridor	Cave-in hazard: deteriorating wooden covers and wall linings are producing open holes >5'.	unknown	N/A			Located throughout facility
	Subterranean walkway	Drowning, falling hazard		linear feet			
	Bldg. 104 - Administration	Structural hazard: roof is sagging, floors, ceilings, and weakening load-bearing walls are collapsing from weathering.	72050[a]	square feet (NE 18)			
	Bldg. 105 - Theater	Structural hazard: roof is sagging, floors, ceilings, and weakening load-bearing walls are collapsing from weathering.	72050[a]	square feet (NE 18)			Stainless-steel inside building; recycle possibility
	Bldg. 106 - Mess Hall	Structural hazard: roof is sagging, floors, ceilings, and weakening load-bearing walls are collapsing from weathering.	72050[a]	square feet (NE 18)			
	Bldg. 125 - Pre-fab. Building	Collapsed, total ruin	unknown	N/A			
	Bldg. 130 - Hobby Shop	Structural hazard: roof is sagging, floors, ceilings, and weakening load-bearing walls are collapsing from weathering.	unknown	N/A			
Site 19 - Auto Maintenance and Storage Facilities							
	Water tank (AST19-2)	Empty	1	item		250 gallon	
	Bldg. 109 - Auto Maintenance Facility	Structural hazard: roof, floor, ceilings, and load-bearing walls are collapsing from weathering, numerous openings > 8"x8". Climbing hazard: 2nd floor readily climbable from interior and exterior.	unknown	N/A			South side is 2 story, concrete slab foundation

TABLE 4-1. (Continued)
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 19 - Auto Maintenance and Storage Facilities							
	Bldg. 108 - Auto Storage	Structural hazard: roof is sagging and load-bearing walls are strained from weathering	unknown	N/A			Concrete slab foundation
	Floor jacks		2	item			
Site 20 - Aircraft Control and Warning Building							
	Bldg. 103 - Aircraft Control and Warning	Structural hazard: walls and ceilings have collapsed, remaining load-bearing walls are sagging and deteriorated due to weathering.	3358	square feet			
	Lead-shielded cable	N/A	25	linear feet		1-inch cable	
Site 21 - Wastewater Treatment Facility							
	Wastewater Treatment Tank	Falling and Drowning hazard: open cistern filled with water	1	item		800 gallon	Concrete cistern bermed with earthen materials.
	Steam line piping	N/A	500	linear feet		1-1/4-inch diameter	
	Wastewater Treatment Building	Structural hazard	Unknown	N/A			
Site 22 - Water Wells and Water Supply Building							
	Drinking water wells		4	Wells			Abandon per ADEC procedures
	Bldg. 113 - Water Supply Building	Structural hazard: roof and walls collapsing. Falling hazard: subsurface floor is >6 and concrete lined thus resulting in a drowning hazard.	28	feet high			Contains 4 large water tanks listed separately
	Well #4 pumphouse	Structural hazard: openings > 8" x 8", roof sagging, and load-bearing walls deteriorated due to weathering.					
	Bldg. 114 - Pump Station	Climbing hazard	1	item			
	Water tanks (AST22-2 to 5)	Climbing hazard, empty	4	tanks		60,000 gallon	In Building 113
Site 23 - Power and Communication Line Corridors							
	Downed power pole	Entanglement hazard					
	Drum(s)	Empty, sharp edges, rusted	1,500	item			
Site 24 - Receiver Building Area							
	Drum(s)	Empty	300	item			
	Concrete Receiver Building and foundation	Structural hazard					
Site 25 - Direction Finder Area							
	Concrete building foundation	Structural hazard					Foundation only
	Drums	Empty, rusted, sharp edges				55-gallon drums	Included in Site 23

TABLE 4-1 (Continued)
INVENTORY OF FUDS-ELIGIBLE BUILDING DEMOLITION AND DEBRIS REMOVAL ITEMS

Site Location	Building or Debris	Evaluation of Physical Hazard	Estimated Quantity	Units	Estimated Weight (Pounds)	Estimated Dimensions	Comments
Site 26 - Former Construction Camp Area							
	Drinking water well	Contaminant migration pathway	1	well			Decommission per ADEC guidelines
	Well house	Structural hazard, collapsing	1	building			
Site 27 - Diesel Fuel Pump Area							
	No visible sources of BD/DR						
All	Antenna	Climbing hazard	108	antenna			Throughout site

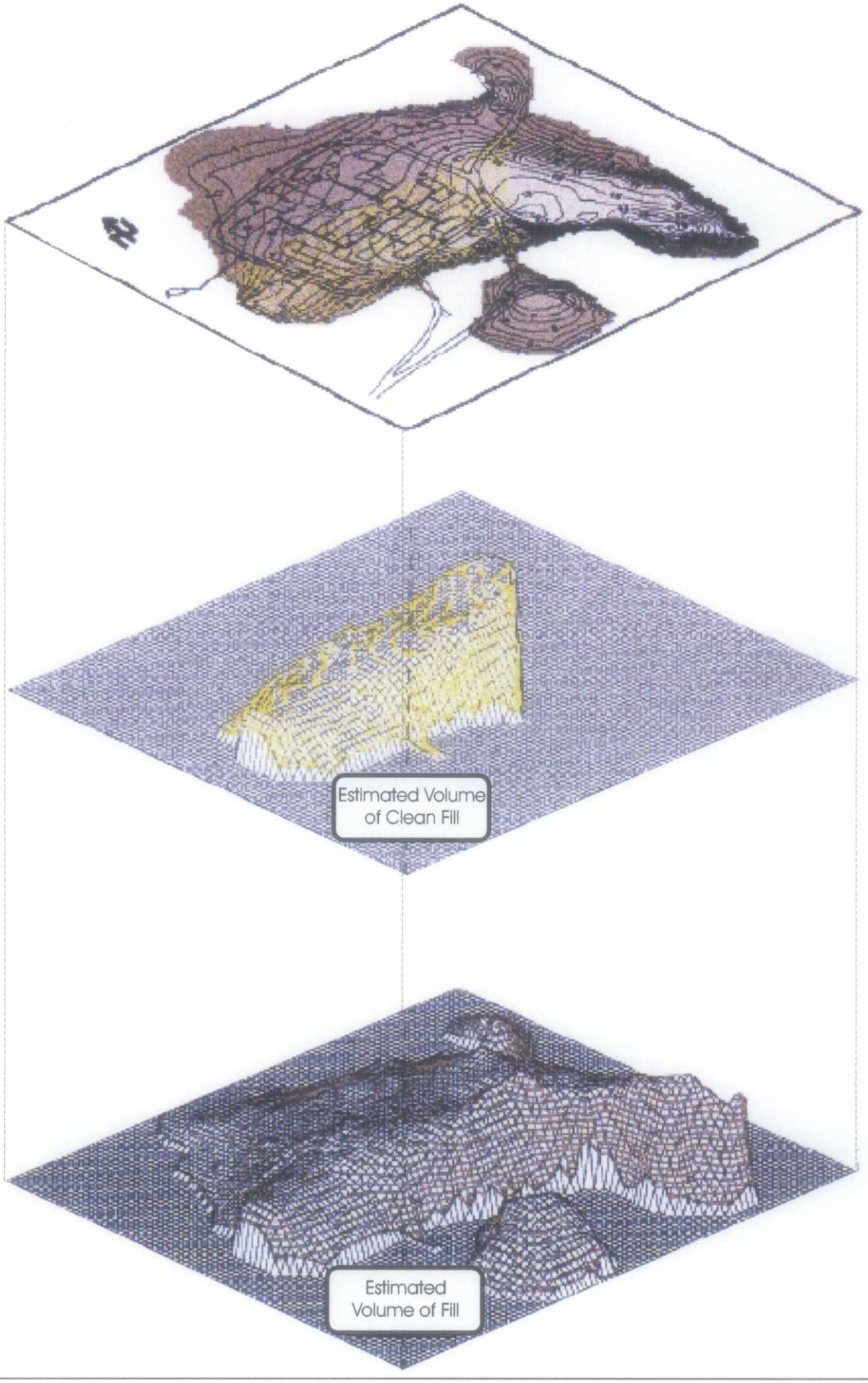
Excluded Items:

Site 7	Landfill
Site 9	Landfill
Site 10	Estimated 29,500 buried drums with lube oil grease
Site 19	Drain (Auto maintenance)
Site 24	Drum field
Site 27	Partially buried drums

KEY:

ACM - Asbestos-containing material
BD/DR - Building demolition/debris removal
CON/HTW - Containerized hazardous or toxic waste
DERP - Defense Environmental Restoration Program
FUDS - Formerly Used Defense Site
N/A - Not applicable
NE - Northeast Cape
PCB - Polychlorinated biphenyls
POL - Petroleum, oil and lubricants
SHPO - State Historic Preservation Office
TCLP - Toxic characteristic leaching procedure
UST - Underground storage tank

NOTE:
(a) - Combined estimated quantity of building material at Site NE 18.



MONTGOMERY WATSON

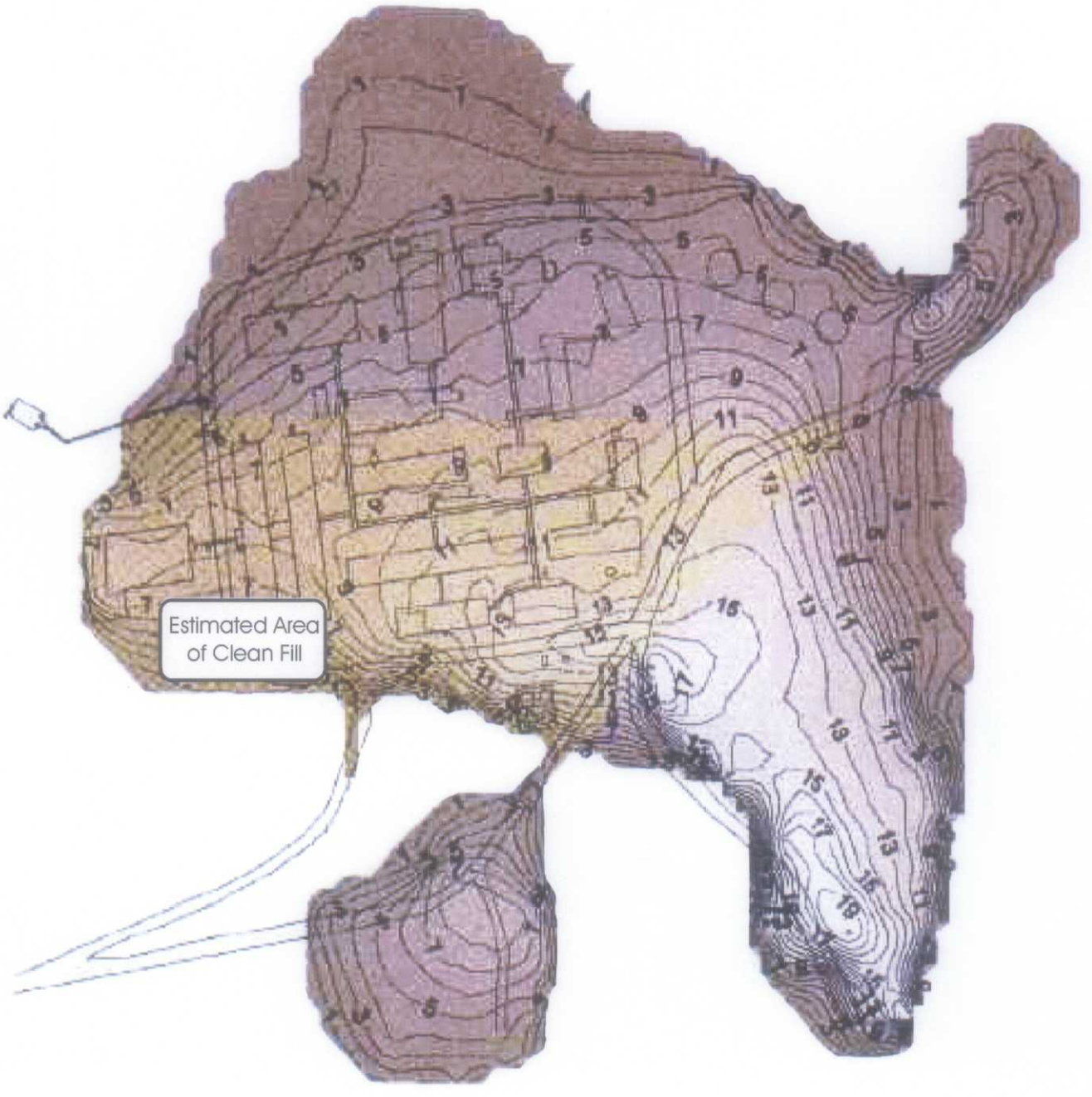
Anchorage, Alaska

FIGURE 4-1

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE - ST. LAWRENCE ISLAND, ALASKA

FILL VOLUMES

JOB No. 1811.000



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 4-2

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE-ST. LAWRENCE ISLAND, ALASKA

FILL DEPTH CONTOUR MAP

JOB No. 118905.01

The isopach map shown in Figures 4-1 and 4-2 is subject to several estimation inaccuracies (the primary potential inaccuracy being the estimation of the original topography that underlies the fill material). A substantial amount of artificial fill is contained within the gravel pad at the main operations complex. The total volume of fill was estimated using volume-estimating routines developed by Golden Software, which calculates the volume of a surface overlying a reference plane. Using this method, the total volume of fill is estimated at approximately 360,000 cubic yards. The largest volume appears to be the two lobes south of the main operations complex that did not have permanent structures. The westernmost lobe is identified in older maps as a "softball diamond", although it was believed to be originally used for construction equipment staging during the construction of the main operations complex. The easternmost lobe was used by Morrison Knudsen (MK) for temporary construction housing and construction staging in 1950 to 1966 (Toolie, 1996). An abandoned construction well used by MK during building of the facility is on the eastern lobe.

The quantity of usable fill may be limited by contamination. Fill on the northern edge of the gravel pad (Sites 13, 15, 16, 17, 19, and 20) is contaminated with diesel fuel. However, there is no current evidence of contamination at Site 14 and Site 18, which represent a major portion of the fill pad. Site 21 was not included in the fill volume because of potential contamination associated with the wastewater treatment facility.

As previously noted, the two lobes at the southern edge of the fill pad do not have structures on them, and represent a substantial amount of artificial fill. However, three locations were noted in these areas which may suggest that buried waste and debris may be contained under this fill. The western lobe consists of coarse, poorly sorted angular gravel with boulders to a maximum of 1 foot in diameter. The road which crosses this lobe contains finer fill material of crushed rock, with a grain size of generally less than 3 inches. An approximately 40-foot section of the embankment near the Cargo Beach Road contains partially buried metal and wood debris. In addition, a portion of the southwest embankment shows indications of tar oozing from the fill material. In the north-central portion of the eastern lobe, a weathered concrete foundation pad is located in an area of rounded darker rocks that probably originated from the beach area. The eastern lobe also shows indications of debris and tar on the southern edge of the fill pad. These observations are consistent with the reports that when MK demobilized in about 1966, they burned and buried obsolete items such as construction offices and barracks (Toolie, 1996).

Thus, the total usable amount of fill materials may be much less than the total fill area. The total usable fill has been estimated by eliminating areas of known contamination, and estimating the depth to groundwater beneath the pad. This results in an estimated usable volume of approximately 140,000 cubic yards. However, sampling data in this area is limited and the estimated quantity of usable fill may be further reduced by unanticipated soil contamination.

Vegetation is present throughout the fill pad, with the exception of roads and driveways that have been used in the recent past or have been compacted by vehicular traffic. Vegetation in non-traveled areas consists of light grasses and small low shrubs. In areas that were never subject to heavy traffic, such as relatively inaccessible areas between buildings, revegetation has occurred in as much as 25 to 50 percent of the total surface area. In other areas that may have had minor traffic during operation of the facility, revegetation on the order of 10 to 20 percent has occurred.

Because of the extreme wind conditions at Northeast Cape, deflation of traveled areas is a significant erosional process. In less traveled areas, wind erosion appears to have stabilized due to revegetation and creation of a natural pavement created by larger sand and gravel clasts. Heavily traveled areas, such as the Airport and Cargo Beach Road can be observed to be the source of windblown sand and dust during wind events. These roads are reported to have deflated several feet since military maintenance ceased (Toolie, 1996). During the military era, the roads were oiled with "drain oil", although little evidence of this oiling can be observed today. Drain oil was stored in Tank 16-1 north of the Paint and Dope Building at Site 16.

Much of the artificial fill pad on which the main operations complex is constructed is believed to have originated from the gravel borrow pit, which consists of coarse, angular granitic rocks. The surface of the pad consists of poorly sorted fine to coarse gravel combined with sand and windblown silt. Boring logs from the northern section of the fill pad suggest that the fill materials do not consist exclusively of coarse material, but also contain a significant amount of silt. This suggests that native soils may have been mixed with materials from the borrow pad during construction of the pad. In many areas, the fill material is difficult to distinguish from native soils during drilling.

4.4.2 Reconnaissance of the Former Borrow Area

The borrow area was investigated as a potential source of fill, or as a potential site for an inert monofill. The borrow area was used during construction of the facility, and is located at the mountain front of the Kinipaghulghat Mountains, approximately 2,000 feet south of the main operations complex. The borrow area is located on a broad colluvial slope consisting of clasts of igneous material weathered from granitic rocks at higher elevation. The mountain front rises steeply at the borrow area, where bedrock materials crop out and reach a maximum elevation of 1,800 feet.

The borrow area materials were derived from the Cretaceous Kinipaghulghat Pluton. The approximately 10 square mile pluton is present as relatively resistant bedrock outcrops, which form the mountains of the northeast cape of the island. The rocks of the Kinipaghulghat Pluton are reported by Patton and Csejtey (1980) to consist primarily of massive quartz monzonite, which grades locally to monzonite, granodiorite, syenite, and alaskite. Some of the monzonite and syenites contain abundant mafic minerals but little or no quartz.

Field observations at the borrow area indicate two large areas which have been worked. The westernmost area appears to have been the most heavily used. The main borrow area is approximately 1,500 feet wide and 800 feet long, with a smaller area of about 600 by 200 feet which has been heavily worked. The colluvium at this location consists of angular to subangular granitic rock. The typical clast size is about 3 inches, although boulders to 3 feet in diameter are common. Higher on the hillslope, the typical clast size is about 6 inches. Monzonitic rocks are the most abundant in the immediate vicinity of the borrow area, although fine-grained apalitic rocks, rocks consisting almost entirely of mafic minerals, and rocks consisting almost entirely of plagioclase feldspar were occasionally found. At higher elevations above the borrow area, more mafic granitic rocks form a large intrusion in the pluton which is less resistant to weathering.

Based on observations at the site, the borrow area was worked by pushing materials down the slope with heavy equipment. Toolie (1996), confirmed this, and indicated that blasting was not required. The rock was crushed in two different sizes, one for roading materials, and another for the runway materials. Disturbance by heavy equipment is evident approximately 500 feet up the colluvial slope. At the base of the slope is a working pad of about 1/2 acre on the working pad is a loading dock and driveway at which materials could be loaded in trucks. The loading dock still appears serviceable.

At the base of the colluvial slope near the working pad are several springs and ponded water. These springs originate from seepage in the granitic rock, and suggest that subsurface water may be perched on shallow bedrock beneath the working pad. Based on the elevations of the springs and surrounding topography, it would not be unreasonable to assume that subsurface water is less than 20 feet deep on the working fill pad.

Based on these field observations, the former borrow area is an excellent source of fill materials, with an estimated volume of 50,000 cubic yards or more that could be collected without blasting. Much of the material may be oversized (greater than 6 inches) for structural purposes, and the fill material will have a high hydraulic conductivity. A road from the main operations complex to the borrow area is in good repair, and could be used with minimal further environmental damage.

The observations of springs at the borrow area suggest that it may not be a viable landfill location because of the potential for shallow bedrock and shallow subsurface water. A landfill should not be planned in this location without subsurface investigation.

4.4.3 Reconnaissance for Low Permeability Cover Material

During the 1998 field work, an installation-wide reconnaissance for a source of low permeability geologic materials was conducted. The low-permeability materials may be needed as a capping material if a landfill is constructed on-site.

The scope of the reconnaissance was:

- Review of the boring logs from the 1994 investigation
- Visual inspection of the entire installation
- Hand-digging shallow test holes at selected locations

The reconnaissance revealed no apparent or obvious high-volume source of fine silt or clay material available within one mile of the Main Operations Complex, Airport or Cargo Beach. Although thin silt and clay lenses are prevalent at the site, these materials are generally interbedded with sand and coarse materials.

The southern portion of the site (near the Kinipaghulghat Mountains) constitutes the proximal portions of an alluvial fan, and thus are composed of relatively coarse, permeable material. Geologic materials become finer at more distal portions of the fan toward the Bering Sea, and discontinuous finer-grained deposits can be found. However, sensitive ecological environments,

such as tundra or wetlands almost universally overlie these materials. Mining of sediments in these areas would cause significant damage to fragile vegetation. Beach deposits have little vegetation, but are composed of coarse sand and gravel. No significant clay deposit was found during the reconnaissance.

4.4.4 Summary of Monofill Data

Based on the data from this and previous site investigations, several significant issues were identified regarding the design and construction of an on-site monofill. These include:

Siting. Most of the installation is situated on tundra or wetlands, and, therefore, inappropriate for excavation and construction of a monofill. The former gravel borrow area and the Main Operations Complex (Figure 1-4) are both previously disturbed areas with limited or no vegetation and could be developed into a monofill. Based on limited subsurface information, the southern portion of the Main Operations Complex appears suitable for a monofill and would be close to much of the debris destined for the monofill. The depth to groundwater underneath the southern portion of the Main Operations Complex is estimated between 15 and 25 feet. The depth of gravel beneath the southern portion of the Main Operations Complex is estimated to be between 1 and 15 feet.

Although potentially feasible, the former gravel borrow area has shallow subsurface water and springs that would raise concerns over leaching from a monofill. Siting a monofill at the former gravel borrow area would probably be more complex and costly.

Fill materials. The total usable (uncontaminated) quantity of fill material at the Main Operations Complex has been estimated at 140,000 cubic yards. However, much of this area has not been subject to subsurface investigation. If previously-unidentified contamination is found, the quantity of usable fill may be significantly reduced. Shallow groundwater or frozen soils may also limit the use of these materials.

The former gravel borrow area is an excellent source of fill materials, with an estimated quantity of at least 50,000 cubic yards. Much of this material is oversized (greater than 6 inches), and will have a high hydraulic conductivity. The material could be used to backfill excavations or as a high-permeability cover material, but would be unsuitable as a low-permeability cover material for the monofill.

Cover materials. No significant quantities of clay or other low permeability earthen materials were observed at or near the installation. Mining of shallow organic silts present at many of the sites would disturb sensitive tundra and wetlands.

Access. Existing gravel roads to the Main Operations Complex and former gravel borrow area are generally in adequate condition for use by the heavy equipment typically used to construct and operate a construction and demotion debris monofill. However, road improvements for a 500-foot length of road may be necessary, primarily to fill swales formed by erosion. This conclusion should be verified with the potential remediation contractors, since construction methods and equipment vary.

Data Gaps. Subsurface investigation at both the Main Operations Complex and former gravel borrow area is limited. Design and construction of a monofill in either area should be preceded with at least an investigation to determine the presence or absence of subsurface water and flow characteristics, extent of contamination at the Main Operations Complex, and extent of frozen soils or permafrost.

5. SITE INVESTIGATION AND REMEDIATION SUMMARIES

This section presents a physical description of each site, potential sources of contamination, a summary of investigative activities, contaminants of concern, and recommended remedial actions. Tables of analytical results (Tables 5-1 through 5-50) are found in a separately bound document. Site photographs are provided in Appendix A. Complete laboratory results and data validation reports are provided in Appendix B and C, respectively. Biological sampling results and stream flow measurements are provided in Appendix D and E, respectively.

5.1 SITE 1: BURN SITE SOUTHEAST OF LANDING STRIP

Physical Description. The burn site is located southeast of the runway (Figure 1-4). The site is part of the gravel pad and currently there are no structures or debris at the site (Figure 5-1). The site is sparsely vegetated.

Potential Sources of Contamination. Materials reportedly burned at the site and by-products of burning.

Investigation Activities. E&E field personnel inspected the site for buildings and debris that because of their state of disrepair could represent a physical hazard at the site, of containerized hazardous or toxic wastes, and potential sources of environmental contamination. No hazardous structures, hazardous debris, or CON/HTRW was observed at this site (E&E, 1993). There were no visual indications of potential contamination, such as distressed vegetation or charred debris.

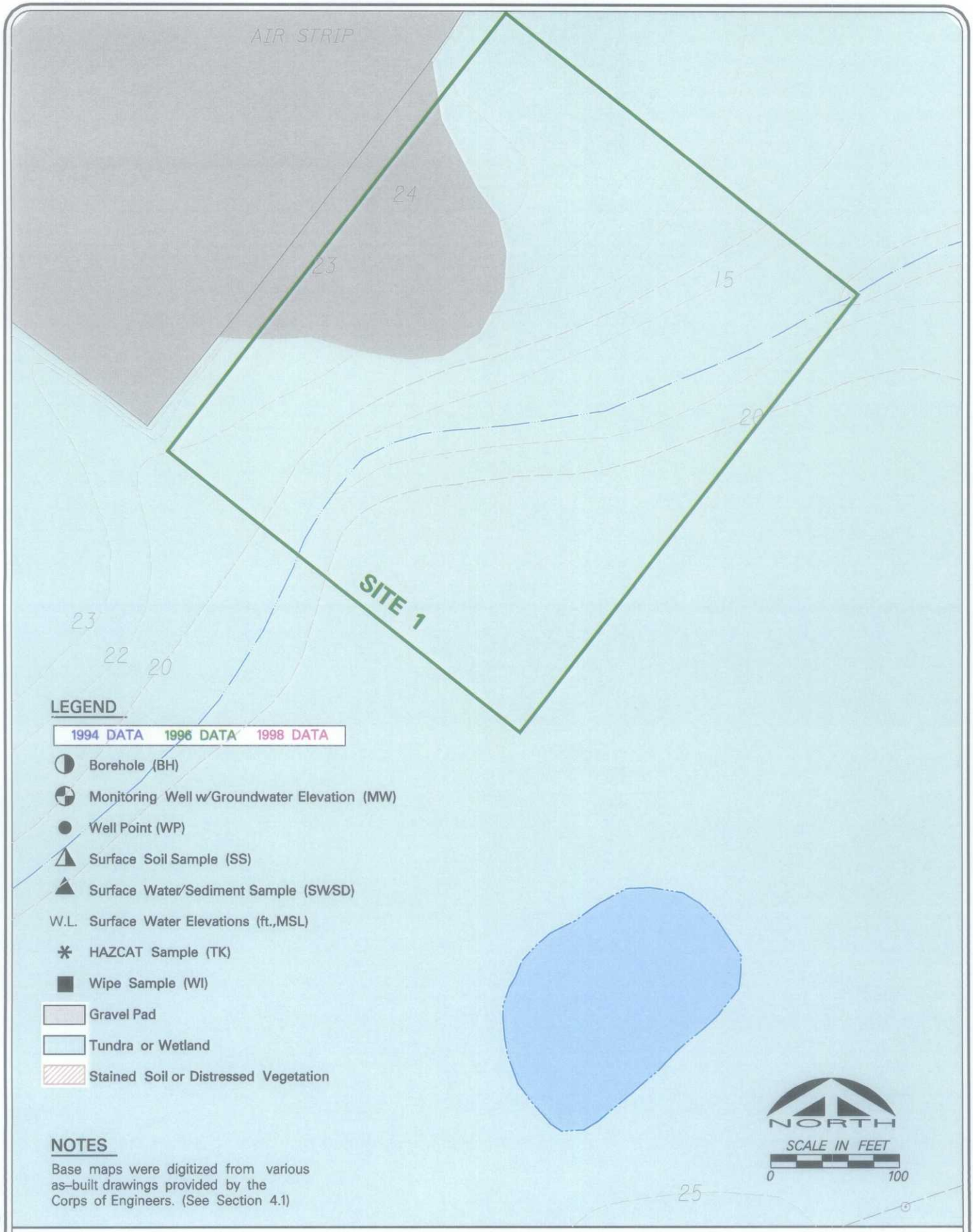
This site is not eligible for DERP cleanup because no CON/HTRW, hazardous structures, or hazardous debris are present or suspected to be present at the site.

