United States Army
Corps of Engineers

Alaska District
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# FINAL

# DECISION DOCUMENT

## Mt. Edgecumbe /
## Sitka Naval Operations Base (NOB)
## Japonski Island, Sitka, Alaska

## FUDS Property No. F10AK0496


September 2009

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# Table of Contents

# List of Tables

## List of Figures

# Acronyms and Abbreviations

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ADEC | Alaska Department of Environmental Conservation |
| ADOT&PF | Alaska Department of Transportation & Public Facilities |
| ARAR | Applicable or relevant and appropriate requirements |
| AST | Aboveground storage tank |
| bgs | Below grounds surface |
| BTEX | Benzene, toluene, ethylbenzene, and xylenes |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| COC | Contaminant of concern |
| COPC | Contaminant of potential concern |
| DERP | Defense Environmental Restoration Program |
| DRO | Diesel range organics |
| EPA | U.S. Environmental Protection Agency |
| FUDS | Formerly Used Defense Sites |
| GRO | Gasoline range organics |
| IC | Institutional Controls |
| IHS | Indian Health Service |
| mg/kg | Milligram per kilogram |
| mg/L | Milligram per liter |
| NCP | National Oil and Hazardous Substance Contingency Plan |
| NOB | Naval Operations Base |
| PA | Preliminary Assessment |
| PAH | Polynuclear aromatic hydrocarbons |
| POL | Petroleum, oil, and lubricants |
| ppm | Parts per million |
| RAB | Restoration Advisory Board |
| RCRA | Resource Conservation and Recovery Act |
| RRO | Residual range organics |
| SI | Site Inspection |
| TAH | Total aromatic hydrocarbons |
| TAqH | Total aqueous hydrocarbon |
| TPH | Total petroleum hydrocarbon |
| USACE | U.S. Army Corps of Engineers |
| UST | Underground storage tank |
| VOC | Volatile organic compounds |

# Part 1: The Declaration

## 1.1 Site Name and Location

The former Sitka Naval Operations Base (NOB) was located on Japonski Island, in Sitka, Alaska. Ten sites associated with the Sitka NOB were authorized for environmental restoration under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS). The FUDS property number for this site is F10AK049603.

## 1.2 Statement of Basis and Purpose

This Decision Document presents the US Army Corps of Engineers (USACE) selected remedy for the Sitka NOB, chosen in accordance with DERP, the Administrative Record for this site, and based upon the previous site investigations and removal actions. Petroleum, oil, and lubricants (POL) contaminated sites fall under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion and are being addressed under the authority of the DERP statute. The proposed response actions meet the State of Alaska Department of Environmental Conservation (ADEC) requirements for cleanup of petroleum-contaminated sites and are consistent with the process set forth in the National Oil and Hazardous Substance Contingency Plan (NCP). The selected remedy meets ADEC requirements and ADEC concurs with the selected remedy.

Authorities for this project include DERP, U.S. Code, Title 10, Section 2701, et seq.; Alaska Administrative Code (AAC), Title 18, Chapter 75.

## 1.3 Assessment of the Site

The response action selected in this Decision Document is expected to protect public health, welfare, and the environment from actual or threatened releases of pollutants or contaminants from the sites associated with the Sitka NOB FUDS.

In general, the sites in this Decision Document were identified as areas of concern due to the presence of petroleum products in the soil. The principal contaminants of concern at these sites are diesel range organics (DRO), residual range organics (RRO), polynuclear aromatic hydrocarbons (PAH), and lead in the soil.

## 1.4 Description of the Selected Remedy

Based on the results of previous assessments, investigations, and removal actions, USACE has selected remedies for each site of concern at the Sitka NOB. The selected remedies for each site are presented in Table 1.

## 1.5 Statutory Determinations

The selected remedy for each site is protective of human health and the environment.

## 1.6 Data Certification Checklist

Part 2 of this Decision Document includes the following information:

- Contaminants of concern (COC) and their respective concentrations for each site (Section 2.6)
- Baseline risk represented by the COCs and COPCs at each site (Section 2.6 Nature and Extent of Contamination)
- Cleanup levels established for COCs and COPCs (Section 2.4.2)

- Potential land and groundwater use assumptions as a result of the Selected Remedies
- Estimated costs (Section 2.9.3)
- Key factors that led to selecting the remedy (Section 2.9)

Additional information can be found in the Administrative Record on file for this site.