Contaminants of Concern. None.

Recommended Remedial Action. No further action.

5.2 SITE 2: AIRPORT TERMINAL AND LANDING STRIP

Physical Description. The airport is located north of the Main Operations Complex (Figure 1-4). The airport terminal area consisted of two buildings, the Terminal Building and a Transformer Shed (now removed), and an apron pad located on the southeast side of the airstrip at approximately the midpoint of the airstrip (Figure 5-2). The structures consist of a 25 foot wide by 64 foot long by 18 foot high operation/control tower (Terminal Building); an approximately 6 foot wide by 9 foot long by 8 foot high transformer shed located approximately 30 feet southeast of the Terminal Building. The Transformer Shed was removed from the site during the 1994 Interim Removal Action (NES, 1995). There is also a 1,000-gallon AST (AST 2-1) at the southeast corner of the Terminal Building.



MONTGOMERY WATSON

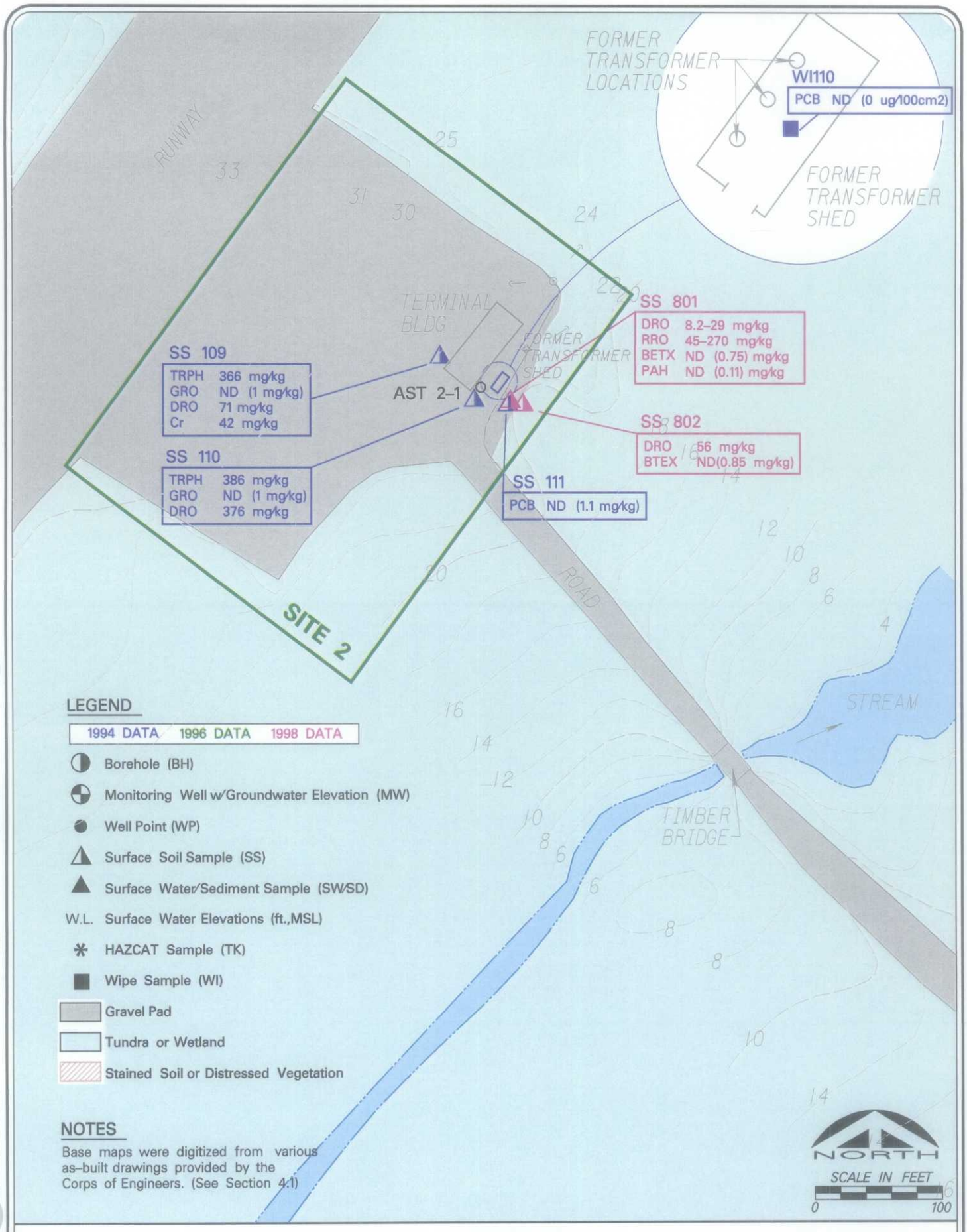
Anchorage, Alaska

FIGURE 5-1

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 1 BURN SITE SOUTHEAST OF LANDING SITE

JOB No. 189098.05 DATE: 24-AUG-1999 10:08 FILE: e:\usace\necape\99r1_fs\draft\fig5_01.dgn



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-2

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 2 AIRPORT TERMINAL AND LANDING STRIP

Potential Sources of Contamination. AST, transformers.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of buildings and debris slated for demolition and removal is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two 500-gallon diesel ASTs were identified and found to be empty. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Two potential sources of environmental contamination were identified at this site, the AST and Transformer Shed. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1, Soil Matrix Level C criteria and ADEC Method 2 soil cleanup standards for PCB. Soils around the AST and at the edge of the pad were sampled and analyzed for TRPH, RRO, DRO, GRO, BTEX, metals, and PAH. Complete soil analytical data are presented in Table 5-1 and compared to the cleanup criteria. All results were below the cleanup criteria, except for one soil sample in which chromium at 42 mg/Kg was detected (only one sample was analyzed for metals). This exceeds the proposed cleanup criteria of 26 mg/Kg. Since there is no apparent source and only one exceedence, chromium is not considered a contaminant of concern.

One surface soil sample and one wipe sample were collected from the Transformer Shed and analyzed for PCB. As shown in Table 5-1 (for soil) and Table 5-2 (for wipe samples), no PCBs were detected.

Contaminants of Concern. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR. A tractor of potential historical significance is located adjacent to the southern edge of the runway.

Gravel Pad: No further action.

Tundra/Wetlands: No further action.

Potential Obstacles to Remediation. None identified at this time.

5.3 SITE 3: FUEL LINE CORRIDOR AND PUMPHOUSE

Physical Description. Site 3 is located in the northeast corner of the installation (Figure 1-4) on the Cargo Beach. It consists of a fuel pumphouse housing engine-driven pumps, two 500-gallon ASTs (AST 3-1 and AST 3-2) located outside the pumphouse, and a 4-inch welded steel fuel line (Figure 5-3). The fuel line was used to transfer diesel fuel approximately 8,000 feet from the pumphouse at the Cargo Beach to the bulk storage facilities at the housing and operations area. Miscellaneous debris, such as an auto battery and a bucket of paint, are scattered at the site.

Potential Sources of Contamination. Two ASTs, Pumphouse, fuel line, auto lead-acid battery, bucket of paint.

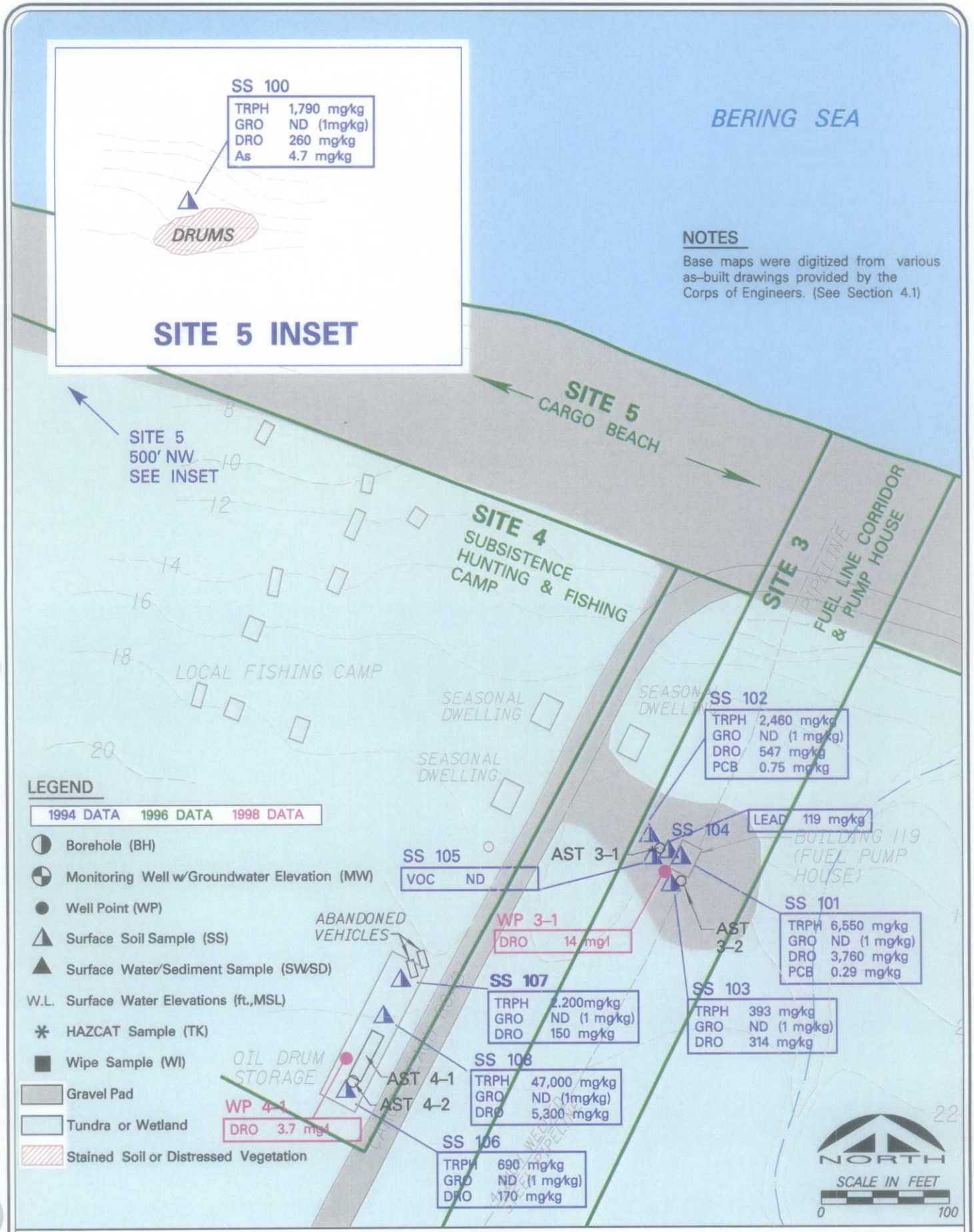
Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM and lead-based paint. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Non-friable ACM were observed at the site. No warning signs were posted for non-friable ACM. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two 500-gallon diesel ASTs were identified and found to be empty. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential sources of environmental contamination identified at this site are the two ASTs, pumphouse and fuel line, lead-acid battery and bucket of paint. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1, Soil Matrix Level C standards for petroleum and ADEC Method 2 soil cleanup standards for all other constituents. Soils around the potential sources were sampled and analyzed for TRPH, DRO,



FILE: e:\usace\necape\99r1_fs\draft\fig5_03.dgn 24-AUG-1999 10:09

JOB No. 189098.050

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-3

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 3, 4 & 5 FUEL LINE, SUBSISTENCE CAMP, & CARGO BEACH

GRO, BTEX, RCRA metals, PCB and volatile organic compounds (VOC). Analytical results are presented in Table 5-3 (for soil) and Table 5-4 (for water) and compared to the cleanup criteria. Isolated areas of site soils exceed the ADEC Method 1 Soil Cleanup Standards for TRPH and DRO.

One subsurface water sample was collected and analyzed for DRO, BTEX and PAH. The DRO result of 14 mg/L DRO exceeds the ADEC cleanup criteria for DRO of 1.5 mg/L. Although ethylbenzene, xylene, fluorene and naphthalene were detected in subsurface water, the levels do not exceed cleanup criteria for those constituents.

Contaminants of Concern. DRO in soil and subsurface water. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No further action.

Potential Obstacles to Remediation. None identified at this time.

5.4 SITE 4: SUBSISTENCE FISHING AND HUNTING CAMP

Physical Description. The subsistence fishing and hunting camp is located southwest of the Cargo Beach barge off-loading area (Figure 1-4). The site includes wood frame structures originally constructed as housing for Alaskan Native civilian employees of the base. Three of the structures are presently used by Alaskan Natives as a fishing and hunting camp for part of the year. The other structures are in disrepair due to inclement weather.

There are also two abandoned vehicles and two abandoned ASTs located just south of the housing area. The larger tank (AST 4-1) is approximately 15,000 gallons, with steel construction and dimensions of 27 feet long and 10 feet in diameter. The second tank (AST 4-2) is approximately 400 gallons, double-walled and insulated, and 5.5 feet long and 3.6 feet in diameter. Both tanks reportedly were used to store potable water. Figure 5-3 shows the layout of the site.

Similar to the majority of the Northeast Cape installation, vegetation at Site 4 consists primarily of sedges and grasses giving way to beach grasses near the Bering Sea Coast. The vegetation appears to be healthy with extensive coverage over the site, with the exception of the Cargo Beach Road and the beach itself. Drainage from the site is north/northeast towards the beach

with standing water scattered about the site in depressed areas. There is no source of potable water at Site 4.

Potential Sources of Contamination. Two abandoned vehicles, abandoned drums (currently empty).

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

The three structures that are currently used as seasonal housing were inspected for ACM by a certified asbestos inspector. The inspection included all visually accessible material including flooring, wainscoting, exterior materials, and roofing materials. Although no sampling or invasive inspection was performed, no materials believed to contain asbestos were noted in any of the homes. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the debris slated for demolition is provided in Section 4.3. The buildings at the site were constructed by local residents and are therefore not eligible for DERP-FUDS action.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two ASTs were reported to have held drinking water were identified. According to Eugene Toolie, both tanks located within Site 4 (AST 4-1 and AST 4-2) were used to supply water to the Subsistence Hunting and Fishing Camp (Toolie, 1996). AST 4-1 (15,000 gallons) was empty and all points of entry secured. AST 4-2 (400 gallons) was about 30% full of rainwater. All sample results for AST 4-2, sample ID 96NE04TK101 were non-detect. AST 4-2 was covered and secured with wire to prevent further accumulation of precipitation. The drums appear to be empty and rusted. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential sources of environmental contamination identified at this site were the vehicles and abandoned, rusted drums. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1, Soil Matrix Level C standards for petroleum and ADEC Method 2 soil cleanup standards for all other constituents. Soil samples were collected adjacent to the potential sources and analyzed for TRPH, DRO, GRO, BTEX and lead. Analytical results are presented in Table 5-5 (soil) and Table 5-6 (water) and compared with the cleanup criteria. As shown on Figure 5-3, isolated soil samples exceed the cleanup criteria for DRO. Based on the data presented in Section 5.30.1, Background Levels of Site Contaminants in Soil, TRPH was eliminated as a contaminant of concern at this site.

One subsurface water sample was collected from Well Point 4-1 and analyzed for DRO, PAH and BTEX. As shown in Table 5-5, the result of 3.7 mg/L DRO exceeds the ADEC groundwater

cleanup criteria. Individual petroleum constituents of PAH and BTEX are all below the ADEC groundwater cleanup criteria.

Contaminants of Concern. DRO in tundra and subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: No further action.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated tundra consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. The Cargo Beach Road is in disrepair and has eroded significantly since the 1994 field investigation. Remedial activities involving large or heavy equipment at Site 4 would be difficult. In its present condition, the Cargo Beach Road can only be traversed by means of all-terrain vehicles.

5.5 SITE 5: CARGO BEACH

Physical Description. The Cargo Beach area is immediately north of the Subsistence Hunting and Fishing Camp (Figure 1-4) and extends eastward from the Cargo Beach Road approximately 3,000 feet, and westward approximately 1,700 feet. The Cargo Beach extends from the low tide level approximately 150 feet inland. This area was used for barge off-loading operations. According to E&E (1993), the site contains approximately 275 drums (currently empty) in various states of decay. Figure 5-3 shows the layout of the site, buildings, storage tanks, sampling locations and results. All accessible drums were discovered to be empty or partially-filled with rainwater (in open drums). Some of the drums inaccessible to the field team could contain their original contents.

Potential Sources of Contamination. Approximately 275 abandoned drums, currently empty.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris, that because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present on the site. Debris, such as abandoned drums, marston matting and cable, is present at the site. An inventory of the buildings and debris slated for removal is provided in Section 4.3. No ASTs or USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

One potential source of environmental contamination was identified at this site, the abandoned drums. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1, Soil Matrix Level C standards for petroleum and ADEC Method 2 soil cleanup standards for all other constituents. Soils around the drums were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB and metals. Analytical results are presented in Table 5-7 and compared with the cleanup criteria. As shown on Figure 5-3, soil analytical results are below the Soil Cleanup Standards in all cases, except for arsenic in one soil sample. The concentration of arsenic was 4.7 and 4.8 mg/Kg in the primary sample and QA split.

Contaminants of Concern. Arsenic on Cargo Beach gravel.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR. Inspect underlying soils for staining and sample if staining is observed.

Gravel Pad/Sand beach: Remediate isolated area of arsenic contaminated soil consistent with the installation-wide cleanup criteria and remedial action.

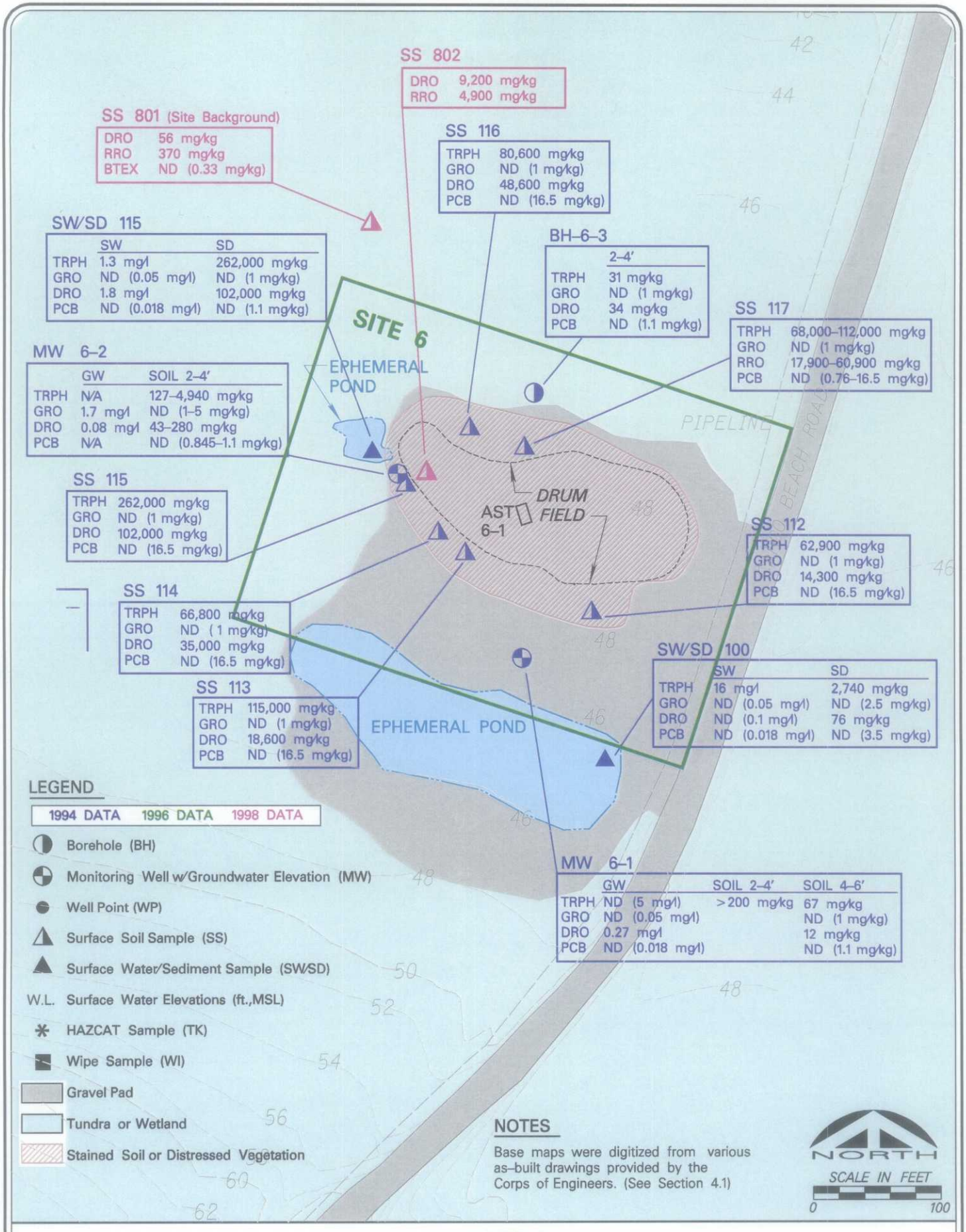
Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.6 SITE 6: CARGO BEACH ROAD DRUM FIELD

Physical Description. This site was used primarily for the disposal of empty drums containing petroleum, oil, and lubricants (POL) generated during operation of the former base. The drum field is located 0.6 miles south of Sites 3 and 4 along the Cargo Beach Road (Figure 1-4). The site consists of approximately 1,500 POL drums, one empty 500-gallon potable water storage tank and miscellaneous metal debris (Figure 5-4). All of the items are aboveground and easily accessible from the Cargo Beach Road.

Potential Sources of Contamination. 1,500 POL drums, battery.



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-4

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 6 CARGO BEACH ROAD DRUM FIELD

JOB No. 189098.050 DATE: 24-AUG-1999 10:09 FILE: e:\usace\necape\99rl_fs\draft\fig5_04.dgn

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures are present on the site. Debris is present at the site including the abandoned drums and metal mats. An inventory of buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, one potable water AST was identified and found to be empty. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Two potential sources of environmental contamination were identified at this site, the POL drums and the battery. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1 soil cleanup standards for petroleum and Method 2 for all other constituents. Soils and sediments around the drums were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, semivolatile organic compounds (SVOC), pesticides and metals. Analytical results are presented in Table 5-8 and compared with the cleanup criteria. As shown on Figure 5-4, soil analytical results exceed the Soil Cleanup Standards for RRO and DRO.

Surface water and subsurface water around the drums was sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, VOC, SVOC, pesticides and metals. Analytical results are presented in Table 5-9 and compared with the cleanup criteria. Surface water exceeds the Water Cleanup Standards for TRPH, DRO, total zinc, and zinc. Total and dissolved concentrations of zinc exceed the standard in one of the two surface water samples. No source of zinc was identified so zinc in surface water is excluded as a contaminant of concern. Subsurface water exceeds the Ground Water Cleanup Standards for DRO, total beryllium, total chromium, total zinc, total lead, and total nickel. However, these metals were not detected in the filtered sample and, therefore not included as a contaminant of concern.

In addition to drums disposed in the Cargo Beach Drum Field, the source of DRO in subsurface water may be Site 7, the Cargo Beach Landfill south of the site.

Contaminants of Concern. RRO and DRO in soil. DRO in tundra soil and water. DRO in subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated surface and subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated tundra consistent with installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

5.7 SITE 7: CARGO BEACH ROAD LANDFILL

Physical Description. The landfill is located approximately 0.8 miles south of Sites 3 and 4 along the Cargo Beach Road (Figure 1-4). The Cargo Beach landfill (Figure 5-5) was used as the base's solid waste disposal area from 1965 to base closure in 1974 (E&E, 1993), and contains a wide variety of materials. According to E&E (1993), the landfill contains approximately 2,300 exposed POL drums, miscellaneous metal debris and several batteries. Based on available information this was not an ADEC-permitted landfill. According to the seasonal residents (E&E, 1993) the trash was often burned prior to burial. These reports of burned debris have lead to a concern that dioxins and furans may be present.

Potential Sources of Contamination. Drums, batteries and other materials in the landfill.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) are present at the site. Some ACM was identified in the landfill. The type and location of the ACM is summarized in Table 3-1. No signs could be posted, since the asbestos materials were in the open. Debris is present in the landfill but buried debris is not included in the inventory of debris slated for demolition provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, no tanks were identified. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential source of environmental contamination at this site is the landfill. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 1 for petroleum and Method 2 soil cleanup standards for all other constituents. Surface

NORTH

SCALE IN FEET

0 100

SW/SD 103

	SW	SD
TRPH	ND (5 mg/l)	15,600 mg/kg
GRO	ND (0.05 mg/l)	ND (5.3 mg/kg)
DRO	ND (0.1 mg/l)	815 mg/kg
Zn (dis.)	0.07 mg/l	440 mg/kg
2,3,7,8–TCDD		0.008 mg/kg
Cr		100 mg/kg
Ni		280 mg/kg
As		10 mg/kg
PCB		1.78 mg/kg

SS 121

TRPH	71 mg/kg
GRO	ND (1 mg/kg)
DRO	11 mg/kg
As	3.7 mg/kg
PCB	ND (1.1 mg/kg)

BH 7–2

	2–4′	9.5–11.5′	14.5–16.5′
TRPH			37 mg/kg
GRO		ND (1.1 mg/kg)	
DRO	1450 mg/kg		ND (4 mg/kg)
Br			2.3 mg/kg
As			3.9 mg/kg
PCB	ND (1.104 mg/kg)		ND (0.503 mg/kg)

SS 124

TRPH	192–580 mg/kg
GRO	ND (1 mg/kg)
DRO	113–284 mg/kg
As	3.5–5.1 mg/kg
PCB	ND (0.031–1.1 mg/kg)

LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation
- Landfill

BH 7–3

	2–4′	4–6′	9.5–11.5′
TRPH			52 mg/kg
GRO		ND (1.4 mg/kg)	
DRO	280 mg/kg	30 mg/kg	
As		2.7 mg/kg	
PCB	ND (0.719 mg/kg)	ND (0.549 mg/kg)	

SW/SD 101

	SW	SD
TRPH	ND–10 mg/l	19,000–293,000 mg/kg
GRO	ND (0.05–0.1 mg/l)	ND (5–11 mg/kg)
DRO	3.5–72 mg/	440–4,900 mg/kg
Cd	0.011 mg/l	10.9–14 mg/kg
Pb	0.038–0.13 mg/l	
Ni	0.08–0.096 mg/l	
Zn	0.52–1.2 mg/l	
Hg	0.0004–0.0005 mg/l	
As		9.4 mg/kg
PCB	0.018 mg/l	ND (5.3–21.56 mg/kg)

SS 119

TRPH	74,500 mg/kg
GRO	ND (1 mg/kg)
DRO	32,000 mg/kg
PCB	ND (15.075 mg/kg)

SS 120

TRPH	2,190 mg/kg
GRO	ND (1 mg/kg)
DRO	231 mg/kg
As	6.3 mg/kg
PCB	ND (1.1 mg/kg)

BH 7–1

	9.5–11.5′	14.5–16.5′	24.5–26.5′	29–31′
TRPH		18 mg/kg		30 mg/kg
GRO	ND (1.1 mg/kg)		ND (1.1 mg/kg)	
DRO	ND (4.3 mg/kg)		ND (4.3 mg/kg)	
As	3.9 mg/kg		2.7 mg/kg	
PCB	ND (0.502 mg/kg)			ND (0.492 mg/kg)

SS 802

(Background for TOC)

SS 123

TRPH	1,950 mg/kg
GRO	ND (1 mg/kg)
DRO	2,300 mg/kg
As	3.5 mg/kg
PCB	ND (1.1 mg/kg)

SS 122

TRPH	3,800 mg/kg
GRO	ND (1 mg/kg)
DRO	995 mg/kg
PCB	ND (1.1 mg/kg)

SW/SD 102

	SW	SD
TRPH	ND (5 mg/l)	8,930 mg/kg
GRO	ND (0.05 mg/l)	ND (3.4 mg/kg)
DRO	0.2 mg/l	625 mg/kg
Zn	0.06 mg/l	89 mg/kg
As	ND (0.005 mg/l)	4 mg/kg
PCB	ND (0.018 mg/l)	

MW 7–4

	GW	2–4′	9.5–11.5′
TRPH	ND (5 mg/l)		299 mg/kg
GRO	ND (0.05 mg/l)		ND (1.2 mg/kg)
DRO	0.62 mg/l	138 mg/kg	67 mg/kg
Benzene	0.0021 mg/l		
As			3.6 mg/kg
PCB		ND (0.536 mg/kg)	
Benzene	ND(0.0010 mg/l)		
DRO	1.1 mg/l		

SITE 7

DRUMS

CARGO BEACH ROAD

EXPOSED DRUMS AND METAL DEBRIS

POND

SS 118

NOTES

Base maps were digitized from various as–built drawings provided by the Corps of Engineers. (See Section 4.1)

FILE: e:\usace\necape\99-1_fs\draft\fig5_05.dgn
DATE: 24-AUG-1999 10:14
JOB No. 189098.05

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5–5

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 7 CARGO BEACH ROAD LANDFILL

and subsurface soils, subsurface water, surface water, and sediment around the landfill were sampled and analyzed for TRPH, RRO, DRO, GRO, PCB, VOC, SVOC, pesticides, priority pollutant metals, dioxin, and furan contamination.

Analytical results are presented in Table 5-10 and compared with the cleanup criteria. As shown on Figure 5-5, soil analytical results exceed the Soil Cleanup Standards for DRO, arsenic, beryllium, cadmium, chromium, and nickel. Levels of dioxins were below the Soil Cleanup Standards.

Surface water and subsurface water around the drums were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, VOC, SVOC, pesticides and metals. Analytical results are presented in Table 5-11 and compared with the cleanup criteria. Surface water exceeds the Water Cleanup Standards for DRO, total lead, total nickel, total cadmium, total thallium, zinc (total and dissolved), mercury (total and dissolved). Dissolved concentrations of lead, nickel, cadmium and thallium are below the water cleanup standard, suggesting that metals attached to soils entrained in the water are the source of the exceedences. Therefore, lead, nickel, cadmium and thallium are excluded as contaminants of concern. Both zinc and mercury concentrations were exceeded in the filtered and unfiltered samples, making these metals contaminants of concern in surface water.

Based on the location of the surface and subsurface samples, it appears that petroleum constituents, probably from the landfill, have impacted the surface water.

Contaminants of Concern. DRO, arsenic, beryllium, cadmium, chromium, and nickel in tundra soil. DRO, mercury, and zinc in tundra surface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR including procedures for closing the landfill.

Gravel Pad: No gravel pad.

Tundra/Wetlands: Remediate isolated areas of contaminated tundra consistent with an installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

5.8 SITE 8: POL SPILL SITE

Physical Description. In the 1993 CDAP for the Northeast Cape site, E&E noted a reported spill of diesel fuel in the POL pipeline that runs along the Cargo Beach Road from Site 4 to the main operations complex and the three 400,000-gallon storage tanks at Site 11. Figure 1-4 shows the location of Site 8. Because no evidence of a release was observed, E&E deemed the site not eligible for the DERP-FUDS program. However, in response to concerns raised in a public

meeting, a subsequent inspection of Site 8 was performed on August 5, 1996 and September 14, 1998. Mr. Eugene Toolie, who was working at Northeast Cape at the time that the spill occurred and was responsible for the pipeline repair and cleanup efforts, accompanied the Montgomery Watson field team. Mr. Toolie reported that a spill of approximately 500 gallons occurred in 1973, and was discovered by a discrepancy in the amount of fuel pumped from the Cargo Beach, and the amount received at the 400,000-gallon tanks. Figure 5-6 shows the location of the reported spill.

This is the only spill Mr. Toolie is aware of from the POL pipeline.

Potential Sources of Contamination. Release from fuel pipeline.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) or debris were present at the site. No ASTs or USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2. The fuel pipeline at the site is slated for removal and is listed under Site 3, Fuel Line Corridor and Pumphouse.

The source of environmental contamination is the diesel fuel release. The spill was discovered at a welded bend in the pipeline, which is marked today by the compression fitting installed by Mr. Toolie at the time of the break. Cleanup efforts were initiated shortly thereafter. Cleanup consisted of spreading absorbent pads over the spill area. These pads were later taken to a location north of the Paint and Dope Building (Site 16) and burned. Mr. Toolie indicated that the cleanup efforts were relatively successful. Below the road embankment, immediately downslope of the fuel line break, is a wetlands area about 40 feet wide and 60 feet long. The wetlands area drains to the south to the Suqi River, which crosses under the road approximately 400 feet to the south of the spill area. Within the wetlands area and parallel to the road embankment lies a 10 foot by 3 foot surface water area with a diesel sheen and odor. Even in this area, the wetlands are apparently healthy and choked with cottonweed grass. The diesel-contaminated area appears localized, and there is no evidence that it flowed to the Suqi River, which is consistent with Mr. Toolie's recollections. No sampling was performed because the presence of diesel was readily observed in a small, localized area.

Contaminants of Concern. DRO in tundra soils and surface water.

Recommended Remedial Action.

CON/HTRW: Action listed under Site 3 for the fuel pipeline.

BD/DR: No further action.

NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-6

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 8 POL SPILL SITE

JOB No. 189098.050 DATE: 24-AUG-1999 10:14 FILE: e:\usace\necape\99r1_fs\draft\fig5_06.dgn

Gravel Pad: No further action.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated tundra consistent with installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

5.9 SITE 9: HOUSING AND OPERATIONS LANDFILL

Physical Description. This landfill was a waste disposal area from the time period of the construction of the base in 1952 to 1965, when Site 7 became the primary landfill (E&E, 1993). The landfill is located approximately 500 feet northeast of the housing and operations area (Figure 1-4). The visible landfill debris consists of miscellaneous metal debris, POL drums, and one abandoned vehicle in the surface water body near the southwest corner of the landfill perimeter (Figure 5-7). Based on current information, this landfill was not permitted by ADEC. As with Site 7, local residents report that most waste was burned prior to burial (E&E, 1993), thus presenting the potential for dioxin and furan contamination.

Potential Sources of Contamination. Materials in the landfill.

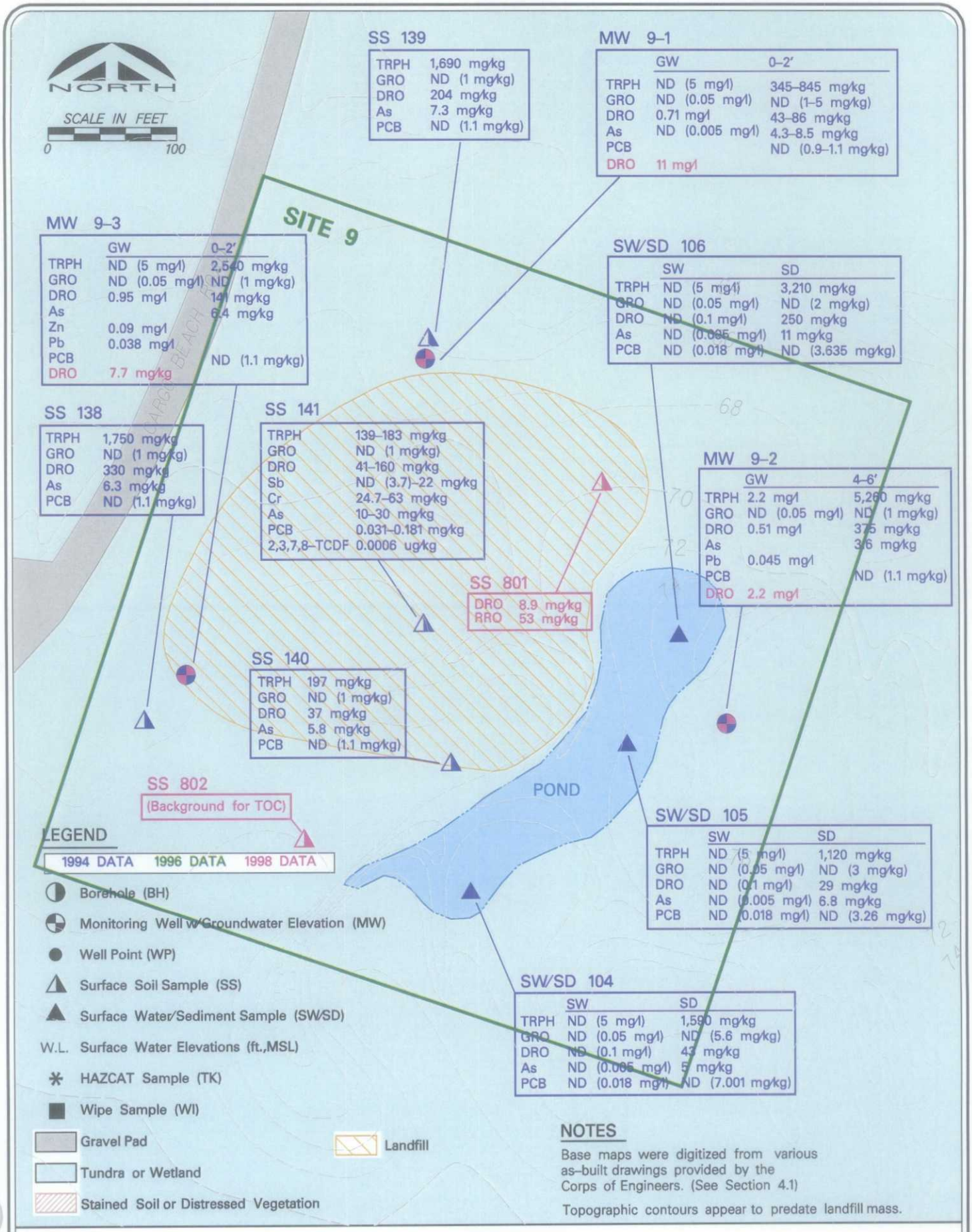
Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present on the site. Most debris at the landfill is buried. Buried debris is not included in the inventory of the buildings and debris slated for demolition provided in Section 4.3. No ASTs or USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential source of environmental contamination at this site is the landfill. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface and subsurface soils, subsurface water, surface water, and sediment around the landfill were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, SVOC, pesticides, priority pollutant metals, dioxin and furan contamination. Analytical results are presented in Table 5-12 and compared with the cleanup criteria. As shown on Figure 5-7, soil analytical results exceed the Soil Cleanup Standards for DRO, arsenic, antimony, beryllium, and chromium. Levels of dioxin and furan were below the Soil Cleanup Standards. Contaminated areas are in the tundra.

Surface water and subsurface water around the landfill were sampled and analyzed for TRPH, DRO, GRO, BTEX, VOC, SVOC, PCB, pesticides, metals and dioxins. Analytical results are



MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5-7

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE - ST. LAWRENCE ISLAND, ALASKA

SITE 9 HOUSING & OPERATIONS LANDFILL

presented in Table 5-13 and compared with the cleanup criteria. DRO, total zinc, and total lead in unfiltered samples exceeded the Ground Water Cleanup Standards. The filtered sample for lead and zinc were below the criteria, therefore, was eliminated as contaminants of concern at this site. All other subsurface water results were below the Ground Water Cleanup Standards selected for the site. All surface water results were below the Water Cleanup Standards, except for dissolved zinc. All other surface water samples were below the criteria for zinc, including the total zinc for this sample, therefore, zinc is eliminated as a contaminant of concern.

Contaminants of Concern. DRO, arsenic, antimony, beryllium and chromium in tundra.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR, including closing the landfill.

Gravel Pad: None.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated tundra consistent with installation-wide cleanup criteria and remedial action, including the exceedence of DRO in subsurface water.

Potential Obstacles to Remediation. None identified at this time.

5.10 SITE 10: BURIED DRUM FIELD

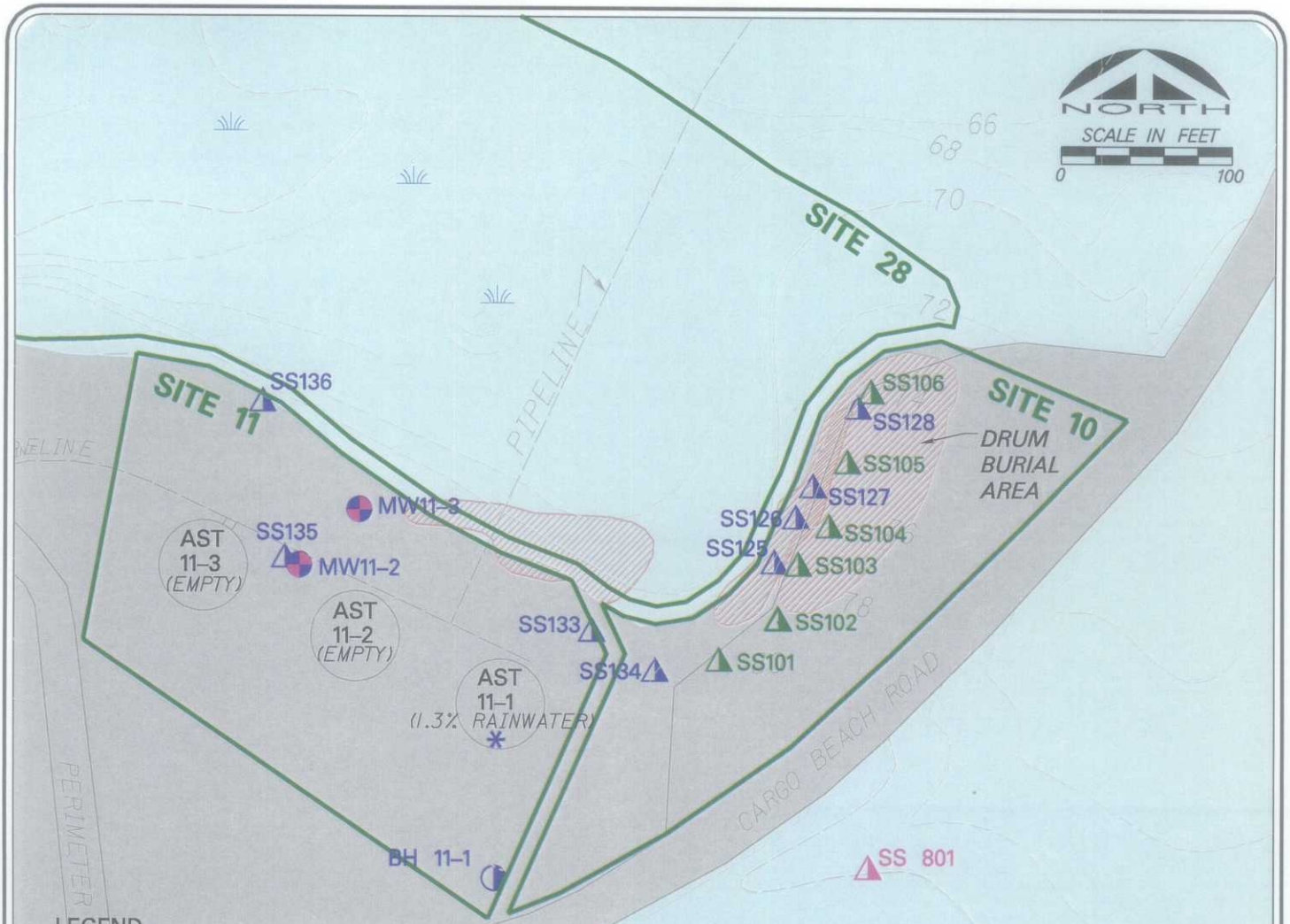
Physical Description. According to local residents (E&E, 1993), this area is believed to hold approximately 29,500 drums containing 90-weight waste oil. The area was used as a drum storage area for a variety of POL types (Toolie, 1996). There is a large stained area towards the northwest corner of the burial plateau along with numerous smaller stained areas on the surface of the site (Figure 5-8). There is also visible staining along the bermed west edge of the site.

The site is located directly across the Cargo Beach Road from Site 9 and lies approximately 400 feet northeast of the housing and operations complex (Figure 1-4). The site is level with the road and proceeds eastward where it drops off approximately 8 feet.

The biota of Site 10 is limited due to the gravel pad area extending from the Cargo Beach access road. The gravel pad at Site 10, similar to the pad covering the remainder of the site, consists of compacted fine to medium gravels with sand. The sparse vegetation covering (approximately 40% of the site), includes sedges, grasses, and some mosses. The drainage of the site is north to northwesterly through Site 11 towards the Drainage Basin Site.

Potential Sources of Contamination. Buried drums with 90-weight waste oil.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical



LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

Sample/Depth	DRO (mg/kg or mg/l)	TRPH (mg/kg or mg/l)	GRO (mg/kg or mg/l)	PCB (mg/kg or mg/l)
1996				
SS 101	1,600–2,300	1,700–5,230		
SS 102	220	160		
SS 103	1,200	2,100		
SS 104	17,000	32,000		
SS 105	59	130		
SS 106	2,000	2,500		
1994				
SS 125	22,700	43,700	ND (1)	ND (16.5)
SS 126	26,500	62,300	ND (1)	ND (33)
SS 127	24,500	119,000	ND (1)	ND (16.5)
SS 128	2,170	7,910	ND (1)	ND (1.1)
SS 133	69,100	32,100	ND (1)	0.793
SS 134	379	416	ND (1–5)	ND (0.9–1.1)
SS 135	902	2,120	ND (1)	0.323
SS 136	195	464	ND (1)	ND (1.1)
MW 11–2 GW	1.4	ND (5)	ND (0.05)	
MW 11–2 0–2'	130	436	ND (1)	
MW 11–2 2–4'	358	168	ND (1)	
MW 11–3 GW	6.1	6.6	1.1	
MW 11–3 0–2'	27	182	ND (1)	
MW 11–3 2–4'	31	90	ND (1)	
MW 11–3 4–6'	11	76	ND (1)	
MW 11–3 9.5–11.5'	22,000	29,200	192	
SW 116	ND (0.1)	ND (5)	ND (0.05)	ND (0.018)
SD 116	ND (4)	67	ND (1)	ND (1.1)
1998	DRO	RRO		
MW 11–2	0.34	ND (0.25)		
MW 11–3	45	ND (5)		
SS 801	410	980		

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5–8

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 10 & 11 BURIED DRUM & FUEL STORAGE TANKS

hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present at the site. Debris at the site is scattered drums. The remaining debris is buried and therefore not included in the inventory of the buildings and debris slated for demolition provided in Section 4.3. No ASTs or USTs or CON/HTRW was observed at the site.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential source of environmental contamination at this site is the buried drums. A geophysical magnetic survey found only a small anomaly in this area, suggesting that the burial of 29,500 drums may have been an overestimate. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface and subsurface soils, surface water, and sediment around the landfill were sampled and analyzed for DRO, GRO, PCB, SVOC, pesticides, and priority pollutant metals contamination. Analytical results are presented in Table 5-14 (soil) and Table 5-15 (water) and compared with the cleanup criteria. As shown on Figure 5-8, soil analytical results exceed the Soil Cleanup Standards for DRO.

Surface water exceeds the Water Cleanup Standards for dissolved silver in one sample. Silver was undetected in the unfiltered water sample and no sources of silver were identified, therefore, the metal is excluded as a contaminant of concern.

This site drains to Site 28, the Drainage Basin, consisting of tundra/wetlands to the northwest. Potential impacts of site contaminants on the Drainage Basin are discussed in Section 5.28, the Drainage Basin.

Contaminants of Concern. DRO in soil. DRO, PCB and lead in surface water.

Recommended Remedial Action.

CON/HTRW: Confirm or refute the presence of free product in the buried drums. If present, remediate.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated surface and subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.11 SITE 11: FUEL STORAGE TANK AREA

Physical Description. The site consists of three diesel fuel storage tanks measuring 50 feet in diameter and 28 feet in height (approximately 400,000 gallons) and all associated piping and valves (Figure 5-8). It is located directly adjacent to Site 10 in the northeast corner of the housing and operations complex (Figure 1-4). The gravel pad has little to no vegetation. Drainage from Site 11 is north / northwesterly to a large pond which discharges towards the Drainage Basin.

In March of 1967 or 1968, AST 11-2 was punctured during snow removal operations and approximately 180,000 gallons of diesel fuel were released (E&E, 1993; Toolie, 1998). The spill occurred in the winter when there was heavy blowing snow, but little ice. Mr. Toolie (Toolie, 1998) remembers that diesel was one inch thick all the way to the mouth of the Suqi River at the Bering Sea. No cleanup was attempted. A large volume of the fuel collected in the sediment of the wetlands area directly north of the tanks. Significant staining and distressed vegetation were still visible in September 1998.

Potential Sources of Contamination. Diesel release from AST 11-2 and potential releases from the other two tanks.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present at the site. An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, three 400,000-gallon ASTs were identified. Two tanks, AST 11-2 and AST 11-3, were found to be empty. AST 11-1 contained about 4 inches of accumulated rain water with a petroleum sheen. The tank contents were sampled and analyzed to determine appropriate disposal. Sample results are provided in Section 4.2 and suggest that the contents are non-hazardous water with sheen. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

The source of environmental contamination at this site is the diesel release from AST 11-2 and potential releases from the other two ASTs. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface and subsurface soils, subsurface water, surface water, and sediment around the tanks were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, VOC, SVOC, pesticides, and priority pollutant metals contamination. Analytical results are presented in Table 5-16 and compared with the cleanup criteria. As shown on Figure 5-8, soil

analytical results exceed the Soil Cleanup Standards for DRO. Contaminated areas are on the gravel pad.

Subsurface water under the gravel pad was sampled and analyzed for TRPH, DRO, GRO, BTEX, and VOC. Analytical results are presented in Table 5-17 and compared with the cleanup criteria. In 1994, DRO and benzene exceeded the Ground Water Cleanup Standards. All other subsurface water results were below the Ground Water Cleanup Standards selected for the site. In 1998, DRO concentrations were still above the Ground Water Cleanup Standards, but benzene levels had decreased to below the standard as a result of either degradation or increased water levels. The water levels during the 1998 sampling were approximately 2-3 feet higher than in 1994. Therefore, benzene will be retained as a contaminant of concern.

Although it is a common laboratory contaminant, methylene chloride is retained as a contaminant of concern due to its appearance in groundwater at this site and multiple occurrences in soil and groundwater at adjacent Site 28.

This site drains to Site 28, the Drainage Basin, consisting of the tundra/wetlands to the northwest. Potential impacts of site contaminants on the Drainage Basin are discussed in Section 5.28, the Drainage Basin.

Contaminants of Concern. DRO in soil. DRO, benzene and methylene chloride in subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.12 SITE 12: GASOLINE TANK AREA

Physical Description. Site 12 is adjacent to the Main Operations Complex (Figure 1-4). This site contains two ASTs, which contained leaded gasoline and a fuel pump mounted inside a shed immediately east of the two tanks (Figure 5-9). The tanks are 15,000 and 30,000 gallons.

Potential Sources of Contamination. Two ASTs and fuel pump.

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-9

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 12 & 26 GASOLINE TANKS AND FORMER CONSTRUCTION CAMP

Investigation Activities. E&E found no evidence during the previous site inspection to suggest that any discharge had occurred at this location (E&E, 1993). The site was re-inspected in 1998 by Montgomery Watson and no evidence of a release was observed. Both ASTs are empty. No soil or water samples were collected at this site.

An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2. No visible sources of BD/DR were observed at the site.

Contaminants of Concern. GRO, DRO in gravel pad soil.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: None.