**Table 1 – Selected Remedies for Areas of Concern at Sitka NOB**

| Area | Site Name | Selected Remedy |
|---|---|---|
| Area A | Power Plant | Cleanup Complete |
| Area B | Former Army/Navy Service Station | Cleanup Complete |
| Area C | Water Tower Tank Farm | Cleanup Complete |
| Area D | Tank Farm No. 1 | Cleanup Complete |
| Area E | Millerville Housing Area | Cleanup Complete |
| Area F | Tank Farm No. 2 | Cleanup Complete with Institutional Controls |
| Area H | Seaplane Dock | Cleanup Complete |
| Area I | Tank Farm No. 4 | Cleanup Complete |
| Area J | Tank Farm No. 5 | Cleanup Complete |
| Area K | Tank Farm No. 3 | Cleanup Complete with Institutional Controls |

## 1.7 Authorizing Signatures

This Decision Document presents the selected remedy for the Former Sitka Naval Operations Base, Sitka, Alaska. The Alaska District, the lead agency under DERP at the Sitka FUDS, developed this Decision Document, which will be incorporated into the larger Administrative Record file for Sitka available for public view at the Kettleson Memorial Library, 320 Harbor Drive, Sitka, AK, 99835. This Decision Document, presenting the selected remedies approved by the undersigned, pursuant to Memorandum DAIM-ZA, 9 September 2003, Subject: Policies for Staffing and Approving Decision Documents, and to Engineer Regulation 200-3-1, FUDS Program Policy.

APPROVED:

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**Reinhard W. Koenig, Colonel** **Date**
U.S. Army Corps of Engineers
District Commander

U.S. Army
Corps of Engineers

ADEC concurs with the Alaska District's selected remedy. The concurrence may be reviewed and modified in the future if new information becomes available that indicates the presence of contamination or exposures that may cause unacceptable risk to human health or the environment.

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**John Halverson** **Date**

Federal Facility Environmental Restoration Program Manager

Alaska Department of Environmental Conservation

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# Part 2: The Decision Summary

## 2.1 Site Name, Location, and Brief Description

This Decision Document presents the selected cleanup remedies for the sites associated with the Sitka Naval Operations Base (NOB) Formerly Used Defense Site (FUDS) located on Japonski Island, in Sitka, Alaska (FUDS F10AK049603).

### 2.1.1 Site Location

The City of Sitka is located on the southwestern coast of Baranof Island in the Alexander Archipelago of Southeastern Alaska (see Figure 1). This small community is located at 57° 03' North latitude and 135°20' West longitude, approximately 590 miles southeast of Anchorage and 850 miles northwest of Seattle.

The Sitka NOB site is located on Japonski Island across the Sitka Channel from the City of Sitka. The site is legally described as Lots 12, 13, 14 and 15 of U.S. Survey No. 1496, and covers approximately 65.5 acres. The portion of the NOB site that is the subject of this report consists of ten individual sites and is on the southeastern half of Japonski Island. The northwestern half of the island is now the Sitka Airport (under the jurisdiction of the Alaska Department of Transportation and Public Facilities) and the U.S. Coast Guard (USCG) Sitka Air Station (WC, 1997) (see Figure 1).

### 2.1.2 Site History

In the mid-1800s, a Japanese ship sank near Sitka and the sailors were marooned on a nearby island. This island became known as Japonski, which is Russian for Japanese. In 1890, the U.S. Dept. of the Navy acquired Japonski Island as part of the Sitka Naval Reservation. It was an insignificant outpost until the 1930s when it began to grow. The Navy designated it as a naval air station in 1939, then a naval section base in 1941, and finally, a naval operating base in 1942. The Sitka NOB consisted of a naval air station, subordinate naval shore activities, radio station, hospital, naval section base, and marine barracks. The Sitka NOB was the main Navy floatplane facility in southeastern Alaska during World War II.

In 1946, a portion of the former Sitka NOB was transferred to the U.S. Department of the Interior for use by the Bureau of Indian Affairs (BIA) as a school and hospital. The BIA operated a boarding high school from 1947 to 1983 at which time it transferred the school to the Alaska Department of Education and Early Development who continues to operate the school. The BIA operated the Native hospital from 1947 to 1956 when the Indian Health Service (IHS) of the U. S. Public Health Service (PHS) was created and consequently assumed management of all federal Indian health related programs from BIA (WC, 1997). The IHS is now part of the US Department of Health and Human Services. The hospital is currently operated by the Southeast Alaska Regional Health Consortium.