Gravel Pad: Investigate and remediate isolated areas of petroleum. Contaminated soils consistent with installation-wide cleanup criteria and remedial action. Address potential for petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

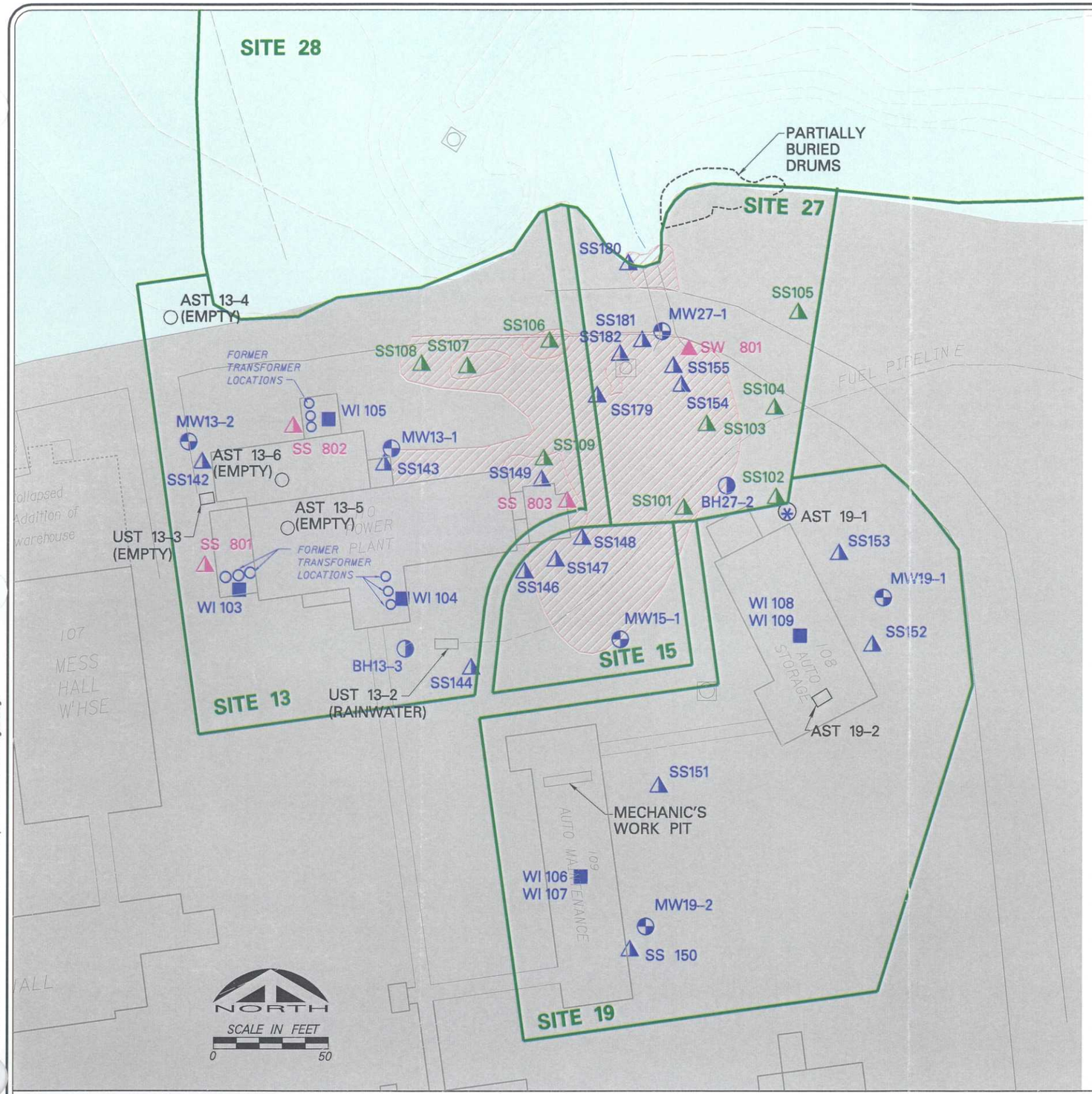
Tundra/Wetlands: No further action.

Potential Obstacles to Remediation. None identified at this time.

5.13 SITE 13: HEAT AND ELECTRICAL POWER BUILDING

Physical Description. This site was the central heating and power generating facilities for the base. It consists of Building 110 of the housing and operations complex and the land surrounding it, and also includes two diesel USTs, two diesel ASTs and two potable water ASTs (Figure 5-10). One diesel UST is located on the south of the building and has a volume of 20,000 gallons (E&E, 1993). The other diesel UST is located on the northwest side of the building and reportedly holds 5,000 gallons. There are also two empty ASTs located within Site 13, the first a 1,000-gallon diesel AST on the north side of the building directly adjacent to the generator area, and the second is a 5,000-gallon diesel AST, directly across the perimeter road. Two potable water tanks are housed in Building 110. The first is a 500-gallon steel pressure tank; the second is a 204,000-gallon steel water storage tank.

The site formerly included three transformer banks consisting of three transformers each, which were removed during the 1994 removal action (NES, 1995). One is located in a room on the south side; another is in a room on the north side; and the third is in an add-on room on the southwest side of the building. Building 110 also contains four Cummins Diesel generators with associated piping and ventilation ducts.



LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

NOTES

Base maps were digitized from various as–built drawings provided by the Corps of Engineers. (See Section 4.1)

Sample 1998	RRO (mg/L)	DRO (mg/L)	Total PCB (mg/kg)
MW 13–1	ND (12)	100	
MW 13–2	0.52	32	
MW 15–1	3.8	960	
MW 19–1	ND (2.5)–0.93	16–18	
MW 19–2	ND (1.2)	7.3	
MW 27–1	ND (0.25)	1.4	
SS 801			25
SS 802			8.4
SS 803			180
SW 801	ND (0.2)	0.73	

Sample 1996	TRPH (mg/kg)	DRO (mg/kg)	Total PCB (mg/kg)
SS 101		150–480	
SS 102		700	
SS 103		91	
SS 104		680	
SS 105		2,900	
SS 106	12,000		0.43
SS 107	22,000		9
SS 108	14,000		28
SS 109			0.54

Sample /Depth 1994	TRPH (mg/l & mg/kg)	GRO (mg/l & mg/kg)	DRO (mg/l & mg/kg)	As (mg/l & mg/kg)	Cr (mg/l & mg/kg)	Benzene (mg/l & mg/kg)	PCB (ug/100cm2)
MW 13–1 GW	190	4	23		0.24		
MW 13–2 GW	24	3.6	22		0.14	0.12	
MW 13–2 4–6'	945	7	955				
BH 13–3 4–6'	431–1,150	ND (1)–7.1	434–1,000				
BH 13–3 9.5–11.5'	7,880	225	10,800				
MW 15–1 GW	31	ND (0.05)	9.3				
MW 15–1 9.5–11.5'	535	ND (1)	2,190				
MW 19–1 GW	9.7	6.1	13			0.025	
MW 19–1 0–2'	690	ND (1)	110	3.9	21	ND (0.0025)	
MW 19–1 4–6'	28,800	6,650	971	4.4	16	ND (2.5)	
MW 19–1 9.5–11.5'	16,300	461	13,300	4.3	6.4	0.737	
MW 19–2 GW	ND (5)	ND (0.05)	34				
MW 19–2 14.5–16.5'	389	ND (1)	122				
MW 27–1 GW	0.7–2.6	1.2–1.9	2–3.8			0.0056	
MW 27–1 0–2'	18,000		5,710			ND (0.05–5.4)	
MW 27–1 2–4	10,000–29,300	410–1,300	8,470–16,000				
MW 27–1 4–6'	1,690	39	569			0.157	
MW 27–1 9.5–11.5'	181	ND (1)	19			0.064	
BH 27–2 0–2'	52,400	283	9,230			ND (0.0025)	
BH 27–2 4–6'	535	2.3	52				
BH 27–2 9.5–11.5'	170	ND (1)	11				
SS 142	3,280	ND (1)	2,610				
SS 143	551	ND (1)	398				
SS 144	6,130	ND (1)	1,530				
SS 146	20,500	ND (1)	4,660				
SS 147	12,400	ND (1)	2,840				
SS 148	24,200	ND (1)	4,860				
SS 149	22,400–36,800	ND (1)	6,580–7,610				
SS 150	2,000		868		57		
SS 151	680		328		23		
SS 152	3,150		1,240		18		
SS 153	413		43		40		
SS 154	16,600	17	9,460				
SS 155	12,800	4.4	35,700				
SS 179	53,700	9.1	27,500				
SS 180	44,700	89	37,900				
SS 181	66,400	370	33,600				
SS 182	41,800	7	9,850				
WI 103							6,500
WI 104							54–4,100
WI 105							2,100
WI 106	12,000						
WI 107		ND (100)–3,600					
WI 108		ND (100)–580					
WI 109							

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5–10

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 13, 15, 19 & 27 HEAT & ELECTRICAL POWER, BURIED FUEL LINE SPILL, AUTO MAINTENANCE, DIESEL FUEL PUMP

There is virtually no vegetation at this site, as it lies within the confines of the main complex and was constructed exclusively on the gravel pad. Drainage from the site is northward towards the Drainage Basin Site. There is no standing water at Site 13.

Potential Sources of Contamination. Two diesel USTs, two diesel ASTs, three banks of transformers (now removed), generators and piping.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to the buildings suspected to contain friable asbestos. Table 3-2 lists the warning sign locations. Samples of paint were tested and found to be lead-based paint (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two diesel ASTs, two diesel USTs and two water tanks were observed. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Six potential sources of environmental contamination were identified at this site, including the two diesel ASTs, the two diesel USTs, the generators and transformer shed. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface and subsurface soils around the tanks and buildings were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, VOC, SVOC, pesticides, and priority pollutant metals contamination. Analytical results are presented in Table 5-18 and compared with the cleanup criteria. As shown on Figure 5-10, soil analytical results exceed the Soil Cleanup Standards for DRO and PCB. Contaminated areas are on the gravel pad.

Subsurface water under the gravel pad was sampled and analyzed for TRPH, RRO, DRO, GRO, BTEX, and priority pollutant metals. Analytical results are presented in Table 5-19 and compared with the cleanup criteria. DRO, GRO, benzene, total arsenic, total chromium, total lead and total nickel exceed the Ground Water Cleanup Standards. Levels of dissolved arsenic, chromium, lead and nickel in filtered samples are below the Ground Water Cleanup Standards, indicating that metals in soil entrained in the water samples caused the exceedence. Therefore, none of these metals are identified as a contaminant of concern at this site.

In 1994, benzene exceeded the Ground Water Cleanup Standards; however, in 1998 the benzene levels had decreased to below the standard. It would appear likely that the concentrations of benzene, a mobile, volatile, and readily-biodegradable constituent, have rapidly attenuated in the environment. Therefore, benzene was eliminated as a constituent of concern in subsurface water at the site.

Wipe samples were collected from the three Transformer Pads and analyzed for PCB. Analytical results are presented in Table 5-20. Residual PCB-1260 levels detected on the Transformer Pads ranged from 54 to 6500 $\mu g/100cm^2$.

This site drains to Site 28, the Drainage Basin, consisting of the tundra/wetlands to the northwest. Potential impacts of site contaminants on the Drainage Basin are discussed in Section 5.28, the Drainage Basin.

Contaminants of Concern. DRO and PCB in soil. DRO and GRO in subsurface water. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW. Investigate PCB concentrations in building foundation.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum- and PCB- contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.14 SITE 14: EMERGENCY POWER/OPERATIONS BUILDING

Physical Description. This site includes the emergency power generation and communications equipment that was housed in Building 98 of the housing and operations area, and the land immediately around it (Figure 5-11). The site includes one 5,000-gallon AST located on the south side of the building, and one 55-gallon drum full of antifreeze, also located on the south side of the building. The basement of Building 98 was found to be flooded during previous investigations. When the water was pumped out, the "basement" was found to be a subterranean passage. In 1998, the passage had partially refilled with water. The site formerly included a transformer shed containing one transformer bank with three transformers (located immediately on the left side of the southeast entrance of the building). The transformer shed and transformers were removed in 1994 (NES, 1994).

LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

NORTH

SCALE IN FEET

0 100

MW 21–1

	GW	0–2′
TRPH	0.59 mg/l	7,020 mg/kg
GRO	ND (0.05 mg/l)	ND (1 mg/kg)
DRO	ND (5 mg/l)	482 mg/kg
As	0.072 mg/l	3.2 mg/kg
Hg dissolved	ND (0.0005 mg/l)	ND (0.1 mg/kg)
Cr	0.23 mg/l	
Ni	0.018 mg/l 0.19	
~~Zn~~ Pb	0.26 mg/l	
~~Pb~~ Hg	0.0006 mg/l	
~~Hg~~ Zn	0.65 mg/l	
PCB		ND (1.1 mg/kg)

SW/SD 111

	SW
DRO	0.2 mg/l
Zn	0.49 mg/l
Zn, Dis	0.07 mg/l
PCB	ND (0.018 mg/l)

SS 168

TRPH	1,690–18,400 mg/kg
GRO	ND (1 mg/kg)
DRO	1,160–3,800 mg/kg
As	9.6–18 mg/kg
4–Chloroaniline	6 mg/kg
Hg	3.1–5.6 mg/kg
PCB	1.92 mg/kg

MW 21–2

	0–2′	4–6′
TRPH	14,500 mg/kg	85 mg/kg
GRO	ND (1 mg/kg)	ND (1 mg/kg)
DRO	620 mg/kg	46 mg/kg
As	5.9 mg/kg	2.8 mg/kg
Cr	13 mg/kg	42 mg/kg
PCB	ND (1.1 mg/kg)	ND (1.1 mg/kg)

SS 167

TRPH	2,590 mg/kg
GRO	ND (1 mg/kg)
DRO	ND (4 mg/kg)
As	170 mg/kg
Zn	230 mg/kg
Cr	8.5 mg/kg
Cd	69 mg/kg
Sb	38 mg/kg
PCB	ND (1.1 mg/kg)

MW 21–3

	GW	0–2′
TRPH	ND (5 mg/l)	4,320 mg/kg
GRO	ND (0.5 mg/l)	
DRO	1 mg/l	250 mg/kg
As, dissolved	ND (0.005 mg/l)	3.2 mg/kg
Ni	0.1 mg/l	
Zn	5.1 mg/l	
Pb	0.1 mg/l	
PCB		ND (1.1 mg/kg)

SS 166

TRPH	753 mg/kg
GRO	ND (1 mg/kg)
DRO	ND (4 mg/kg)
As	39 mg/kg
Zn	200 mg/kg
Cr	41 mg/kg
Cd	ND (2 mg/kg)
Sb	ND (10 mg/kg)
PCB	ND (1.1 mg/kg)

SW/SD 112

	SW	SD
TRPH	ND (5 mg/l)	1,860 mg/kg
GRO	ND (0.05 mg/l)	ND (1 mg/kg)
DRO	0.47 mg/l	379 mg/kg
As	ND (0.005 mg/l)	21 mg/kg
Zn	0.21 mg/l	554 mg/kg
Cr	ND (0.02 mg/l)	93 mg/kg
Cd	ND (0.02 mg/l)	ND (2 mg/kg)
Sb	ND (0.1 mg/l)	ND (10 mg/kg)
PCB	ND (0.018 mg/l)	ND (1.1 mg/kg)

WI 100

Total PCB ND (1.1 mg/kg)

SS 802

DRO	48 mg/kg
Aromatic	ND (13 mg/kg)
Aliphatic	32 mg/kg
RRO	200 mg/kg
Aromatic	98 mg/kg
Aliphatic	110 mg/kg

SS 801

Total PCB 1.5 mg/kg

SITE 21

SITE 14

AST 21–1

AST 21–2

AST 14–1

5 GAL. DRUM, ANTIFREEZE

FORMER TRANSFORMER LOCATIONS

BOG

Concrete Slab

filler pipes & rivets

Electric Relay

111 SUPPLY WAREHOUSE

Prefab Bldg

Conc. Sewer Box

Culvert

Conc. Footing

MH

conc. footing

98 EMERGENCY POWER & OPERATION BLDG.

SUBTERRANEAN ROOM (DEWATERED)

corridor

SUBTERRANEAN CORRIDOR (DEWATERED)

101 WEST DORMITORY

101 EAST DORMITORY

MESS

Power & Communication To Security B'ldg

NOTES

Base maps were digitized from various as–built drawings provided by the Corps of Engineers. (See Section 4.1)

FILE: envsvcs\necape\99-1_fs\draft\fig5_11.dgn
DATE: 24-AUG-1999 10:17
JOB No. 118909B.05

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5–11

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 14 & 21 EMERGENCY POWER/OPERATIONS, WASTEWATER TREATMENT FACILITY

The site is located adjacent to the Main Operations Complex (Figure 1-4). Vegetation at the site ranges from sparse in areas encompassed by the gravel pad to completely coverage in non-disturbed areas. Vegetation consists of tundra grasses, sedges, moss, and lichens. There are several drainages from Site 14. Drainage pathways typically follow the contours of the building footprint. Drainages from the north, south, and west sides of the building are primarily in the same direction, i.e., north, south, and west, respectively. Drainage from the east side of the building is primarily towards the north. There is no standing water in the immediate vicinity of the site.

Potential Sources of Contamination. AST, transformers, drum of antifreeze.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995). The type and location of ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, one AST was identified and found to be approximately 50% full of rainwater and sludge. A drum of antifreeze was observed at the site and is included on the CON/HTRW inventory. A full inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Two potential sources of environmental contamination were identified at this site, the AST and transformer bank. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface soils around the tank and transformers were sampled and analyzed for RRO, DRO, PCB and BTEX. Analytical results are presented in Table 5-21 and compared with the cleanup criteria. As shown on Figure 5-11, all soil analytical results are below the Soil Cleanup Standards, except for PCBs. Wipe samples were collected from the flooring around the transformers was analyzed for PCB. Analytical results are shown in Table 5-22.

Contaminants of Concern. ACM, lead-based paint and PCB incidental to BD/DR. PCB's in soil.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW. Investigate PCB concentrations in building foundations.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of PCB-contaminated soil consistent with the installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.15 SITE 15: BURIED FUEL LINE SPILL AREA

Physical Description. This site encompasses the area running west from the 20,000-gallon UST at Site 13 towards the diesel fuel pump island at Site 27 (Figure 5-10). A break in this fuel line resulted in an approximately 40,000-gallon diesel fuel spill. The rupture is reported to have occurred in 1971 or 1973 (Toolie, 1996 and Toolie, 1998). This ruptured fuel line was abandoned in place and a second line was installed at a shallower depth (E&E, 1993).

Vegetation in the area is minimal as the site lies entirely on the gravel pad and within the confines of the main complex. There is significant surface soil staining about the site, which may be attributable to the historic underground fuel release or fueling operations at the site. Drainage from the site is north through Sites 13 and 27 and into the Drainage Basin.

Potential Sources of Contamination. Diesel release from fuel line.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present on the site. No materials are listed on the inventory of the buildings and debris slated for demolition is provided in Section 4.3. No ASTs or USTs were observed at the site. A full inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

The source of environmental contamination at this site is the diesel release from the fuel line. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents. Surface and subsurface soils around the fuel line were sampled and analyzed for TRPH, DRO, GRO, and BTEX. Analytical results are presented in Table 5-24 and compared with the cleanup criteria. As shown on Figure

5-10, soil analytical results exceed the Soil Cleanup Standards for DRO. Contaminated areas are on the gravel pad.

Subsurface water under the gravel pad was sampled and analyzed for TRPH, RRO, DRO, GRO, BTEX, and priority pollutant metals. Analytical results are presented in Table 5-25 and compared with the cleanup criteria. RRO, DRO, total arsenic, total beryllium, total lead, total zinc, and total nickel exceed the Ground Water Cleanup Standards. Levels of dissolved arsenic, beryllium, lead, zinc, and nickel in filtered samples are below the Ground Water Cleanup Standards, indicating that metals in soil entrained in the water samples caused the exceedence. Therefore, these metals are not included as contaminants of concern.

This site drains to Site 28, the Drainage Basin, consisting of the tundra/wetlands to the northwest. Potential impacts of site contaminants on the Drainage Basin are discussed in Section 5.28, the Drainage Basin.

Contaminants of Concern. DRO in soil. RRO and DRO in subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: None.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated surface and subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.16 SITE 16: PAINT AND DOPE STORAGE BUILDING

Physical Description. This site includes a single-room wood framed building on a concrete slab foundation (Figure 5-12) located on the north side of the perimeter access road surrounding the housing and operations complex (Figure 1-4). This site was originally a flammable liquids storage facility. Numerous decaying containers ranging in size from 1 pint to 5 gallons are scattered both inside the building and throughout the surrounding area. One steel AST, reported to be used for oiling roads (Toolie, 1996), is located on the northern border of the site. Its dimensions are 7.5 feet long with an oval cross section of 6 feet by 4 feet. In addition to the AST, there is a large amount of miscellaneous debris located on the north side of the building.

Vegetation in the area is minimal due to physically disturbed earth and the gravel fill pad. However, the lack of vegetation appears to be a result of earthmoving rather than fuel

LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

Location	PCB (mg/kg or mg/l)	As (mg/kg or mg/l)	Sb (mg/kg or mg/l)	Cd (mg/kg or mg/l)	Cr (mg/kg or mg/l)	Zn (mg/kg or mg/l)	Pb (mg/kg or mg/l)	bis (2 ethylhexyl) phthalate (mg/l)
1994								
SS 156	ND (1.1)	4.5	ND (10)	ND (2)	147	385	125	
SS 157	ND (1.1)	4.6	ND (10)	ND (2)	17	442	69	
SS 158	0.1	5	ND (10)	ND (2)	23	152	18	
SS 159	0.9	4.2	21	7.2	90	12,100	586	
SS 160	ND (4.9)	7	ND (10)	ND (2)	25	112	224	
SS 161	0.532	6	ND (10)	ND (2)	38	127	822	
SS 163	1.4	12	ND (10)	ND (2)	65	460	204	
SS 164	ND (1.1)	4.7–4.8	ND (10)	ND (2)	11–13.8	48–50	28–34	
MW 16–1 GW	ND (0.018)							0.025
MW 16–1 (0.2')	ND (1.1)	3.1–5.6	ND (10)	ND (2)–1.8	11–14	41–44	22–23	
MW 16–2 GW	ND (0.018)							
MW 16–2 (4–6')	ND (1.1)	5.6	ND (10)	2	22	45	18	
MW 16–3 GW	ND (0.018)							
MW 16–3 (0–2')	ND 1.1)	3.4	ND (10)	ND (2)	8.9	41	157	
MW 16–3 (8–10')	ND (1.1)	4.2	14	1.6	19	49	99	
1998								
MW 16–1 GW							0.026	
MW 16–3 GW							0.0029	

SS 157
AST 16–1 (50% full)
MW 16–2
DEBRIS
SS 158
Paint & Dope Storage
SS 159
MW 16–1 GW 801
SS 160
SS 161
SS 160
SS 163
SS 164
GW 802 MW 16–3
SS 156
SITE 16

SS 165
Concrete Slab
Collapsed Addition of warehouse
107 MESS HALL W'HSE
WI 102
TotaL PCB ND (1,100 ug/100cm2)
SITE 17

SS 145
TotaL PCB 58.3 ug/100cm2
111 SUPPLY WAREHOUSE
WI 101
bis (2 ethylhexyl) phthalate 61,000 ug/100cm2
Total PCB 21 ug/100cm2

Electric Relay
Prefab Bldg
106 MESS HALL
110 POWER PLANT
109 AUTO MAINTENANCE
78

NORTH
SCALE IN FEET
0 50

NOTES

Base maps were digitized from various as–built drawings provided by the Corps of Engineers. (See Section 4.1)

FILE: e:\usace\necape\99r1_fs\draft\Fig5_12.dgn
DATE: 24-AUG-1999 10:17
JOB No. 1189098.05

MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5–12

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 16 & 17 PAINT & DOPE STORAGE BLDG, GENERAL SUPPLY & MESS HALL WAREHOUSE

contamination distress. The sparse grasses present at the site appeared healthy. There is no clear drainage pathway as the site is fairly well graded.

Potential Sources of Contamination. Abandoned containers, AST.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, one AST was identified and found to be approximately 50% full of the fluids, black oil and gray water. The fluids appeared to be weathered heavy motor oil, and rainwater and snowmelt accumulation. Fluids were sampled and results are provided in Section 4.2.1. A listing of CON/HTRW at the site is shown on the inventory provided in Section 4.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Two potential sources of environmental contamination were identified at this site, the AST and the abandoned containers. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils is ADEC Method 2 for all constituents. Soils and subsurface water around the AST and abandoned containers were sampled and analyzed for SVOC, VOC, PCB, pesticides and priority pollutant metals. Analytical results are presented in Table 5-26 (for soil) and Table 5-27 (for water) and compared to the cleanup criteria. All soil constituents were below the Soil Cleanup Standards, except PCBs, arsenic, antimony, cadmium, chromium, lead, and zinc.

Bis-(2-ethylhexyl)phthalate, total beryllium, total cadmium, total chromium, total lead, total zinc, and total nickel exceeded the Water Cleanup Standards. Dissolved concentrations of beryllium, cadmium, chromium, lead, zinc, and nickel are below the Water Cleanup Standards, suggesting that metals attached to soils entrained in the water are the source of the exceedences. Therefore, these metals are eliminated contaminants of concern. Although a common laboratory contaminant, bis-(2-ethylhexyl)phthalate is retained as a contaminant of concern, due to its occurrence at this site and high detection levels of the same contaminant in a wipe sample at the adjacent Site 17.

Contaminants of Concern. PCBs, arsenic, antimony, cadmium, chromium, lead, and zinc in soil. ACM and lead-based paint incidental to BD/DR. Bis-(2-ethylhexyl)phthalate in subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW. Investigate PCB concentrations in building foundations.

BD/DR: Perform BD/DR.

Gravel Pad: Address elevated levels of metals in the gravel pad as part of the installation-wide cleanup criteria and remedial action. Address bis-(2-ethylhexyl)phthalate contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.17 SITE 17: GENERAL SUPPLY WAREHOUSE AND MESS HALL WAREHOUSE

Physical Description. The site includes Buildings 111 and 107 of the housing and operations complex (Figure 1-4). The warehouses were both single story buildings approximately 10,000 square feet in area (Figure 5-12). They were used to store miscellaneous materials such as paper goods, food and cleaning fluids required for base operations. Cold storage facilities were located at this site.

Potential Sources of Contamination. Lead or ACM. Any remaining potentially- hazardous materials such as cleaning fluids. Leaking drum.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces were tested and found to consist of lead-based paint (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, no tanks were identified. Twenty 25-pound tubs of dishwashing

compound labeled as "Chlorine Releasing" were observed in the General Supply Warehouse (Building 111) and are considered CON/HTRW. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

No potential sources of environmental contamination were identified at this site. Soil samples were collected beneath the leaking drum and analyzed for SVOC and VOC. None were detected (Table 5-28). Wipe samples were collected from the flooring in the warehouses was analyzed for PCB and SVOC. One wipe sample showed PCB at 21 μg/square centimeter. Analytical results are presented in Table 5-29. No PCB source was identified.

A soil sample was collected at the entrance to the Supply Warehouse (Building 111). PCB concentrations soils from the gravel pad exceeded the Soil Cleanup Standards.

Contaminants of Concern. PCB in soil. ACM, lead-based paint and PCB incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW. Investigate PCB in building foundations.

BD/DR: Perform BD/DR.

Gravel Pad: Excavate and dispose of PCB-contaminated soil.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

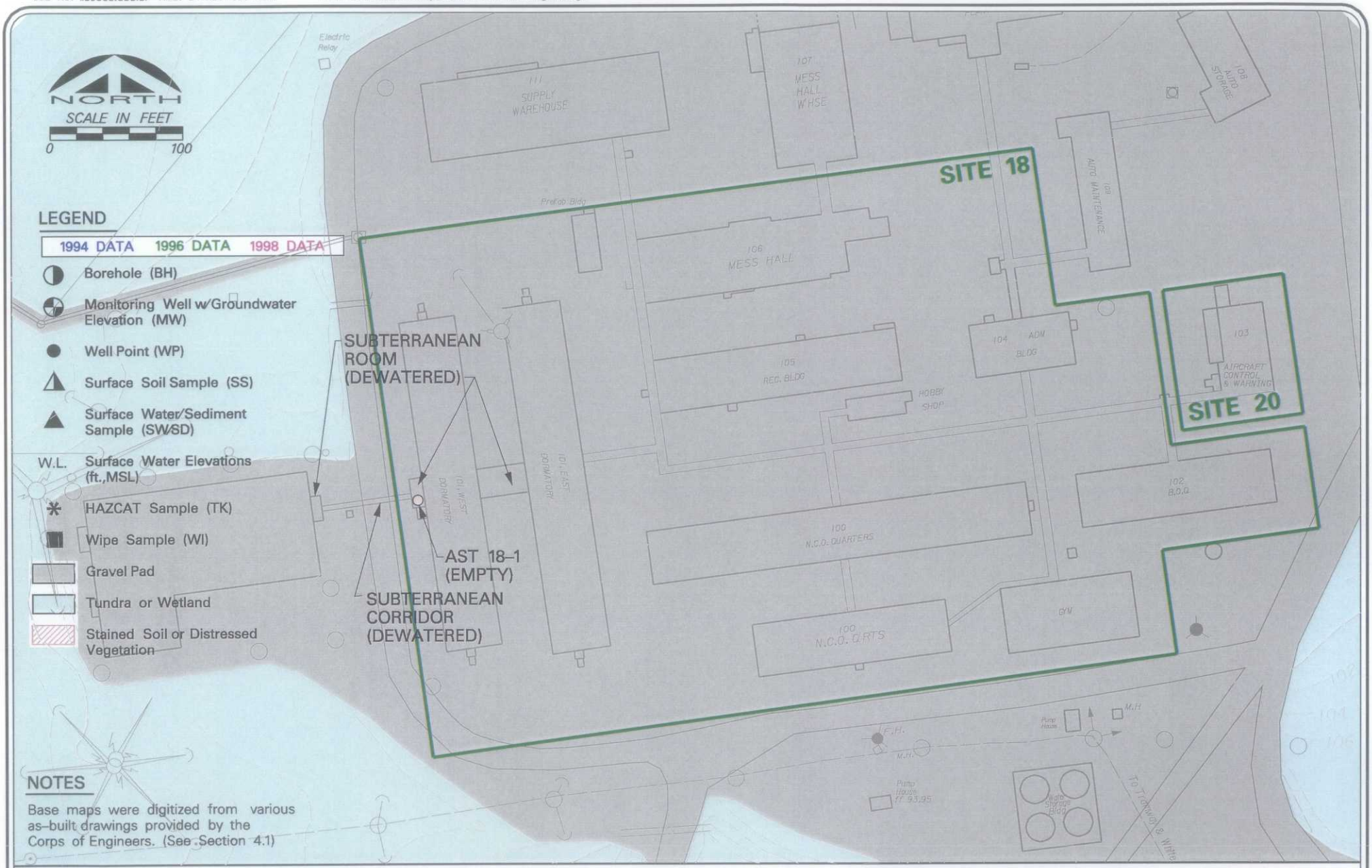
5.18 SITE 18: HOUSING FACILITIES AND SQUAD HEADQUARTERS

Physical Description. As shown in Figure 1-4, Site 18 is in the Main Operations Complex. The Housing Facilities and Squad Headquarters consists of 10 buildings, including Buildings 99, 100 (east and west buildings), 101, 102, 104, 105, 106, 125 and 130, all linked by enclosed walkways. Figure 5-13 shows the layout of the site. All of the buildings are in disrepair and debris is scattered throughout the site. Site 18 makes up most of the main complex and is built on the gravel pad. Vegetation throughout the site is sparse to non-existent, but the existing vegetation appears healthy and not adversely effected by site conditions. Drainage from the site in general is towards the north. There is no standing water at the site.

Potential Sources of Contamination. Lead- and asbestos-containing building materials.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

JOB No. 189098.050 TIME: 24-AUG-1999 10:18 FILE: e:\usace\necape\99rl_fs\draft\fig5_13.dgn



NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-13

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 18 & 20 HOUSING FACILITIES & SQUAD HEADQUARTERS, AC&W BLDG.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Paint chips from painted surfaces were collected and analyzed and found to contain lead-based paint (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

One subterranean structure (the underground corridor between Building 101 and Building 98 at Site 14) was found flooded during the investigation. Dewatering of the subterranean corridor was necessary to inspect it for potentially hazardous materials. As described in Section 2.4.4, IRD Management, the water within the corridor was analyzed and found to be suitable for discharge directly to the ground adjacent to the buildings. No sludge or potentially toxic or hazardous materials were observed in the corridor during inspection of the subterranean passage.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. One tank was observed at the site in the subterranean corridor, once it had been dewatered. The tank, in contact with the water, showed no evidence of its past contents. Four 5-gallon pails and six quart-sized containers of Decontamination Agent, DS-2 were containerized into seven 12-gallon drums, transported and disposed off-site. Five 5-gallon pails of Super Tropical Bleach (STB) were containerized in one 55-gallon drum and were transported from the site for off-site disposal. Containerization, transportation and disposal activities are reported in Section 3.3, Hazardous Waste Disposal. An inventory of the remaining CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

No other potential sources of environmental contamination were identified at this site.

Contaminants of Concern. ACM and lead-based paint.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: No further action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.19 SITE 19: AUTO MAINTENANCE AND STORAGE FACILITIES

Physical Description. The Auto Maintenance and Storage Facilities are located in the Main Operations Complex (Figure 1-4). The site consists of the Auto Storage Facility (Building 108), Auto Maintenance Facility (Building 109) and the adjacent land (Figure 5-10). The buildings were constructed using wood framing, with steel columns and trusses that support the roofs. The flooring in both buildings is a concrete slab. Both floors are stained and have floor drains, which are assumed to drain to the north along the downward sloping grade. There is a mechanics' work pit in the north end of the auto maintenance facility, which is flooded with water. The site also contains the following CON/HTRW items: one 250-gallon oblong AST located outside of the northeast corner of Building 108 containing approximately 50 gallons of spent antifreeze; one empty 250-gallon AST located by Building 108; 24 two-gallon smudge pots; and 72 five-gallon buckets of Military Aircraft Washing Powder.

Vegetation in the area is limited, as this site is located within the main complex on the gravel fill pad. The sparse vegetation consists of grasses and appears to be healthy. The drainage of the site is to the north towards the Drainage Basin. There is no standing water at the site.

Potential Sources of Contamination. Two ASTs, mechanics' work pit, floor drains from auto maintenance and storage areas, 24 smudge pots, 72 buckets of Military Aircraft Washing Powder.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two ASTs were identified. One 250-gallon AST was found to contain approximately 50 gallons of spent antifreeze. The other 250-gallon AST was found to be empty. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

Seven potential sources of environmental contamination were identified at this site, including each of the two ASTs, each of the two floor drains, the mechanics' work pit, the smudge pots and the Military Aircraft Washing Powder. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils ADEC Method 2 for all constituents. Soils and subsurface water around the ASTs, floor drains and smudge pots were sampled and analyzed

for TRPH, DRO, GRO, BTEX and metals. Analytical results are presented in Table 4-11 (for wastes in containers and tanks), Table 5-31 (for soil) and Table 5-32 (for water) and compared to the cleanup criteria. Isolated areas of site soils exceed the Soil Cleanup Standards for DRO, GRO, arsenic and chromium.

The concrete floor was wipe-sampled and analyzed for petroleum and metals. Analytical results are presented in Table 5-33. As described in Section 4.2.1, water and sediment from the mechanics' work pit was sampled and analyzed for metals and ethylene glycol (water) and TRPH, BTEX and PCB (sediment). Water in the pit appears to be below groundwater and surface water criteria and may be appropriate for direct discharge to the ground. The sediment in the mechanics' work pit exceeds the RCRA toxicity characteristic and, if excavated and disposed, will require disposal as a hazardous waste. The containers of Military Aircraft Washing Powder were inside the building, unbroken, and there was no evidence of leaks or spills to the environment.

Two monitoring wells were installed at the site. Subsurface water was collected from the monitoring wells in 1994 and 1998. Water quality criteria are exceeded for DRO, GRO, total zinc, total lead, and benzene. The filtered samples of zinc and lead are below the Water Cleanup Standard, therefore, they are not included as contaminants of concern. In 1998, the benzene levels had decreased to below the standard. It would appear likely that the concentrations of benzene, a mobile, volatile, and readily-biodegradable constituent, have rapidly attenuated in the environment. Therefore, benzene was eliminated as a constituent of concern in subsurface water at the site.

Contaminants of Concern. DRO, GRO, arsenic and chromium in soil. DRO and GRO in subsurface water. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of contaminated soil consistent with installation-wide cleanup criteria and remedial action. Address petroleum-contaminated subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.20 SITE 20: AIR FORCE AIRCRAFT CONTROL WARNING (AC&W) BUILDING

Physical Description. Site 20 is located in the Main Operations Complex (Figure 1-4). It consists of Building 103, the Air Force Aircraft Control Warning (AC&W) Building (Figure 5-13). The building is very weathered and the roof has collapsed.

Potential Sources of Contamination. Lead- and asbestos-containing building materials.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to the buildings suspected to contain friable asbestos. Table 3-2 lists the warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

No ASTs and USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

No other potential sources of environmental contamination were identified at this site.

Contaminants of Concern. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: No further action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.21 SITE 21: WASTEWATER TREATMENT FACILITY

Physical Description. Site 21 consists of the wastewater treatment system which served the Housing and Operations Complex. The facility is located east of the perimeter road (Figure 1-4) and consists of two side-by-side septic settling tanks approximately 15 feet wide by 50 feet long and eight feet deep (Figure 5-11). Effluent from these tanks was discharged via an 8-inch insulated cast iron pipe to a wetland area approximately 450 feet to the east.

Aside from areas of physically disturbed earth from earthmoving activities, vegetation in this area is healthy. Soil characteristics range from gravelly fill near the building to very organic marshy areas and grasses. The drainage of the site follows a stream located at the ends of the outfall approximately 1,000 feet west of the main structure. The flow rate of this stream is approximately 100 gpm.

Potential Sources of Contamination. Wastewater treatment effluent.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, two 500-gallon diesel ASTs were identified and found to be empty. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

One potential source of environmental contamination was identified at this site, the discharge from the septic tanks. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils is ADEC Method 2 for all constituents. Soils and sediments around the septic tank discharge were sampled and analyzed for TRPH, DRO, GRO, PCB, VOC, SVOC, pesticides and metals. Analytical results are presented in Table 5-34 (for soil) and compared to cleanup criteria. Isolated areas of site soils and sediments exceed the Soil Cleanup Standards for DRO, PCB, arsenic, antimony, cadmium, chromium, and mercury. 4-chloroanaline was detected at SS168 in the primary and duplicate samples at 6 mg/Kg and 4.94 mg/Kg, respectively. 4-chloroanaline was not detected (MDL = 1.7 mg/Kg) in the split sample from the same location that went to the QA/QC laboratory or in any other site sampling locations. It is assumed that this constituent was a laboratory contaminant and, therefore, is excluded as a contaminant of concern at the site.

Subsurface water samples were collected and analyzed from 3 monitoring wells in 1994 ~~and~~ 1998 and several surface water sampling locations. Analytical results are presented in Table 5-35 (for subsurface water). Total arsenic, total chromium and total lead exceed the Water Cleanup Standards, while dissolved concentrations of these metals are all below the standards.

This suggests that metals associated with soils entrained in the water are the source of the metals, therefore, they are excluded as contaminants of concern in the subsurface water. Total and dissolved concentrations of zinc exceed the standard in one of two surface water samples. No source of zinc was identified so zinc in surface water is excluded as a contaminant of concern.

Contaminants of Concern. DRO, PCB, arsenic, antimony, cadmium, chromium, and mercury in tundra soils. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: None.

Tundra/Wetlands: Remediate isolated areas of contaminated tundra consistent with an installation-wide cleanup criteria and remedial action identified for the site.

Potential Obstacles to Remediation. Site obstacles to removal of the wastewater treatment facility include uneven terrain and marshy conditions, which may impede earthmoving activities and demolition of the facility.

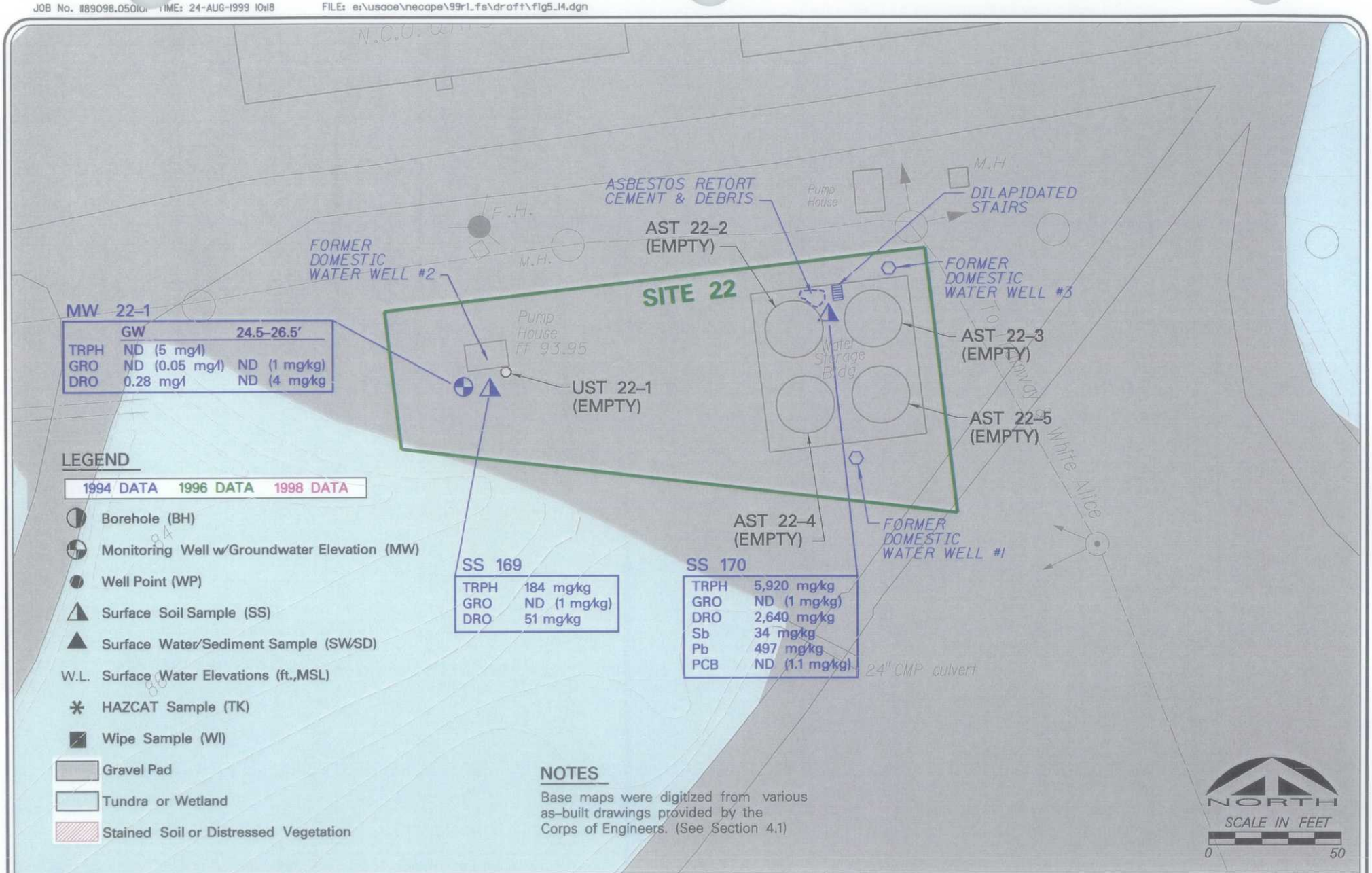
5.22 SITE 22: WATER WELLS AND WATER SUPPLY BUILDING

Physical Description. Site 22 is located adjacent to the Main Operations Complex (Figure 1-4). This site consists of the potable water storage building (Building 113), the pumphouse (Building 114) and three of the four water supply wells at the installation (Figure 5-14). The water storage building holds four 20-foot diameter and 26-foot high water tanks and miscellaneous piping.

Inside the building's northern entrance, 150 1-gallon paint cans containing Asbestos Retort Cement and ten 50-pound bags of asbestos cement are piled. The pumphouse contains a motor driven pump and diesel pump drive (E&E, 1993). There is also a UST (UST 22-1), which apparently supplied the pump, located on the south side of this building. The building is in fair condition but has suffered some weathering due to the lack of windows and doors. Little information is available pertaining to the four wells.

Potential Sources of Contamination. Diesel-powered engine and pump, UST 22-1, cans and bags of asbestos cement.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-14

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 22 WATER WELLS AND WATER SUPPLY BUILDING

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of the presence of asbestos and its potential hazards were posted at all viable entrances to buildings suspected to contain friable asbestos. Table 3-2 lists warning sign locations. Paint chips from painted surfaces were collected, analyzed and found to contain lead-based paint (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of ASTs and USTs and an inventory of tank contents. At this site, one UST was identified and found to be empty. CON/HTRW observed at the site includes approximately 150 one-gallon cans of Asbestos Retort Cement (previously identified as fire brick paint) located in the water storage building. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

Four potential sources of environmental contamination were identified at this site, including the diesel engine and pump, UST 22-1 and cans and bags of asbestos cement. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils is ADEC Method 2 for all constituents. Soils and sediments around the diesel engine, pump and UST 22-1 were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, SVOC, pesticides and metals. Analytical results are presented in Table 5-36 (for soil) and compared to the cleanup criteria. Isolated areas of site soils and sediments exceed the Soil Cleanup Standards for DRO, antimony, and lead. Because there is an identifiable source of lead and the metal has exceeded the criteria in the only soil sample that tested for metals, it will be retained as a contaminant of concern. Similarly, antimony has been detected in the same sample and will be considered a contaminant of concern.

Subsurface water samples were collected and analyzed for TRPH, DRO, GRO, and BTEX. Analytical results are presented in Table 5-37 and show no constituents above the identified regulatory criteria.

Contaminants of Concern. DRO, antimony, and lead in soil. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. No subsurface water remediation warranted. Address elevated levels of metals in the gravel pad as part of the installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: No tundra at this site.

Potential Obstacles to Remediation. None identified at this time.

5.23 SITE 23: POWER AND COMMUNICATION LINE CORRIDORS

Physical Description. The power and communication line corridors run from the main camp to the outlying facilities (Figure 1-4). An empty transformer crib, a downed power pole, and miscellaneous 55-gallon drums are also located at the northwest side of the site (Figure 5-15) near Site 24. Five 55-gallon drums are located at the site due north of the White Alice station, and approximately 1,500 abandoned drums are scattered throughout the site.

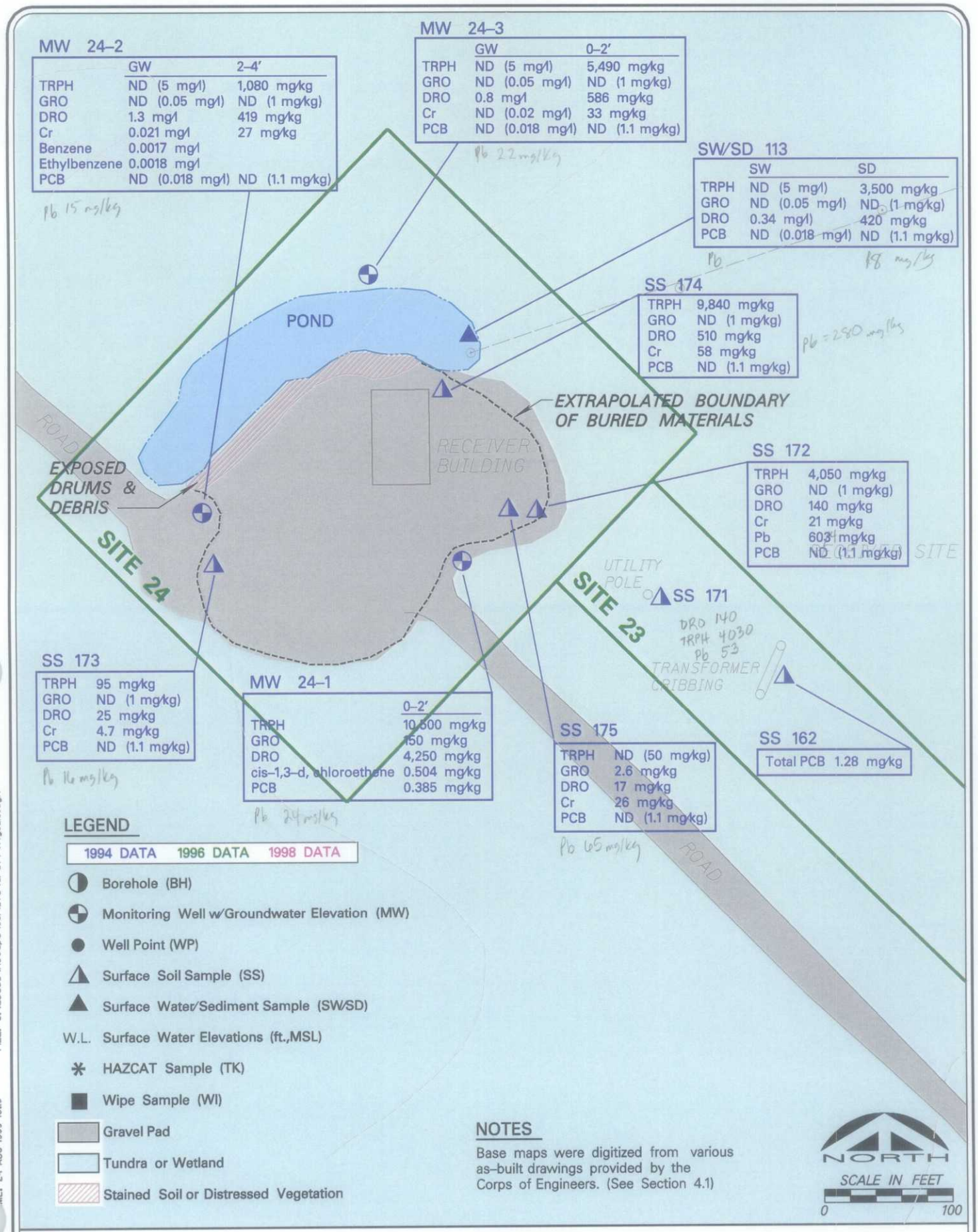
Potential Sources of Contamination. Transformers and crib (now removed), drums.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) and no ASTs or USTs were present at the site. An inventory of the buildings and debris slated for demolition is provided in Section 4.3. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

Two potential sources of environmental contamination were identified at this site, the drums and transformer crib (now removed). Two discrete portions of the corridor were chosen for this investigation. The first is directly adjacent to Site 24 (the Receiver Building), and was selected because of the presence of a stained soils beneath an empty transformer crib, a downed power pole, and miscellaneous 55-gallon drums. The second location is due north of the White Alice station and was selected based on the presence of five 55-gallon drums with unknown contents. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are in accordance with ADEC Method 1 for petroleum and Method 2 for all other constituents. Soils around the transformer crib were sampled and analyzed for PCB. Analytical results are presented in Table 5-38 (for soil) and compared to the cleanup criteria. Soil analytical results exceed the soil cleanup standards for PCB-1260. The contaminated area is in the tundra.

Soil samples from around the abandoned drums were collected and analyzed for TRPH, DRO, GRO, BTEX, PCB, SVOC, pesticides, and metals. No constituents exceed the Soil Cleanup Standards.



MONTGOMERY WATSON
Anchorage, Alaska

FIGURE 5–15

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITES 23 & 24 POWER & COMMUNICATION LINE CORRIDORS & RECEIVER BUILDING

Contaminants of Concern. PCB in soil.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: No further action.

Tundra/Wetlands: Remediate isolated areas of PCB-contaminated soil consistent with the PCB cleanup criteria and remedial action identified for the site.

Potential Obstacles to Remediation. None identified at this time.

5.24 SITE 24: RECEIVER BUILDING AREA

Physical Description. The receiver building is located approximately 1.5 miles west of the Housing and Operation Complex (Figure 1-4). It consists of one reinforced concrete building on concrete pillars (Figure 5-15). All equipment associated with the building has been removed and the concrete building burned; only the concrete shell remains. The pad on which the building is located is suspected to consist of empty buried POL drums aligned in rows and covered with gravel. According to E&E (1993) there are approximately 1,000 drums buried at the site.

Potential Sources of Contamination. Buried and scattered drums.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

Site structures (e.g., buildings) were inspected for ACM. At this site, ACM and/or suspected ACM was observed in buildings and surrounding areas (Montgomery Watson, 1995a). The type and location of the ACM is summarized in Table 3-1. Signs warning of asbestos hazards were unnecessary and were not posted, because the asbestos observed at the site is non-friable asbestos. Painted surfaces are assumed to be lead-based paint, based on sampling performed at other sites (Montgomery Watson, 1995a). An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

No ASTs or USTs or CON/HTRW were observed at the site.

The potential source of environmental contamination at this site is the buried and scattered abandoned drums. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are in accordance with ADEC Method 1 Matrix Level C for petroleum and ADEC Method 2 for all other constituents. Soils around the scattered and buried drums were

sampled and analyzed for TRPH, DRO, GRO, PCB, VOC, SVOC, pesticides, and metals. Analytical results are presented in Table 5-39 (for soil) and compared to the cleanup criteria. Isolated areas of site soils and sediments exceed the Soil Cleanup Standards for DRO, lead, chromium, and cis-1,2-Dichloroethene. Not a common source of laboratory contamination cis-1,2-Dichloroethene has an identifiable source and is considered a contaminant of concern.