In 1983, portions of the former Sitka NOB were declared a national Historic landmark (Alaska Historical Resource Survey; SIT-079). The historically significant features within the landmark's boundaries include: two aircraft hangers; a control tower; the concrete parking area-runway in front of the hangers; two concrete seaplane ramps; the ready ammunition magazines behind the hangers; the bombproof power plant; officer quarters; and an assortment of barracks and other buildings. Excluded from the landmarks on Japonski Island are: the USCG Air Station with its residential complex; Sitka Airport; and the bridge from Japonski Island to the City of Sitka (WC, 1997).

Current landowners of the former Sitka NOB sites include: Alaska Area Native Health Service; Alaska Department of Education and Early Development; and Alaska Department of Transportation and Public Facilities (ADOT&PF).

The Corps of Engineers began environmental work at the site in 1991 when personnel from the Alaska District performed a preliminary site assessment (PSA). This assessment identified numerous POL storage tanks that were potential sources of contamination, as well as other potential sites of concern that would need further investigation. Based on the information gathered during this investigation, in 1994 and 1995 USACE had a contractor remove and dispose of over 20 fuel storage tanks and several thousand feet of underground fuel pipelines. At about the same time as the tank removal actions, another USACE contractor conducted an extensive remedial investigation. During the course of the RIs, the contractor divided the NOB site into eleven distinct areas that corresponded to the locations of tank farms, pipelines, buildings, or other facilities. Each area was designated by a letter, such as Area A, Area B, and so forth. The eleven areas of concern are listed below and shown on Figure 2:

1. Area A – Power Plant
2. Area B – Former Army/Navy Service Station
3. Area C – Water Tower Tank Farm
4. Area D – Tank Farm No. 1 (Hospital Access Road Tank Farm)
5. Area E – Millerville Housing Area
6. Area F – Tank Farm No. 2
7. Area G – Igarotte Housing Area
8. Area H – Seaplane Dock
9. Area I – Tank Farm No. 4
10. Area J – Tank Farm No. 5
11. Area K – Tank Farm No. 3

In 1997, a Baseline Risk Assessment was completed, which evaluated the human and ecological risks at each site. A remedial action was conducted in 1999 to remove and treat contaminated soils at several of the sites. This was followed by three additional site investigations (in 2000, 2001, and 2002) to determine the remaining levels of contamination and evaluate whether the site still posed a risk to humans and the environment. A second remedial action was performed at Area F in 2005 based on concerns that contaminated soils remained at the site and that the nearby Mt Edgecumbe Hospital was planning to construct a new building in the area. This removal action involved the excavation and removal of fuel and lead contaminated soils. During this action, the contractor discovered free product in one of the excavations near the hospital and several hundred gallons of free product were removed. A recovery well was installed to monitor the future need for free product recovery. In 2007, USACE returned to the site to determine the source and extent of the free product. The conclusion of this investigation was that the free product had been removed (very little was left in the recovery well) and was very localized in extent.

Area G, the Igarotte Housing Area, was initially determined to be ineligible for FUDS-DERP funding due to the area having been beneficially used by the Federal Aviation Association (FAA) after departure of the Navy. However, complete documentation of that decision could not be found and the site may need to be re-evaluated. Therefore, this site will not be discussed further in this document but will be addressed under separate cover.

## 2.2 Enforcement Activities

The previous investigations and remedial actions at the Sitka NOB FUDS were conducted under the DERP-FUDS program. No enforcement activities, notices of violation, or lawsuits pertaining to the U.S. Department of Defense activities have been enacted regarding the Sitka NOB FUDS.

## 2.3 Community Participation

Previous site characterization and removal activities at the site have been documented in several reports prepared for USACE. An Administrative Record file has been established at the Alaska District office at Elmendorf Air Force Base, Alaska, as well as at the Kettleson Memorial Library in Sitka, AK. The

Administrative Record includes copies of all documents pertaining to site characterization or cleanup activities conducted at the site.

USACE invited public input during site investigation and remedial action planning processes through public meetings and fact sheets. USACE conducted three public meetings (in 1995, 1998, and 2005). USACE also investigated the possibility of forming a Restoration Advisory Board (RAB), but there was insufficient public interest.