Three monitoring wells were installed and water samples were collected in 1994 and analyzed for TRPH, DRO, GRO, VOC, SVOC, PCB, pesticides, and metals. Analytical results are presented in Table 5-40. Ground Water Cleanup Standards were exceeded for DRO, ~~total nickel~~, total lead and ~~total zinc~~. Dissolved concentrations of these constituents are below the Water Cleanup Standards. Metals associated with soils entrained in the water are probably the source of the metals, therefore, these metals are excluded as contaminants of concern.

Surface water and sediment samples were collected from the pond at the site. Samples were analyzed for TRPH, DRO, GRO, PCB, SVOC, and metals. Analytical results are presented in Table 5-39 (sediments) and Table 5-40 (surface water). No Surface Water Cleanup Standards were exceeded.

Contaminants of Concern. DRO, lead, chromium, and cis-1,2-Dichloroethene in soil. DRO in subsurface water. ACM and lead-based paint incidental to BD/DR.

Recommended Remedial Action.

CON/HTRW: None.

BD/DR: Perform BD/DR.

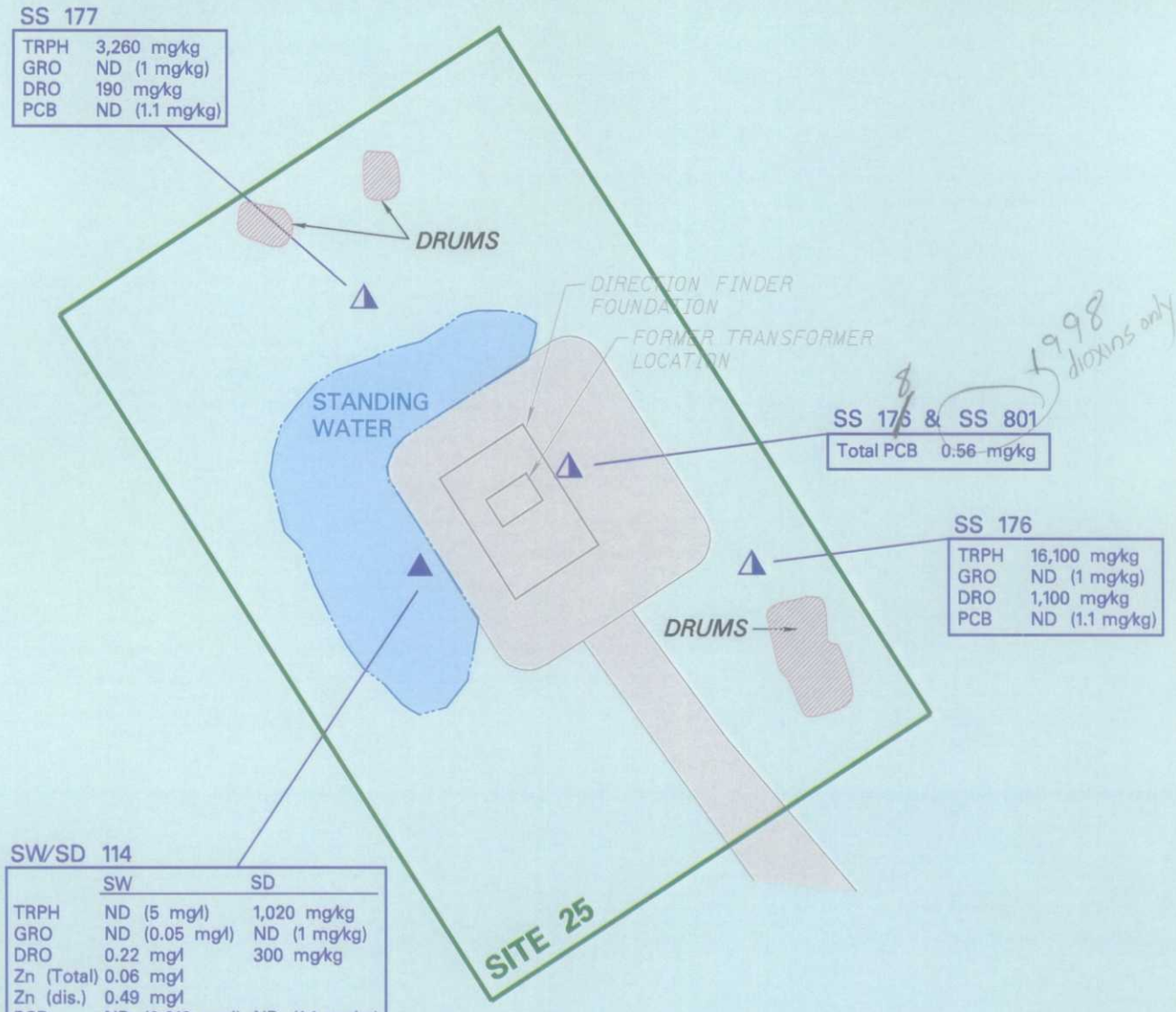
Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Remediate subsurface water consistent with installation-wide cleanup criteria and remedial action. Cover suspected drum burial site with clean fill.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

5.25 SITE 25: DIRECTION FINDER AREA

Physical Description. This site is located at the extreme west end of the installation (Figure 1-4). It originally consisted of a small building containing radio equipment. The building has been burned to the concrete foundation and the debris pushed to the sides of the gravel pad (E&E, 1993). There is one empty transformer casing lying on its side on the foundation and several 55-gallon drums scattered around the site (Figure 5-16).



LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well w/Groundwater Elevation (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

NORTH

SCALE IN FEET

0 50

FIGURE 5-16

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 25 DIRECTION FINDER FOUNDATION

MONTGOMERY WATSON

Anchorage, Alaska

Potential Sources of Contamination. Transformer, 55-gallon drums, by-products of building fire.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) remain at this site. An inventory of the buildings and debris slated for demolition is provided in Section 4.3. No ASTs or USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

Three potential sources of environmental contamination were identified at this site, including the former transformers, 55-gallon drums and by-products of the building fire. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils is ADEC Method 1 for petroleum and ADEC Method 2 for all other constituents. Soils and sediments around the abandoned drums and former transformers casing were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, SVOC, pesticides and metals. Analytical results are presented in Table 5-41 (for soil) and compared to the cleanup criteria. Isolated areas of site soils and sediments exceed the Soil Cleanup Standards for DRO.

One soil sample was collected to analyzed for the dioxins and furans, a potential by-product of burning. Sample locations are shown on Figure 5-16 and laboratory results are presented in Table 5-41. Results showed that the levels of dioxins and furans are below the Soil Cleanup Standards.

A surface water sample was collected off the gravel pad and adjacent to the abandoned drums. Analytical results are presented in Table 5-42 and compared to the cleanup criteria. Water analytical results show the Surface Water Cleanup Standards were exceeded for zinc (total and dissolved) for the only surface water sample. Having an identifiable source, it will be retained as a contaminant of concern.

Contaminants of Concern. DRO in tundra. Zinc in surface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remediate isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Cover suspected drum burial site with clean fill.

Tundra/Wetlands: Address elevated levels of zinc in surface water as part of the installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

5.26 SITE 26: FORMER CONSTRUCTION CAMP AREA

Physical Description. The former Construction Camp Area is located adjacent to the Main Operations Complex (Figure 1-4). As shown on Figure 5-9. It consists of a flat gravel pad area with no structures or debris remaining. One out-of-service drinking water supply well is located at the site.

Potential Sources of Contamination. None.

Investigation Activities. E&E observed no indications of visible debris or HTRW during the site inspection in 1993. The drinking water supply well was identified later and added to this site. An inventory of the buildings and debris slated for demolition is provided in Section 4.3.

Contaminants of Concern. None.

Recommended Remedial Action.

CON/HTRW: None.

BD/DR: Decommission drinking water supply well.

Gravel Pad: No further action.

Tundra/Wetlands: No further action.

Potential Obstacles to Remediation. None identified at this time.

5.27 SITE 27: DIESEL FUEL PUMP ISLAND

Physical Description. The diesel fuel pump island is located in the Main Operations Complex (Figure 1-4). It consists of a 4 foot by 6 foot fuel pump shed, a 4-foot by 4-foot cement valve box, and buried pipeline from the fuel storage tanks to the east. It is located approximately 100 feet north of the Auto Storage Facility, Building 108 (Figure 5-10). It was originally used to refuel heavy equipment and vehicles; no gasoline was dispensed (Toolie, 1996). Diesel releases from the diesel fuel pump island have impacted the Site 28, the Drainage Basin.

The biota of the site is limited due to the gravel pad on which the site was built. The sparse vegetation (less than 5% coverage) consists primarily of grasses. However, what vegetation does exist appears healthy and unaffected by site conditions. Drainage from the site is north under the perimeter access road, through a culvert, and onto the Drainage Basin. During wet periods, subsurface water surfaces in a small spring immediately southeast of the pump island.

Potential Sources of Contamination. Past diesel releases from the fuel pump and fuel line. Buried drums on the embankment.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that, because of their state of disrepair, could represent physical hazards at the site; containerized hazardous or toxic wastes and potential sources of environmental contamination were also inventoried.

No structures (e.g., buildings) were present at the site. An inventory of the buildings and debris slated for demolition is provided in Section 4.3. No ASTs or USTs were observed at the site. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

In response to concerns raised during a community meeting, a radiological survey was performed as described in Section 2.5. No radioactive materials were detected at this site.

The potential source of environmental contamination at this site is the fuel pump and line. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils is ADEC Method 2 for all constituents. Soils and sediments around the fuel ump and fuel line were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB and metals. Analytical results are presented in Table 5-43 (for soil) and compared to the cleanup criteria. Isolated areas of site soils and sediments exceed the Soil Cleanup Standards for DRO, GRO, benzene, arsenic and chromium. Chromium was detected in one sample at 27 mg/Kg. Because it only exceeded the cleanup criteria by 1 mg/Kg and only in one sample, chromium is not listed as a contaminant of concern.

Subsurface water and surface water around the fuel pump and fuel line were sampled and analyzed for TRPH, DRO, GRO, BTEX, and metals. Analytical results are presented in Table 5-44 (for subsurface water) and compared to the cleanup criteria. Some samples exceed the Ground Water Cleanup Standards for DRO, GRO, total zinc, total lead, total nickel, and benzene. In 1998, the GRO and benzene levels had decreased to below the standard. Dissolved concentrations of zinc, lead, and nickel are below the Water Cleanup Standards. Metals associated with soils entrained in the water are probably the source of the metals, therefore, these metals are excluded as contaminants of concern. It would appear likely that the concentrations of benzene and GRO, comprised of mobile, volatile, and readily-biodegradable constituents, have rapidly attenuated in the environment. Therefore, GRO and benzene were eliminated as constituents of concern in subsurface water at the site.

In 1998, a spring was observed southeast of the pump island and was sampled and analyzed for RRO, DRO, GRO, BTEX and PAH. This subsurface water may be characteristic of the quality of water flowing under the gravel pad into the adjacent tundra. All results were below the Surface Water Cleanup Standards.

This site drains to Site 28, the Drainage Basin, consisting of tundra/wetlands to the northwest. Potential impacts of site contaminants on the Drainage Basin are discussed in Section 5.28, the Drainage Basin.

Contaminants of Concern. DRO, GRO, benzene, and arsenic in soil. DRO in subsurface water.

Recommended Remedial Action.

CON/HTRW: Remove and dispose/recycle CON/HTRW.

BD/DR: Perform BD/DR.

Gravel Pad: Remedial isolated areas of petroleum-contaminated soil consistent with installation-wide cleanup criteria and remedial action. Remediate subsurface water consistent with installation-wide cleanup criteria and remedial action.

Tundra/Wetlands: Remediate isolated areas of petroleum-contaminated tundra consistent with installation-wide cleanup criteria and remedial action.

Potential Obstacles to Remediation. None identified at this time.

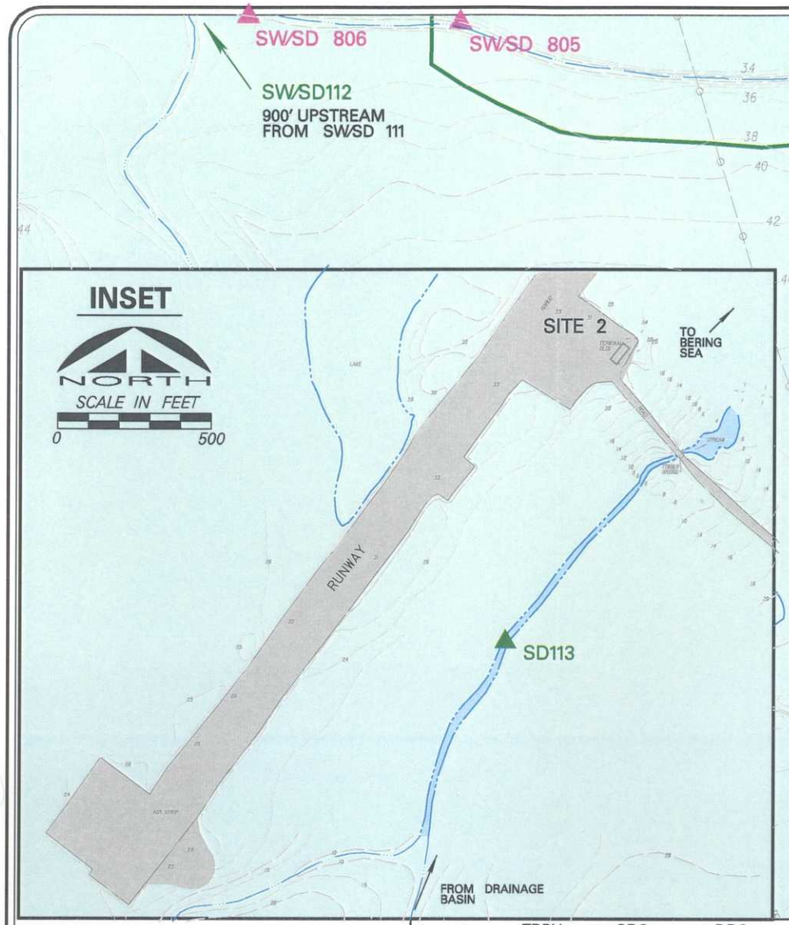
5.28 SITE 28: DRAINAGE BASIN

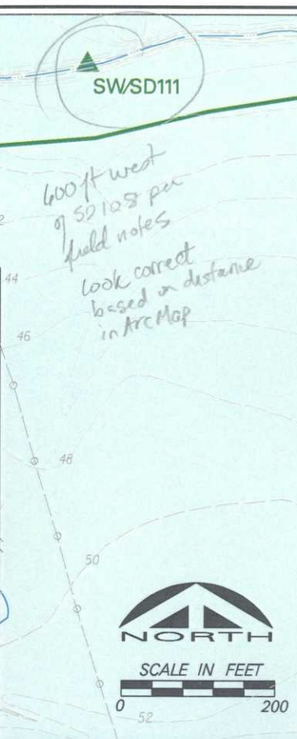
Physical Description. The Drainage Basin is a tundra/wetland north of the Main Operations Complex. Surface water run-off and subsurface water seeps from the Main Operations Complex gravel pad drains into tundra/wetland. This surface water flows north into the Suqi River (Figure 5-17).

Three discrete drainages originate from the Main Operations Complex gravel pad. The first is adjacent to Site 10 (Buried Drum Field) and Site 11(Fuel Storage Tank Area). The second is adjacent to Site 13 (Heat and Electric Power Building), and the third is adjacent to Site 27 (Diesel Fuel Pump Island). These headwaters areas are identified as the "Site 10 and 11 Headwaters", the "Site 13 Headwaters", and the "Site 27 Headwaters".

The Site 10 and 11 headwaters are west of Site 10 and north of Site 11. Heavy, black staining was observed on the edge of the gravel pad at Site 10. Soil staining was not observed beneath the 400,000-gallon diesel tanks at Site 11, even in the vicinity of the puncture in AST 11-2. However, a 120-foot by 30-foot area of soil staining and distressed vegetation was observed in the tundra at the foot of the gravel pad (Figure 5-17).

The Site 13 headwaters area originates from an artificially-created swale which contains a manhole and small (3-foot by 3-foot) concrete supporting structure. According to Eugene Toolie (1996), this manhole served as the drain for the Heat and Electric Power Buildings (Site 13) (Figure 5-10). North of the manhole is an approximately 10-foot wide by 40-foot long area of surface water, which drains to the north. The surface water has no petroleum sheen, but the sediments in the drainage are stained dark brown and black, and produce a heavy sheen when





NOTES

Base maps were digitized from various as-built drawings provided by the Corps of Engineers. (See Section 4.1)

Location 1994	TRPH (mg/kg or mg/l)	GRO (mg/kg or mg/l)	DRO (mg/kg or mg/l)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	PCB (mg/kg or mg/l)
SS 129	4,850	ND (1)	1,860			ND (1.1)
SS 130	2,450	ND (1)	348			ND (1.1)
SS 131	5,230	ND (1)	1,260			ND (1.1)
SS 132	24,500	120	35,800			ND (1.1)
SS 137	80,400	ND (1)	22,600			ND (16.5)
MW 10-1 GW	ND (5)	ND (0.05)	0.49			ND (0.018)
MW 10-1 0-2'	810	ND (1)	366			ND (1.438)
MW 10-1 2-4'		ND (1)	7.9			
MW 10-1 4-6'	12		ND (4.6)			ND (1.273)
MW 10-4 GW	ND (5)	ND (0.05)	3.2			ND (0.018)
MW 10-4 0-2'	907	3.7	720			ND (1.1)
BH 10-2 0-2'	104,000	67-230	81,300-104000	0.61-2.17		0.61-2.14
BH 10-3 0-2'	83,600	41	43,000	0.241		0.241
SW 107	2.3	ND (0.05)	2.3			
SD 107	38,600	ND (1)	38,600			
SW 108	ND (5)	ND (0.05)	1.4			
SD 108	127,000	220	10,100			
SW 109	ND (5)	ND (0.05)	1.4			ND (0.018)
SD 109	81,000	ND (1)	38,000			ND (550)
SW 110	2.1-19	0.21-0.92	12-14		0.0016	0.0016
SD 110	13,800-23,600	3.7-24	7,250-11,500	0-5.16	0.58-1.35	0.58-6.51
SW 117	ND (5)	ND (0.05)	0.79			ND (0.018)
SD 117	101,000	ND (1)	27,500			ND (1.1)

LEGEND

1994 DATA 1996 DATA 1998 DATA

- Borehole (BH)
- Monitoring Well (MW)
- Well Point (WP)
- Surface Soil Sample (SS)
- Surface Water/Sediment Sample (SW/SD)
- W.L. Surface Water Elevations (ft.,MSL)
- HAZCAT Sample (TK)
- Wipe Sample (WI)
- Gravel Pad
- Tundra or Wetland
- Stained Soil or Distressed Vegetation

Location	TRPH (mg/kg or mg/l)	GRO (mg/kg or mg/l)	DRO (mg/kg or mg/l)	RRO (mg/kg or mg/l)	PCB (mg/kg or mg/l)
1998					
MW 10-1	ND (0.250)		0.340		
MW 10-4	ND (0.25)		0.63		
SS 801			860	310	ND (1.05)
SS 802			95	270	ND (7.7)
SS 806			230	370	
SS 807			73	260	
SS 808			108	590	
SS 809			22	69	
SITE 28					
SD 801			14,000	1,800	
SD 802			18,000	1,600	
SD 803			18,000	1,700	
SITE 29					
SW 801		ND (0.1	0.33	ND (0.25)	ND (0.007)
SD 801			20-36	110-170	ND (0.289)
SW 802		ND (0.1)	ND (0.1)	ND (0.25)	ND (0.007)
SD 802			11-130	47-77	ND (0.264)
SW 803		0.33	ND (0.1)	ND (0.25)	ND (0.007)
SD 803			310	100	ND (0.389)
SW 804		0.41	ND (0.1)	ND (0.25)	ND (0.007)
SD 804			2,200	56	ND (1.75)
SW 805		ND (0.1)	ND (0.1)	ND (0.25)	ND (0.007)
SD 805			53	85	ND (2.62)
SW 806		ND (0.1)	ND (0.1)	ND (0.25)	ND (0.007)
SD 806			120	120	ND (5.81)

Location 1996	TRPH (mg/kg or mg/l)	DRO (mg/kg or mg/l)	Aroclor 1254 (mg/kg)	Aroclor 1260 (mg/kg)	PCB (mg/kg or mg/l)
SS 101				0.02	0.02
SS 102				0.77	0.77
SS 103				1	1
SS 107	47,000		0.02		0.2
SS 108	110,000	83,000			
SW 101		22-610		0.0013-0.0026	0.0013-0.0026
SD 101		51-10,000		0.83-1.4	0.83-1.4
SW 102		5.5			ND (0.007)
SD 102		8,600		0.26	0.26
SW 103		1.7			ND (0.0063)
SD 103		150			ND (0.91)
SW 104		14			ND (0.0063)
SD 104		28,000			ND (0.35)
SW 105		0.39			ND (0.0063)
SD 105		89	0.038		0.038
SW 106		2.1			ND (0.0063)
SD 106		25,000			0.33
SW 107		ND (0.25)			ND (0.007)
SD 107		130			ND (0.546)
SW 108		ND (0.25)			ND (0.0063)
SD 108		190			ND (0.77)
SD 109					0.18
SD 110				0.75	0.75
SD 111		25,000			ND (0.504)
SD 112		30			ND (0.84)
SD 113		42			ND (0.399)

Where are 1994 samples located. Contradicts Phase I figures!

(0.83)? why -> DL's high? b/c added improperly!!

MONTGOMERY WATSON
Anchorage, Alaska

FILE: e:\usace\necape\99r1_fs\droft\fig5_17.dgn
DATE: 24-AUG-1999 10:20
JOB No. 189098.05

FIGURE 5-17

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE - ST. LAWRENCE ISLAND, ALASKA

SITES 28 & 29 DRAINAGE BASIN & SUQI RIVER

disturbed. Staining is observed about 2 feet up the embankment from the current surface water elevation, possibly from ice damning during the winter. Vegetation consisting of seasonal grasses grows freely in the drainage, and does not appear significantly affected by hydrocarbons.

Site 27 headwaters area originates as a small swale south of the boundary road, which collects surface water run-off from the diesel pump island. The run-off is routed under the road via a culvert to an artificially-created swale north of the perimeter road (Figure 5-10). An approximately 40- by 20-foot area of ponded water immediately north of the culvert outlet. Staining (black) is apparent around the culvert and on the rocks in the standing water. The swale is filled with grasses which are apparently unaffected by hydrocarbon contamination. Near the terminus of this swale on the east side of the fill bank is an approximately 20- by 30-foot area where the soils are stained black, and no vegetation grows. This staining also occurs 40 feet east of the terminus of the swale, where black soil extends 2 to 5 feet up the embankment. An approximately 10- by 20-foot area of buried drums is also evident on the embankment. In general, the area is heavily vegetated with grass, with the exception of the black stained soils at the end of the swale and approximately 800 square feet of soils that appear to have been disturbed by heavy equipment.

Potential Sources of Contamination. Sites 10 through 20 and 27 are potential sources of contamination to the Drainage Basin, because the basin is down slope (surface flow), and downgradient (groundwater flow) of these sites.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that because of their state of disrepair could represent a physical hazard at the site, of containerized hazardous or toxic wastes, and potential sources of environmental contamination.

No structures (e.g., buildings) are present at the site. An inventory of debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of above- and below- ground storage tanks and inventory of the tank contents. At this site, no tanks were identified. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

The potential sources of environmental contamination at this site are Sites 10 through 20 and 27. Soil cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, the petroleum cleanup criteria for soils are the ADEC Method 2 soil cleanup standards for all constituents.

Surface and subsurface soils in the drainage basin were sampled and analyzed for TRPH, RRO, DRO, GRO, PCB, VOC, SVOC, pesticides, priority pollutant metals, and dioxin contamination. Analytical results are presented in Table 5-45 and compared with the cleanup criteria. As shown on Figure 5-17, soil analytical results exceed the Soil Cleanup Standards for DRO, PCB, chromium and methylene chloride. Chromium was maintained as a contaminant of concern at the site, because it was detected in two samples. Methylene chloride was retained as a potential

contaminant of concern at the site even though it was detected in two of the three background samples, because it was also detected in 4 site samples.

Five surface soil samples were collected within the drainage basin and analyzed for PCBs. Aroclor 1260 was detected at three locations.

Drainage Basin Surface Soil Sampling Results		
Location	**Sample Number**	**PCB Aroclor 1260 (mg/Kg)**
SS 101	96NEDBSS101	0.42
SS 102	96NEDBSS102	0.77
SS 103	96NEDBSS103	1
	96NEDBSS203 (QC)	0.9
	96NEDBSS303 (QA)	1.1

PCBs were retained as a potential contaminant of concern, because of the potential for migrating into the creek drainage.

Sediments in the drainage basin were sampled and analyzed for TRPH, RRO, DRO, GRO, PCB, VOC, SVOC, pesticides, priority pollutant metals, and dioxin contamination. Analytical results are presented in Table 5-45. RRO, DRO, BTEX, metals, PCB, two SVOC and PAH were detected in the sediment samples. No sediment criteria have been identified for the installation at this time; however, the NOAA Screening Quick Reference Tables (SQUIRT) (Buchman 1998) were used to identify contaminants that may be of concern in sediments.

Constituent	**Maximum Detected Site Concentration (mg/Kg)**	**Range of SQUIRT Values for Freshwater Sediments (mg/Kg)**
TRPH	127,000	No criteria
DRO	38,600	No criteria
Total PAH	57.73	0.264 to 12
Total PCB	6.51	0.026 to 0.277
BTEX		No criteria
Metals		
Beryllium	0.63	No criteria
Cadmium	0.87	0.58 to 3.5
Chromium	18	36.2 to 95
Copper	22.5	28 to 197
Lead	63	34 to 127
Nickel	14	19 to 43
Thorium	0.32	No criteria
Zinc	140	94 to 520

PAH = Polynuclear aromatic hydrocarbons (including 2-methyl naphthalene, acenaphthaene, acenaphthylene, anthrecene, benzo(a)anthrecene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i) perylene, benzo(k)fluoranthene, crysene, dibenzo(a,h)anthrecene, fluoranthene, fluorene, indo(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

PCB = Polychlorinated biphenyls

Based on this analysis, total PAH, total PCB, lead and zinc may be constituents of concern at the site. Although no NOAA SQUIRT criteria are provided, petroleum (DRO) may be a constituent of concern.

Samples SW/SD109 and SW/SD110 were collected to determine the presence or absence of PCBs in sediments between the Main Operations Complex and the drainage basin. Samples SW/SD101 through SW/SD106 were collected within the Drainage Basin. Sample SW/SD 101 was closest to the Main Operations Complex and SW/SD 106 was closest to the junction of the drainage basin with the Suqi River. There does not appear to be any distinct trend with the behavior of the petroleum hydrocarbon contamination in the surface water or sediment of the drainage basin. PCBs are concentrated near the Main Complex Area.

Location	Sample Number	DRO (mg/Kg)	Total PCBs (mg/Kg)
SW/SD 101	96NENASD101	10,000	1.4
SW/SD 101	96NENASD201	19,000	0.83
SW/SD 101	96NENASD301	51	1.3
SW/SD 102	96NENASD102	8,600	0.26
SW/SD 103	96NENASD103	150	-
SW/SD 104	96NENASD104	28,000	-
SW/SD 105	96NENASD105	89	0.038
SW/SD 106	96NENASD106	25,000	0.33
SW/SD 107	96NENASD107	130	-
SW/SD 108	96NENASD108	190	-
SW/SD 109	96NENASD109	-	0.18
SW/SD 110	96NENASD110	-	0.75
SW/SD 111	96NENASD111	25,000	-
SW/SD 112	96NENASD112	30	-
SW/SD 113	96NENASD113	42	-

Surface water and subsurface water in the drainage basin were sampled and analyzed for TRPH, DRO, GRO, BTEX, PCB, VOC, SVOC, pesticides and metals. Analytical results are presented in Table 5-46 and compared with the cleanup criteria. DRO, total chromium, total nickel, total zinc, and total lead in subsurface water exceeded the Ground Water Cleanup Standards selected for this site. Total chromium, total nickel and total lead were eliminated as contaminants of concern in subsurface water because the concentrations in the dissolved phase were below the

criteria suggesting that elevated levels of total metals are due to soil/sediment entrained in the water sample.

Eight surface water samples were collected from within the drainage. Results are summarized below.

Drainage Basin Surface Water Results							
Location	**Sample ID**	**DRO (mg/L)**	**Total PCBs (µg/L)**	**EC (umhos)**	**pH**	**Temp. (C°)**	**Dissolved Oxygen**
SW/SD 101	SW101	610	1.3	75	6.29	10	11
SW/SD 101	SW201	41	2.4	75	6.29	10	11
SW/SD 101	SW301	22	2.6	75	6.29	10	11
SW/SD 102	SW102	5.5	-	90	6.66	8	9.8
SW/SD 103	SW103	1.7	-	100	7.13	9.8	7.9
SW/SD 104	SW104	14	-	110	7.15	4	5.7
SW/SD 105	SW105	0.39	-	75	6.98	10	8.1
SW/SD 106	SW106	2.1	-	80	7.03	9	8
SW/SD 107	SW107	2.3	-	50	7.29	9	7.9
SW/SD 108	SW108	1.4	-	50	7.17	9	7.3

DRO, zinc, lead and PCB in surface water exceeds the Water Cleanup Standards for this site. All of these constituents were retained as potential contaminants of concern. The only field measurements which showed a significant difference between the drainage basin and the Suqi River is electrical conductivity (EC) which is lower in the Suqi River.

Contaminants of Potential Concern. DRO, PCB (Aroclor 1260), chromium and methylene chloride in soil. DRO, total PAH, total PCB (Aroclor 1254 and 1260), lead and zinc in sediments. DRO in subsurface water. DRO, zinc, lead and PCB (Aroclor 1260) in surface water.

Recommended Remedial Action. Biological sampling of the drainage basin is planned for July 1999 to investigate the impact of potential contaminants. Remedial action plans will be based on the results. Remediation may include source removal at selected locations at Sites 10 through 20 and 27.

Potential Obstacles to Remediation. The drainage basin is tundra and wetlands. Based on past experience in other arctic locations, intrusive remediation strategies, such as excavation would damage the ecosystem.

5.29 SITE 29: SUQI RIVER

Physical Description. Site 29 (Suqi River) refers to the previously unnamed creek cited in the Phase I RI.

Several small creeks and lakes throughout the Northeast Cape area (Figure 1-3) feed the Suqi River. From the confluence of the Drainage Basin, the river flows to the west for approximately 2,200 feet, then meanders to the north for approximately 2,500 feet, the turns to the northeast. As it flows to the northeast, it crosses under the airport road 400 feet southeast of the terminal building, and flows into a large estuary about 1,300 feet northeast of the road crossing. The total distance from the confluence of the site drainage to the estuary is approximately 1.5 miles (Figure 5-18)

Potential Sources of Contamination. Migration of contaminants from Sites 10 through 20, and 27 via the Drainage Basin (Site 28) is considered the source of contamination for the Suqi River. Site 8, the POL Spill Site, may present a potential source during periods of heavy rainfall, but is not in direct connection with the Suqi River. Consistent with Mr. Toolie's recollection, there is no evidence that diesel-contamination from Site 8 has flowed to the Suqi River.

Investigation Activities. Montgomery Watson field personnel inspected the site and prepared an inventory of buildings and debris that because of their state of disrepair could represent a physical hazard at the site, of containerized hazardous or toxic wastes, and potential sources of environmental contamination.

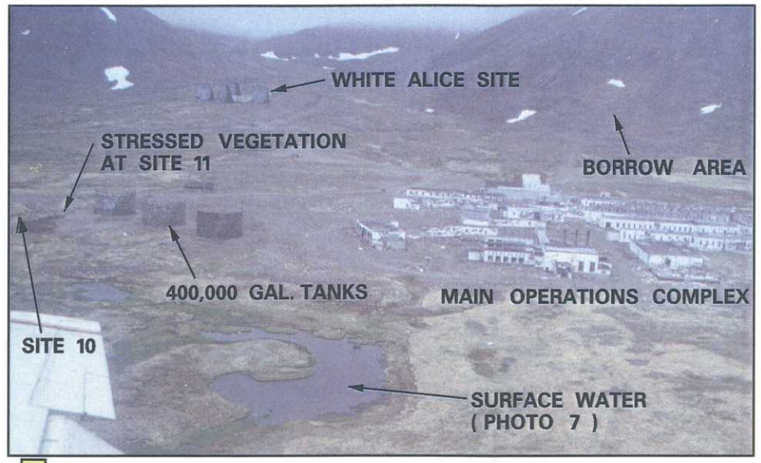
No structures (e.g., buildings) are present at the site. An inventory of debris slated for demolition is provided in Section 4.3.

Montgomery Watson personnel prepared an inventory of above- and below- ground storage tanks and inventory of the tank contents. At this site, no tanks were identified. An inventory of CON/HTRW at the site and plans for removing it are provided in Section 4.2.2.

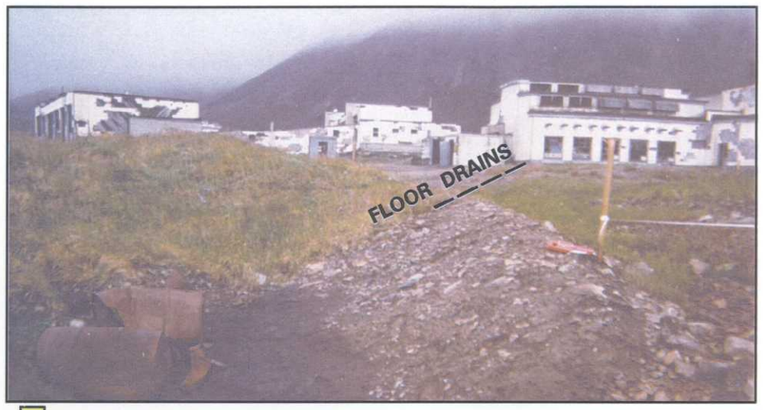
The potential sources of environmental contamination at this site are contaminants at Sites 10 through 20 and 27, which could migrate to the Suqi River via the Site 28 drainage basin Surface water and sediments were investigated. Cleanup criteria for this site were developed according to the installation-wide methodology presented in Section 1.4.2. Using this methodology, surface water results were compared to the freshwater criteria (18 AAC 70). Sediment criteria are not identified at this time, however, the NOAA Screening Quick Reference Tables (SQUIRT) (Buchman, 1998) were used to identify contaminants that may be of concern in sediments.

Six surface water and sediment samples were collected from Suqi River and analyzed for DRO (Aliphatic, Aromatic), RRO (Aliphatic and Aromatic), PAHs, BTEX, and PCB's. Analytical results are presented in Table 5-48 (in surface water) and compared with cleanup criteria. All constituents were below the Surface Water Standards.

Sediment results were compared to the SQUIRT values. As shown below, total PAH in sediments exceeded the NOAA SQUIRT values. RRO and DRO were added as potential contaminants of concern, because of the elevated levels, evidence of distressed vegetation associated with the diesel-stained areas and the absence of SQUIRT criteria. Analytical results are presented in Table 5-47 (in sediments) and compared with cleanup criteria. As discussed in



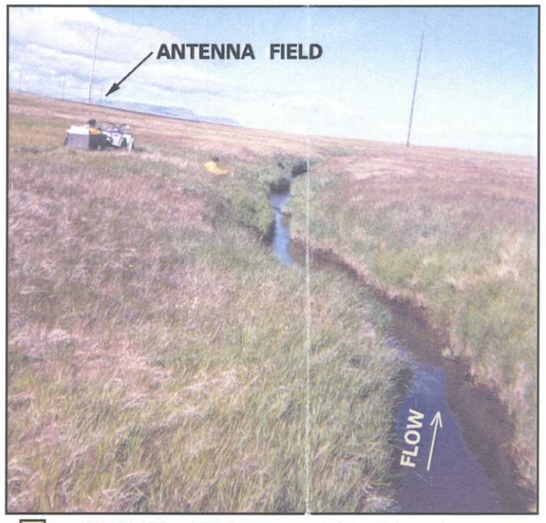
1 AERIAL VIEW – HEADWATERS OF DRAINAGE BASIN



2 DRUMS AND STAINING AT SITE 13 HEADWATERS

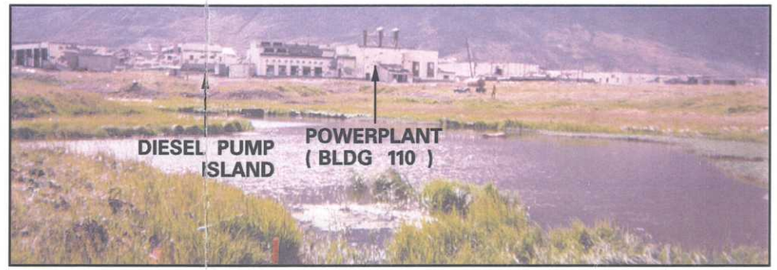
3 400,000 GAL. TANKS ON FILL PAD FROM SITE 27 HEADWATERS AREA

4 INSPECTION OF LOWER REACHES OF THE UNNAMED STREAM



5 UNNAMED STREAM AT LOCATION OF STREAM FLOW MEASUREMENT 3

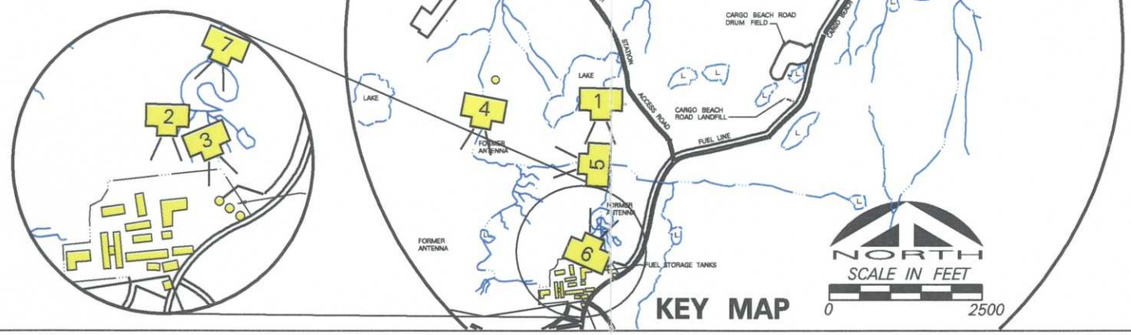
6 SITE 27 HEADWATERS AREA (CULVERT OUTLET FROM DIESEL PUMP ISLAND)



7 SURFACE WATER IN HEADWATERS OF DRAINAGE BASIN WHICH RECEIVES FLOW FROM SITES 10, 11, 13 & 27

KEY MAP

3 CAMERA LOCATION SHOWING DIRECTION OF PHOTOGRAGH



JOB No. 189098.0... TIME: 24-AUG-1999 10:20 FILE: e:\usace\necape\99rl_fs\drafts\fig5_18.dgn

MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5–18

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

DRAINAGE BASIN PHOTOGRAPHS

Section 1.4, soil cleanup criteria, such as aromatic and aliphatic fractions of RRO and DRO are not considered appropriate screening criteria for sediments.

Constituent	Maximum Detected Site Concentration (mg/Kg)	Range of SQUIRT Values for Freshwater Sediments (mg/Kg)
TRPH	Not analyzed	No criteria
DRO	20 to 25,000	No criteria
Total PAH	0.018 to 0.93	0.264 to 12
Total PCB	Not detected	0.026 to 0.277
BTEX	Not analyzed	No criteria
Metals		
Beryllium	Not analyzed	No criteria
Cadmium	Not analyzed	0.58 to 3.5
Chromium	Not analyzed	36.2 to 95
Copper	Not analyzed	28 to 197
Lead	Not analyzed	34 to 127
Nickel	Not analyzed	19 to 43
Thorium	Not analyzed	No criteria
Zinc	Not analyzed	94 to 520

PAH = Polynuclear aromatic hydrocarbons (including 2-methyl naphthalene, acenaphthaene, acenaphthylene, anthrecene, benzo(a)anthrecene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i) perylene, benzo(k)fluoranthene, crysene, dibenzo(a,h)anthrecene, fluoranthene, fluorene, indo(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

PCB = Polychlorinated biphenyls

Sediment sample SW/SD107 was collected east of and prior to the junction of the drainage basin with the Suqi River. It is suspected that petroleum hydrocarbon contamination entered the Suqi River through groundwater infiltration as this is upstream to the creek's confluence with the open channel. No petroleum hydrocarbons were detected in surface water.

Sample SW/SD 108 was collected from the Suqi River downstream of the confluence with the drainage basin. The downstream sample locations, SW/SD 111, SW/SD 112 and SW/SD 113 show elevated DRO concentrations. The extremely high DRO concentration of 25,000 mg/Kg found at sample location SW/SD 111 may be due to the high sediment adsorption characteristics in this portion of the Suqi River. Sample SW/SD 111 was collected in a low flow area with a sandy, organic bottom, while SW/SD 112 and SW/SD 113 had a higher flow with a sand and gravel bottom. No PCBs were detected in any of the surface water or sediment samples collected from the Suqi River.

No sheen, stained soils or distressed vegetation was observed at any sampling locations, except when the organic sediments were disturbed. For example, a sheen was observed in SW/SD 108 and SW/SD 111 upon disruption of the organic sediments. A sheen was observed in SW/SD112

and SW/SD113 when the organic materials in the bank were disturbed but not when the sandy bottom of the river was disturbed. This suggests that most of the petroleum contamination may be contained in the organic portions of the sediment.

DRO and RRO concentrations in the Suqi River sediments do not follow an obvious trend. The sediments in the vicinity of the confluence of the Drainage Basin and the Suqi River, SW/SD803 and SW/SD804, exhibited 310 to 2,200 mg/Kg DRO and 56 to 100 mg/Kg RRO. The remaining samples collected during the 1998 investigation exhibited only slightly lower concentrations; namely, 20 to 130 mg/Kg DRO and 77 to 120 mg/Kg RRO. However, the sediment sample from SW/SD 111 collected in 1996 between SW/SD804 and SW/SD805 exhibited 25,000 mg/Kg DRO. It appears that there may be an interference resulting in low levels of RRO and DRO. As discussed in Section 5.30.3, background sediment samples exhibited DRO concentrations up to 37 mg/Kg and RRO concentration up to 130 mg/Kg.

PAHs were detected in three sediment samples collected during the 1998 investigation SW/SD803, SW/SD804, and SW/SD806.

Contaminants of Concern. RRO, DRO and PAH in sediments.

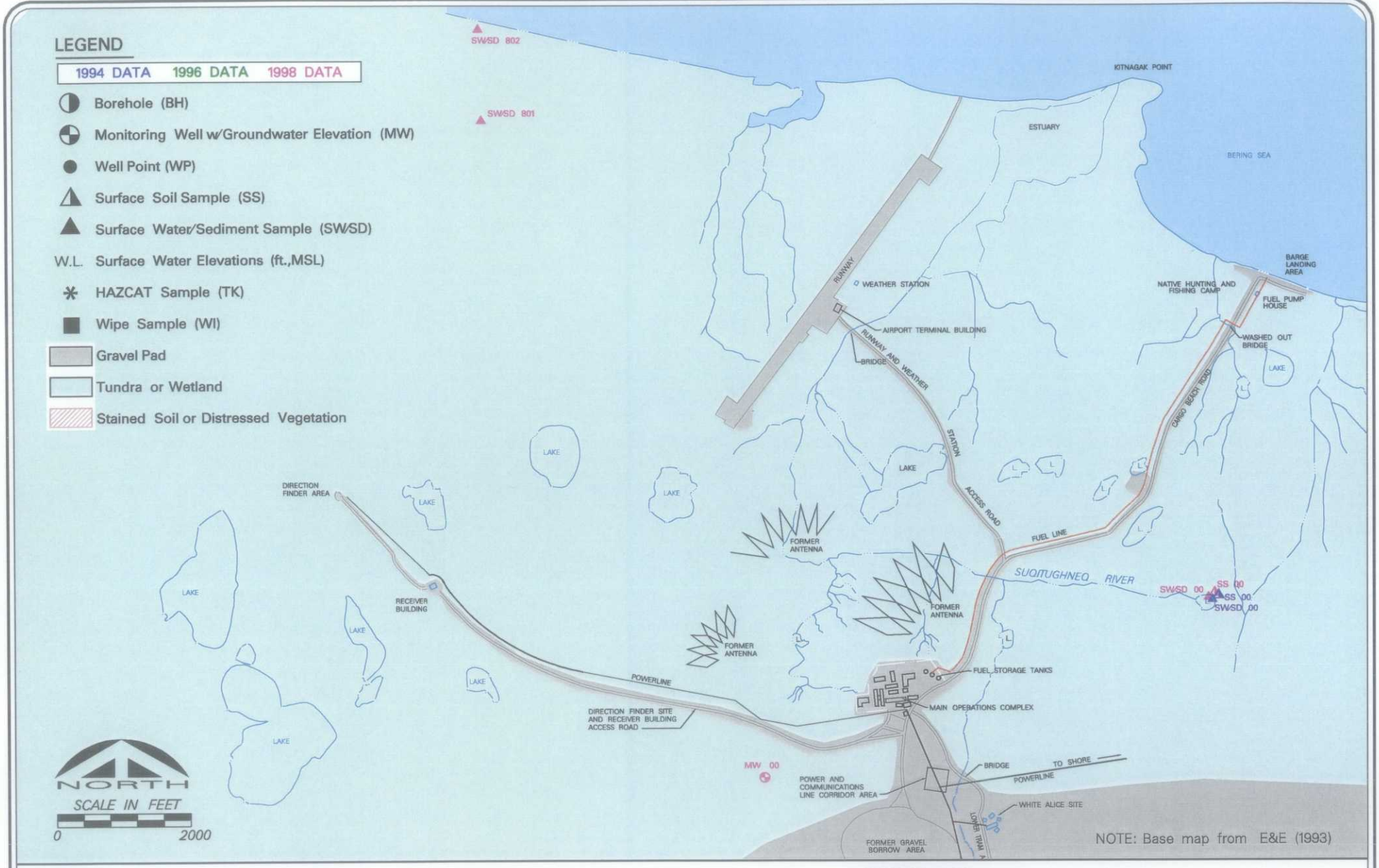
Recommended Remedial Action. Recommendations for remedial action will be developed after the biological sampling planned for July 1999.

Potential Obstacles to Remediation. The drainage basin is tundra and wetlands. Based on past experience in other arctic locations, intrusive remediation strategies, such as excavation would damage the ecosystem.

5.30 SITE 30: BACKGROUND

5.30.1 Background Levels of Site Contaminants in Soil

Two surface soil samples and one near surface soil sample were collected from locations removed from the site and potential site contaminants. The sample locations are shown on Figure 5-19. Complete analytical results are provided in Table 5-49. As shown in Table 5-51, contaminants detected in background soils were TRPH, RRO, DRO, arsenic, chromium, copper, lead, zinc, and two dioxin congeners (1,2,3,4,6,7,8,9-OCDD and 1,2,3,4,6,7,8-HpCCD).



MONTGOMERY WATSON

Anchorage, Alaska

FIGURE 5-19

U.S. ARMY ENGINEER DISTRICT, ALASKA
N.E. CAPE – ST. LAWRENCE ISLAND, ALASKA

SITE 30 BACKGROUND

TABLE 5-51
CONCENTRATIONS OF CONSTITUENTS IN BACKGROUND SOIL SAMPLES

Location	MW00 (0-2 ft)	SS00	SS801
Sample Number	94NEBW158SB	94NE00700SS	98NEC00SS801
TRPH	478 mg/Kg	3,040 mg/Kg	NA
RRO (total)	NA	NA	1,400 mg/Kg
Aromatic	NA	NA	510 mg/Kg
Aliphatic	NA	NA	800 mg/Kg
DRO (total)	120 mg/Kg	190 mg/Kg	13,000 mg/Kg
Aromatic	NA	NA	310 mg/Kg
Aliphatic	NA	NA	1,700 mg/Kg
GRO (total)	ND (1) mg/Kg	ND (3.4) mg/Kg	NA
Aromatic	NA	NA	NA
Aliphatic	NA	NA	NA
Antimony	ND (10) mg/Kg	ND (400) mg/Kg	NA
Arsenic	2.5 mg/Kg	2 mg/Kg	NA
Beryllium	ND (2) mg/Kg	ND (8.1) mg/Kg	NA
Cadmium	ND (2) mg/Kg	ND (8.1) mg/Kg	NA
Chromium	9.2 mg/Kg	9.7 mg/Kg	NA
Copper	18 mg/Kg	10 mg/Kg	NA
Lead	92 mg/Kg	11 mg/Kg	NA
Mercury	ND (0.1) mg/Kg	ND (0.4) mg/Kg	NA
Nickel	ND (5) mg/Kg	ND (20) mg/Kg	NA
Selenium	NA	ND (2) mg/Kg	NA
Silver	ND (2) mg/Kg	ND (8.1) mg/Kg	NA
Thallium	ND (20) mg/Kg	ND (81) mg/Kg	NA
Zinc	84 mg/Kg	24 mg/Kg	NA
1,2,3,4,6,7,8,9 – OCDD	0.038 µg/Kg	0.111 µg/Kg	NA
1,2,3,4,6,7,8-HpCCD	0.00290 µg/Kg	0.0046 µg/Kg	NA
2-Butanone	0.019 mg/Kg	NA	ND (0.034) mg/Kg
Acetone	0.0710 mg/Kg	NA	ND (0.034) mg/Kg
Methylene Chloride	0.016 mg/Kg	NA	0.022 mg/Kg

Key:
NA = Not analyzed

TRPH, RRO, DRO, metals, three volatile organic compounds were detected in background source samples and two dioxin congeners were detected in the background soil samples.

5.30.1.1 Background Levels of Petroleum Constituent in Soil

The background levels of petroleum hydrocarbons are of particular interest. First, levels of TRPH and DRO are unexpectedly high in these samples and exceed regulatory criteria proposed for the site. Second, the aromatic and aliphatic fractions of DRO do not sum to the total DRO found using laboratory method AK 102. Third, DRO levels in background soil samples do not appear to be reproducible. Some of the non-reproducibility may be due to the difference in laboratory methods. Sample 94NE00700SS was analyzed in 1994 by EPA method 8015M, while Sample 98NEC00SS801 was analyzed in 1998 by AK 102. This suggests that site-specific phenomena are influencing detection and analysis of petroleum hydrocarbons.

A peculiar phenomenon was observed at the Northeast Cape installation. In many areas, TRPH levels in soil unexplainably exceeded DRO levels, sometimes by an order of magnitude. This phenomenon was also observed in background soil sample 94NE00700SS, where background levels of 190 mg/Kg DRO and 3,040 mg/Kg TRPH were confirmed by laboratory analysis.

In addition to these two background soil samples, site-specific background soil samples were collected at three sites:

- Site 6 – Cargo Beach Road Drum Field
- Site 9 – Housing and Operations Landfill
- Site 28 – Drainage Basin

At Site 6, a background soil samples adjacent to the site was collected to evaluate whether the elevated levels of TRPH were attributable to RRO. No GRO samples were collected. The data show 370 mg/Kg RRO and 56 mg/Kg DRO. No detectable levels of the four BTEX constituents were found. The sample was not analyzed for PAH. GRO was shown by laboratory analysis not to be a contaminant of concern at the site.

At Site 9, RRO exceeded DRO by a factor of 5.9. The soil sample was analyzed for BTEX and PAH and none were detected. However, levels of both RRO and DRO were low (i.e., below their respective cleanup criteria).

At Site 28, two background soil samples were collected. In the first sample, the level of DRO was 860 mg/Kg and RRO of 310 mg/Kg. The second sample showed 95 mg/Kg DRO and 270 mg/Kg RRO. In both cases, the levels of BTEX were below the method reporting limits. Benzo(g,h,i)perylene and 2-methyl naphthalene were detected in the first sample. Anthracene and fluoranthene were detected in the second sample.

Based on the results of the background soil samples, accurate delineation of petroleum hydrocarbons during investigation and remediation will require development of set procedures to guard against false-positive results.

TRPH (EPA method 418.1) was used extensively in 1994 to evaluate the presence or absence of petroleum hydrocarbons in soil. Because of the limitations of EPA method 418.1, ADEC and the environmental industry have limited use of this method. In ensuing studies at Northeast Cape, TRPH (EPA method 418.1) was replaced with RRO by AK 103, DRO by AK 102 and GRO by AK 101.

To understand and use the 1994 TRPH data to delineate contamination and plan remediation, existing data at each site was reviewed. Sites were divided into three categories: sites with TRPH data averaging 6 to 10 times higher than RRO, DRO, and/or GRO data generated by laboratory analysis (dramatic differences); sites with TRPH data averaging 3 to 5 times higher than RRO, DRO and/or GRO data (moderate differences); and sites with TRPH data averaging 2 to 3 times higher than RRO, DRO, and/or GRO data (minor differences). Table 5-52 summarizes the findings of the evaluation and recommended use of the data.

TABLE 5-52
PROPOSED USE AND LIMITATIONS OF TRPH DATA

Site	Findings	Recommended use of TRPH Data
Dramatic Difference (Factor of 6-10)		
Site 4	Phenomenon observed in isolated samples (two out of three). DRO detected in soils. Laboratory analysis shows GRO is not a contaminant of concern. No RRO data in soil.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6. Use existing DRO and GRO data to evaluate site.
Site 5	Phenomenon observed the only sample. DRO detected in site soils. Laboratory analysis shows GRO is not a contaminant of concern.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6. Use existing DRO and GRO data to evaluate site.
Site 9	Phenomenon observed in four of seven samples. These show TRPH exceeding DRO by a factor of over 8. Site background sample shows RRO exceeding DRO by a factor of 5.9. RRO present in the site sample at a factor of over of 10 above the site background level. DRO was detected in site soils.	Assume part of the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at the site. Use existing DRO and GRO data to evaluate site.
Site 21	Phenomenon observed in all soil samples. The data show TRPH exceeds DRO by a factor of 10 or more. DRO detected in site soils. Laboratory analysis shows GRO is not a contaminant of concern.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Moderate Difference (Factor of 3-5)		
Site 3	Phenomenon observed in two out of three samples. GRO was shown not to be a contaminant of concern at the site. No	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background

Site	Findings	Recommended use of TRPH Data
	PAH data in soil.	sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Site 6	Phenomenon observed in 7 of 10 site soil samples that TRPH exceeds DRO by factor of about 2 to 6. Some don't exhibit the phenomenon, others range to over a factor of 10. Correlation between TRPH and DRO is inconsistent throughout the site, so not possible to draw conclusion.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Site 24	Phenomenon observed in TRPH exceeds DRO in some cases by over a factor of 10. Correlation between TRPH and DRO is inconsistent throughout the site, so not possible to draw conclusion.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Minor Difference (Factor of over 2-3)		
Site 7	Phenomenon observed in 6 soil samples. Eighteen showed some levels of TRPH over DRO. Others showed DRO, but no TRPH. Therefore, not typical of the phenomenon.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Sites 10 and 11	Phenomenon observed typically at a factor of 0 to 3. 1994 affected more than 1996 data. Some data points where TRPH is less than DRO.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Site 22	Phenomenon observed in both samples, which show that TRPH exceeds DRO by a factor of about 2. No GRO detected in either sample.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Sites 13, 15,19,27	Phenomenon observed in most samples. Typically, TRPH exceeds DRO by a factor of 2 to 3. Some cases where it exceeds by a factor of about 10. Others where DRO is higher than TRPH values.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.
Site 28 and 29	Phenomenon observed in isolated cases where TRPH is unexpectedly higher than DRO by a factor of 2 to 3 in soil.	Assume the difference between DRO and TRPH is attributable to unidentified site-specific interference, based on background sample collected at Site 6 and 9. Use existing DRO and GRO data to evaluate site.

Additional sampling and evaluation of background levels of petroleum will be performed during the 1999 investigation.

5.30.1.2 Background Levels of Metals in Soil

Arsenic, chromium, copper, lead and zinc were detected in the background soil sample. Except for arsenic, the metal concentrations are well below the proposed cleanup criteria. The concentration of arsenic in background sample of soil is 2.0 mg/Kg that is equivalent to the proposed cleanup criteria.

5.30.1.3 Background Levels of Dioxins and Furans in Soil

The background level of dioxins and furans were well below the proposed cleanup criteria.

5.30.2 Background Levels of Site Contaminants in Subsurface Water

Monitoring Well MW 00 was installed as a background sampling location in an area removed from the installation operations. The location of MW 00 is shown in Figure 5-19. A primary sample, and QC and QA samples from the well were analyzed for TRPH, DRO, GRO, VOC, SVOC, and dioxins. Analytical results are presented in Table 5-50. TRPH and GRO were not detected above the method reporting limit. DRO was not detected above the method reporting limit in two of the three samples. In the third sample, DRO was reported at 0.14 mg/L. Therefore, the contribution of background to TRPH, DRO and GRO in subsurface water is judged to be inconsequential.

Lead was above the selected regulatory criteria in unfiltered samples, but below in filtered samples suggesting that lead in soil entrained in the unfiltered water could exceed regulatory criteria. Several dioxin and furan congeners were reported above the method reporting limit.

5.30.3 Background Levels of Site Contaminants in Surface Water and Sediment

Three background surface water samples were collected. The surface water collected at location SW/SD00 was analyzed for TRPH, DRO, GRO, metals, PCB, VOC and SVOC. Samples collected at SW/SD 801 and SW/SD 802 were analyzed for RRO, DRO, PAH, BTEX and total organic carbon (TOC). Acetone was the only constituent detected. It was detected at 0.0039 mg/L at SW/SD 00. The locations of the three background samples are shown on Figure 5-19.

Three background sediment samples were collected at the location shown in Figure 5-19. The sample at location SW/SD 00 was analyzed for TRPH, DRO, GRO, metals, PCB, VOC, SVOC, dioxins and furans. The samples at SW/SD 801 and SW/SD 802 were analyzed for RRO (aromatic and aliphatic fractions), DRO (aromatic and aliphatic fractions), PAH, BTEX and TOC.

In sample SW/SD00, DRO was detected at 24 mg/Kg, arsenic at 1 mg/Kg, chromium at 2.6 mg/Kg, copper at 2.8 mg/Kg, lead at 4.6 mg/Kg, and zinc at 13 mg/Kg. Also detected was 2-butanone at 0.014 mg/Kg, acetone at 0.055 mg/Kg, methylene chloride at 0.0095 mg/Kg and dioxins at 0.0000039 mg/Kg TEQ 2,3,7,8 - TCDD.

In samples SW/SD 801 and SW/SD 802, the following constituents were detected:

	SW/SD 801	SW/SD 802
RRO	130	100
Aliphatic	33	ND (54)
Aromatic	78	83
DRO	37	31
Aliphatic	20	ND (27)
Aromatic	ND (15)	ND (27)
TOC	1.4%	3.5%

Units: mg/Kg, day weight unless otherwise noted.

This data shows that the aromatic and aliphatic fractions do not add up to the total DRO or RRO.

5.30.4 Uncontaminated Reference Creek

The uncontaminated Reference Creek will be selected by the project biologists during the upcoming field work in July 1999.

Selection criteria for the stream includes:

- located in an area that was not impacted by military operations at NEC, and
- comparable water flow and size.

Data from the reference creek will be used to determine background conditions at the Northeast Cape Installation.

6. REMEDIAL ACTION

6.1 TRENDS IN CONTAMINANT LEVELS IN SUBSURFACE WATER

Sixteen of the monitoring wells installed at the installation in 1994 were resampled in 1998. The static water levels are presented in Table 6-1 and show that the 1998 static water levels were typically lower than the 1994 water levels.

TABLE 6-1
WATER LEVELS IN MONITORING WELLS

Monitoring Well	1994 Water Level (ft, btoc)	1998 Water Level (ft, btoc)
MW 7-4	9.25	3.66
MW 9-1	7.2	3.81
MW 9-2	9.49	4.93
MW 9-3	9.55	4.86
MW 10-1	4.75	2
MW 10-4	2.5	2.24
MW 11-2	13.8	6.74
MW 11-3	5.9	8.69
MW 13-1	11.8	3.25
MW 13-2	10.8	8.05
MW 15-1	11.1	6.9
MW 16-1	12.2	10.92
MW 16-3	12.5	11.17
MW 19-1	11.42	6.5
MW 19-2	18.7	25.96
MW 27-1	6.6	2.53

Key:

Ft, btoc - feet below top of casing

Table 6-2 shows the results of the 1994 and 1998 sampling events for petroleum constituents.

TABLE 6-2
TRENDS IN CONTAMINANT LEVELS IN SUBSURFACE WATER

Site	Monitoring Well	Analyte (mg/Kg)	1994 Results (mg/Kg)	1998 Results (mg/Kg)
7	MW 7-4	TRPH	ND	NA
		RRO	NA	NA
		DRO	0.62	1.1
		GRO	ND	NA
		Benzene	0.0021	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)
9	MW 9-1	TRPH	ND	NA
		RRO	NA	NA
		DRO	0.71	11
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	0.0019	ND (0.0030)
	MW 9-2	TRPH	2.2	NA
		RRO	NA	NA
		DRO	0.51	2.2
		GRO	ND	NA
		Benzene	0.0012	ND (0.0010)
		Toluene	0.0014	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)
	MW 9-3	TRPH	ND	NA
		RRO	NA	NA
		DRO	0.95	7.7
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	0.0012	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)

TABLE 6-2 (Continued)
TRENDS IN CONTAMINANT LEVELS IN SUBSURFACE WATER

Site	Monitoring Well	Analyte (mg/Kg)	1994 Results (mg/Kg)	1998 Results (mg/Kg)
11	MW 11-2	TRPH	ND	NA
		RRO	NA	ND (0.2500)
		DRO	1.4	0.34
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)
	MW 11-3	TRPH	6.6	NA
		RRO	NA	ND (5.0000)
		DRO	6.1	45
		GRO	1.1	NA
		Benzene	0.0100	ND (0.0010)
		Toluene	0.0065	ND (0.0010)
		Ethylbenzene	0.0700	ND (0.0010)
		Xylene	0.0600	0.0150
13	MW 13-1	TRPH	190	NA
		RRO	NA	ND (12.0000)
		DRO	23	100
		GRO	4	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	0.1000	0.0470
		Xylene	0.2100	0.0560
	MW 13-2	TRPH	24	NA
		RRO	NA	0.52
		DRO	22	32
		GRO	3.6	NA
		Benzene	0.1200	ND (0.0010)
		Toluene	0.1700	ND (0.0010)
		Ethylbenzene	0.1500	0.0660
		Xylene	0.5900	0.0880
15	MW 15-1	TRPH	31	NA
		RRO	NA	3.8
		DRO	9.3	960
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	0.0260

TABLE 6-2 (Continued)
TRENDS IN CONTAMINANT LEVELS IN SUBSURFACE WATER

Site	Monitoring Well	Analyte (mg/Kg)	1994 Results (mg/Kg)	1998 Results (mg/Kg)
16	MW 16-1	TRPH	NA	NA
		RRO	NA	NA
		DRO	NA	NA
		GRO	NA	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	0.0041	ND (0.0010)
		Xylene	0.0100	ND (0.0010)
	MW 16-3	TRPH	NA	NA
		RRO	NA	NA
		DRO	NA	NA
		GRO	NA	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	0.0048
		Xylene	ND	0.0036
19	MW 19-1	TRPH	9.7	NA
		RRO	NA	ND (2.5000)
		DRO	13	18
		GRO	6.1	NA
		Benzene	0.0250	ND (0.0010)
		Toluene	0.0260	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	0.0640	0.0350
	MW 19-2	TRPH	ND	NA
		RRO	NA	ND (1.2000)
		DRO	34	7.3
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	0.0008	ND (0.0030)
27	MW 27-1	TRPH	2.6	NA
		RRO	NA	ND (0.2500)
		DRO	3.8	1.4
		GRO	1.9	ND (0.10)
		Benzene	0.0056	ND (0.0010)
		Toluene	0.1760	ND (0.0010)
		Ethylbenzene	0.0170	ND (0.0010)
		Xylene	0.1110	ND (0.0030)

TABLE 6-2 (Continued)
TRENDS IN CONTAMINANT LEVELS IN SUBSURFACE WATER

Site	Monitoring Well	Analyte (mg/Kg)	1994 Results (mg/Kg)	1998 Results (mg/Kg)
28	MW 10-1	TRPH	ND	NA
		RRO	NA	ND (0.2000)
		DRO	0.49	0.11
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)
	MW 10-4	TRPH	ND	NA
		RRO	NA	ND (0.2500)
		DRO	3.2	0.63
		GRO	ND	NA
		Benzene	ND	ND (0.0010)
		Toluene	ND	ND (0.0010)
		Ethylbenzene	ND	ND (0.0010)
		Xylene	ND	ND (0.0030)

Key:
ND = Not detected at or above the method detection limit.
NA = Not analyzed.

TRPH = Total recoverable petroleum hydrocarbons
RRO = Residual range hydrocarbons
DRO = Diesel range petroleum hydrocarbons
GRO = Gasoline range residual hydrocarbons

The results show that, in general, concentrations of short chain hydrocarbons and benzene in subsurface water have decreased in the intervening four years. At Sites 13, 19 and 27, the concentration of benzene in at least one monitoring well exceeded the Ground Water Cleanup Standard in 1994. In 1998, when the monitoring wells were resampled, the benzene concentrations at all three sites were below the Standards. At Site 27, a similar trend was observed for GRO.

In nine of the fourteen monitoring wells sampled for DRO, the concentration of DRO had risen in the intervening four years. In the remaining four monitoring wells, it had decreased. With the recaption of the difference in static water levels, no factors were identified to account for the increase or decrease.

6.2 SUMMARY OF CONTAMINATED ENVIRONMENTAL MEDIA

Based on the information presented in Section 5, contaminated environmental media at the Northeast Cape installation are summarized in Table 6-3.

TABLE 6-3
SUMMARY OF CONTAMINATED ENVIRONMENTAL MEDIA AND DEBRIS ABOVE BACKGROUND AND REGULATORY LEVELS

Site	Site Description	CON/ HTRW	BD/ DR	Buried Waste	Gravel Pad/Soil	Subsurface Water	Tundra Soil and/or Surface Water	No Action
1	Burn Site Southeast of the Landing Strip							✔
2	Airport Terminal and Landing Strip	✔	✔					
3	Fuel Line Corridor and Pumphouse	✔	✔		DRO	DRO		
4	Subsistence Hunting and Fishing Camp	✔	✔			DRO	DRO	
5	Cargo Beach	✔	✔		As			
6	Cargo Beach Road Drumfield	✔	✔		RRO, DRO	DRO	DRO	
7	Cargo Beach Road Landfill	✔	✔	Landfill			DRO, As, Be, Cd, Cr, Ni, Hg, Zn	
8	POL Spill Site	✔					DRO	
9	Housing and Operations Landfill	✔	✔	Landfill		DRO	DRO, As, Be, Cr, Sb	
10	Buried Drum Field		✔	Buried Drums	DRO	DRO		
11	Fuel Storage Tank Area	✔	✔		DRO	DRO, benzene methylene chloride		
12	Gasoline Tank Area	✔			DRO, GRO			
13	Heat and Electrical Power Building	✔	✔		DRO, PCB	DRO, GRO		
14	Emergency Power/Operations Building	✔	✔		PCB			
15	Buried Fuel Line Spill Area	✔			DRO *(RRO)*[a]	RRO, DRO		
16	Paint and Dope Storage Building	✔	✔		As, Cd, Cr, Sb, Pb, Zn, PCB	Bis-(2 ethylhexyl) phthalate		
17	General Supply Warehouse and Mess Hall Warehouse	✔	✔		PCB			
18	Housing Facilities and Squad Headquarters	✔	✔					

TABLE 6-3 (Continued)
SUMMARY OF CONTAMINATED ENVIRONMENTAL MEDIA AND DEBRIS ABOVE BACKGROUND AND REGULATORY LEVELS

Site	Site Description	CON/ HTRW	BD/ DR	Buried Waste	Gravel Pad/Soil	Subsurface Water	Tundra Soil and/or Surface Water	No Action
19	Auto Maintenance and Storage Facilities	✔	✔		DRO, GRO, As, Cr	DRO, GRO		
20	Air Force Aircraft Control Warning Building	✔	✔					
21	Wastewater Treatment Facility	✔	✔				DRO, As, Cd, Cr, Hg, Sb, PCB	
22	Water Wells and Water Supply Building	✔	✔		DRO, Sb, Pb			
23	Power and Communication Lines Corridors	✔	✔				PCB	
24	Receiver Building Area		✔	Buried Drums	DRO, Cr, Pb, cis-1,3-Dichlora ethane	DRO	DRO	
25	Direction Finder Area	✔	✔				DRO, Zn	
26	Former Construction Camp Area		✔					
27	Diesel Fuel Pump Island	✔	✔	Buried Drums	DRO, GRO, benzene, As	DRO		
28	Drainage Basin Area		✔			DRO	DRO, PCB, PAH, Cr, Pb, Zn, methylene chloride	
29	Suqi River		✔				DRO, PAH	

Footnotes:

a Analyte is included, based on potential for overlapping contaminant plumes from adjacent sites or environmental media.

No further action was identified as the recommended action for two sites. CON/HTRW and/or BD/DR alone was identified as the recommended remedial action for 10 sites. Of the remaining 18 sites, isolated areas of petroleum hydrocarbon contamination in the gravel pad were identified at eleven sites, ten sites were identified where petroleum constituents in subsurface water exceeded the Ground Water Cleanup Standard, and nine sites were identified where the concentration of petroleum constituents in tundra soils and/or surface water exceeds the Cleanup Standards.

Vegetation adjacent to the landfills appears healthy, suggesting that any residual petroleum constituents are not adversely impacting the tundra. There are no reports of subsurface water in this area being used as a potable water source.

Sites 10 and 24 contain buried drums that reportedly contained petroleum products. The Site 10 drums were reportedly buried in the gravel pad. Monitoring wells MW 10-1 and MW 10-4 are located between the buried drums and the drainage basin. Water samples collected from these wells show detectable levels of petroleum hydrocarbons, but the levels do not exceed the Ground Water Cleanup Standards. This suggests that the buried drums at Site 10 are not a significant on-going source of petroleum contamination into the Drainage Basin.

At Site 24, the drums appear to be buried in the gravel pad. Soil and water samples collected adjacent to the buried drums show DRO slightly exceeding the Cleanup Criteria. Vegetation at the site appears to be healthy, suggesting that any residual concentrations of DRO in the tundra soil and water not cause an adverse impact. There are no reports that subsurface water at the site has been used as a potable water source.

Recommended Remedial Action: Procedures for closing out the landfills and sites with buried drums include:

- Removal of all of the surface and exposed debris.
- Characterization of the groundwater to determine if leachate is impacting subsurface water.
- Establishment of the landfill boundaries and location and provision of this information to the landowner.
- Capping to minimize the infiltration of water and revegetation to prevent erosion.
- Landfills must meet the substantive requirements of 18 AAC 60 in place at the time the landfill was used.
- Possible institutional controls or monitoring.

6.4 PETROLEUM-IMPACTED TUNDRA AND SUBSURFACE WATER

Section 6.3 identifies the potential sources of on-going release of contaminants to the tundra and plans for removing the potential on-going sources. Once these sources are removed, petroleum constituents should attenuate with time. Between 1994 and 1998, the concentration of benzene and GRO in subsurface soils decreased, suggesting that natural attenuation is rapid at the site. During the same period, DRO increased in some locations and decreased at others. This suggests that petroleum contamination may be mobile periodically, probably seasonally, in the gravel pad. Migration is probably toward the edges of the pad. With removal of the most highly contaminated gravel/soil, RRO and DRO should begin to attenuate with time, similar to the attenuation of GRO and benzene in the past few years.

In some areas, petroleum hydrocarbon concentrations are high, such as areas where diesel was released directly onto the tundra. Some of these areas have remained impacted years after the release. Experience at other Arctic sites has shown that excavation of tundra often causes more environmental damage than the original contamination.

Recommended Remedial Action: The recommended remedial action is a two-pronged approach: first, remove on-going sources of petroleum releases to the tundra, second, amend areas of distressed vegetation and/or stained soil with nutrients to accelerate hydrocarbon biodegradation and assist revegetation with hardy species.

Proposed Cleanup Criteria: Site-specific tundra cleanup levels will be developed in conjunction with ADEC. Visually monitor the tundra for soil staining and distressed vegetation.

6.5 DRAINAGE BASIN AND SUQI RIVER

Remedial plans for the Drainage Basin and Suqi River will be developed on the biological sampling planned for July 1999.

6.6 REMEDIAL PLANNING AND COORDINATION

The site-specific planning and coordination involved in the execution of this project includes:

- Coordination with SHPO on historic significance of military remains
- Requirements for a 30-day advanced notification to EPA for self-implementing disposal criteria for PCB.
- CON/HTRW and BD/DR interaction. In some instances, CON/HTRW activities will precede BD/DR activities. In other cases, the reverse will be true. Therefore, close coordination of the two programs will be critical.
- Building foundations may interfere with soil excavation on other remedial actions. Remedial actions will be detailed in future documents.
- Remedial action for building foundations with suspected PCB contamination will be detailed in future documents.

6.7 DATA GAPS

Data gaps include:

- TRPH, RRO and DRO in soil and sediment were detected in background samples at levels often comparable to or exceeding the selected regulatory criteria. A strategic or analytical procedure to identify and eliminate the contribution of background or site-specific interference will be an important element of a Remedial Action Plan.
- Due to the limited number of samples, the extent of contamination for the purpose of excavation and/or remediation should be verified real time during excavation.
- Remediation is planned based on the information available from past investigation and sampling. Identification of the potential sources of contamination, potential constituents

and appropriate sampling and analysis methods impacts the quantity of information and accuracy of any assessment.

- The extent to which contamination in the Drainage Basin and Suqi River impacts human health and the environment is not adequately measured using the proposed cleanup criteria. Biological sampling will be performed in July 1999 to elucidate the impact of contamination in these two areas.

- Metals concentrations in the Drainage Basin sediments are a potential contaminant of concern, however, metals in the Suqi River sediments have not been quantified.

- The source of PCB, PAH, petroleum and metals in the Drainage Basin cannot be identified with the existing data. It is unclear whether any portions of Sites 10-20 and 27 are currents sources for contaminant migration into the Drainage Basin.

- PCB concentrations in some building foundations are not characterized.

- ADEC requests supporting documentation that the ephemeral ponds at the site do not support benthic or aquatic life, and that these ponds dry up occasionally.

7. RECOMMENDATIONS AND CONCLUSIONS

The 1996 Phase II RI advanced the site toward closure. Other activities performed during the field work were designed to address specific community concerns or to fill data gaps associated with CON/HTRW removal and BD/DR actions. The most significant conclusions in these areas are:

- There is no evidence of elevated radiation levels at Northeast Cape.
- The POL pipeline leak (Site 8) cited as a concern by local residents was investigated and found to be localized.
- Evidence of an asbestos hazard was not found in privately-owned housing at the site as a result use of salvaged military building materials by current residents.
- The fill pad on which the main operations complex is located contains approximately 140,000 cubic yards of what is thought to be usable fill material.
- The borrow area at the site contains at least 50,000 cubic yards of fill material that could be utilized without blasting or additional environmental damage. However, this area should be the subject of a subsurface investigation if a landfill is planned at this location.
- Warning signs are posted on all military-era buildings at Northeast Cape with known or suspected ACM.
- TRPH, RRO and DRO were detected in background samples at levels often comparable to or exceeding selected regulatory criteria. A strategic or analytical procedure to identify and eliminate the contribution of background or site-specific interference is an important element of the Remedial Action Plan.
- As discussed in this report, TRPH exceeds the sum of DRO and GRO by a factor of five to ten in many instances (RRO samples were not collected in the past). Interpretation and use of the 1994 TRPH data will impact the extent of remediation.
- Petroleum constituents, such as GRO and benzene, in the subsurface water at the site appear to be attenuating with time. DRO has in some cases increased and in other cases decreased in the four years between sampling events.

As documented in the Work Plan (Montgomery Watson, 1998), biological sampling will be performed at the site in July 1999 to document the environmental health of the Drainage Basin and Suqi River. The information will be used to evaluate the impact of existing contamination and recommend appropriate remedial action.

Based on the results of the Phase II RI, no further action was identified as the recommended remedial action at one site. CON/HTRW removal and/or BD/DR removal was identified as the recommended remedial action for 10 sites. Of the remaining 18 sites, isolated areas of petroleum hydrocarbon contamination were identified in the gravel beds at eleven sites. Nine sites were identified where petroleum constituents in subsurface water exceeded the Ground Water Cleanup Standard. Eight sites were identified where the concentration of petroleum constituents in tundra soils and/or surface water exceeded the Cleanup Standards.

Recommendations for remediation include:

- Removal and disposal/recycle of CON/HTRW
- Implementation BD/DR
- Excavation and off-site disposal of PCB-contaminated soils
- Excavation or remediation of isolated areas of high levels of petroleum contamination in the gravel pads
- Amendment and revegetation of petroleum-impacted areas of tundra

8. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 1999. Alaska Oil and Hazardous Substances Pollution Control Regulations, 18 AAC 75. January.

Alaska Department of Environmental Conservation (ADEC). 1998. Conversation between Tom DeRyder (ADEC) and Deborah Luper (Montgomery Watson), September 16, 1998; Leon Lynch (DNR) and Deborah Luper (Montgomery Watson), July 1, 1998; and Eileen Olson (ADEC) and Deborah Luper (Montgomery Watson), June 26, 1998.

Alaska Department of Environmental Conservation (ADEC). 1994. Information Regarding Dioxin Cleanup Levels, Memo from Richard McCormack to ADEC Regional Program Managers. June 8.

Buchman, M. F. 1998. NOAA Screening Quick Reference Tables, NOAA HAZMAT Report 97-2, Seattle, WA, Hazardous Materials Response and Assessment Division, National Oceanic and Atmospheric Administration, 12 pages.

Ecology and Environment, Inc. (E&E). 1993. Chemical Data Acquisition Plan Site Inventory Update Northeast Cape, St. Lawrence Island, Alaska. February.

Montgomery Watson. 1995a. Remedial Investigation Northeast Cape, St. Lawrence Island, Alaska. January 25.

Montgomery Watson. 1995b. Remedial Action Alternatives Technical Memorandum, Northeast Cape, St. Lawrence Island, Alaska. November 6.

Montgomery Watson. 1995c. Building Demolition and Debris Removal Technical Memorandum, Northeast Cape, St. Lawrence Island, Alaska. January 10.

Montgomery Watson. 1996a. Final Work Plan, Phase II Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska. July.

Montgomery Watson. 1996b. Engineering Evaluation/Cost Analysis, Northeast Cape, St. Lawrence Island, Alaska. February.

Montgomery Watson. 1996c.

Montgomery Watson. 1997. Letter Report to Alaska District summarizing wire removal. October 10.

Montgomery Watson. 1998. Final Work Plan 1998-1999 Phase II Remedial Investigation. Northeast Cape, St. Lawrence Island, Alaska. August 24.

Northwest EnviroService, Inc. (NES), 1995, HTW Removal at Northeast Cape, St. Lawrence, Alaska. June.

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

United States Army Corps of Engineers (USACE). 1993. DERP-FUDS Program Manual. December 8.

United States Census Bureau. 1990. Telephone conversation between Elise Tuzman of Montgomery Watson and the U.S. Census Bureau. August.

United States Environmental Protection Agency (EPA). 1994a. Functional Guidelines for Evaluating Organic and Inorganic Data.

United States Environmental Protection Agency (EPA). 1994b. Functional Guidelines for Evaluating Organic and Inorganic Data.

United States Fish and Wildlife Service (USFW). 1998. Listing of Endangered, Threatened and Candidate Species in Alaska. May.

URS Corporation (URS). 1985. Defense Environmental Restoration Account, City of Gambell and Northeast Cape, St. Lawrence Island, Alaska. Volume II. Final Environmental Assessment, No. DACA85-85-C-0036. Anchorage, Alaska. August.