In September 2008, a Proposed Plan was submitted to the public that described the site investigations and remedial action work completed to date at the site. The Proposed Plan presented the recommended remedial alternatives for no further action at any of the areas of concern. The Proposed Plan was made available to the public on September 25, 2008 with a 30-day public comment period (USACE 2008b). A formal public meeting was held on October 28, 2008 in Sitka, Alaska to present the Proposed Plan to the Sitka community and provide an opportunity for comments.

The Responsiveness Summary provides USACE responses to public comments received during the 30-day comment period and is included in Part 3 of this Decision Document.

## 2.4 Scope and Role of Response Action

This document addresses the Sitka NOB FUDS. Previous interim removal actions at the NOB have included removal of over 20 fuel storage tanks, thousands of feet of fuel pipelines, and thousands of tons of POL and lead contaminated soil from the site. This Decision Document addresses the 11 sites identified above and shown on Figure 2.

### 2.4.1 Applicable or Relevant and Appropriate Requirements

Applicable or relevant and appropriate requirements (ARARs) were reviewed to facilitate selecting remedial alternatives. ARARs are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance that must be complied with or achieved under a CERCLA response action. Such requirements that apply directly are “applicable". Others that are not directly applicable but that are similar enough to be used, may be determined “relevant and appropriate”. Those state standards that are identified in a timely manner and that are more stringent than Federal requirements may be determined to be ARARs. Petroleum, oil, and lubricant (POL) contaminated sites fall under the CERCLA petroleum exclusion and are being addressed under the authority of the DERP statute. The proposed response actions meet the State of Alaska Department of Environmental Conservation requirements for cleanup of petroleum-contaminated sites and are consistent with the process set forth in the National Oil and hazardous Substance Contingency Plan (NCP).

### 2.4.2 Remedial Action Objectives

During the 1994 -1995 Remedial Investigations, preliminary screening levels were used to determine whether additional action was needed at each site. These preliminary screening levels were based on a matrix score that was calculated for the Sitka NOB using ADEC’s petroleum-contaminated soil cleanup guidelines in place at that time. The matrix score was based on site-specific information such as soil type, depth to subsurface water, potential receptors, etc. The total matrix score for the NOB was 39 and corresponded to ADEC’s Level B cleanup levels.

At the time of the 1999 removal/remedial action, Environmental Protection Agency (EPA) had not established cleanup levels for fuels, but had deferred that authority to the individual states. ADEC had established cleanup levels for fuels in soils, but it was in the process of revising these cleanup levels. USACE used the most current (for that time) ADEC guidance to develop risk-based screening levels for each fuel type. These values

were used for comparison to confirmatory sampling results to determine if the extent of contamination had been reached at the various excavation areas.

#### 2.4.2.1 Alternative Cleanup Levels

In 2002, USACE submitted a position paper to the ADEC, in accordance with 18 AAC 75.350, which proposed that the groundwater on Japonski Island is not a current or reasonably expected potential future drinking water source due to lack of sufficient aquifer volume and since the City of Sitka supplies potable water to the island by a pipeline. In September 2002, ADEC approved the groundwater ACLs for the Sitka NOB project site that are ten times greater than the listed regulatory cleanup levels in 18 AAC 75, Table C (see Appendix A for copies of these letters). As a consequence of this decision, USACE was also allowed to increase by a factor of ten the soil 'migration-to-groundwater' risk-based exposure pathway cleanup levels listed in 18 AAC 75, Tables B1 and B2 for an 'Over 40-inch Zone.' USACE then determined the cleanup level for each COC as the lowest value among the listed 'Ingestion', 'Inhalation', or ten times the 'Migration-to-Groundwater' values. Table 2 shows the approved ACLs for the Sitka NOB sites. The ACL for each COC was used to evaluate the soil and groundwater analytical data collected during the 2002 SI and all subsequent investigations and remedial actions. These levels were also used in this document to evaluate historical results from all confirmatory samples and sample data used to evaluate site closure at each site.

In 2004, the USACE conducted a risk evaluation for Area F in preparation for the 2005 removal action. Based on the risk evaluation, USACE requested approval of site-specific alternative soil cleanup levels for five PAHs: benzo(a)anthracene; benzo(a)pyrene; benzo(b)flouranthene; dibenzo(a,h)anthracene; and, indeno(1,2,3,-cd)pyrene. Because these alternative levels were calculated specifically for Area F, they are applied only to the soils at Area F and not to the soils at any other Sitka NOB sites (see Appendix A).

#### 2.4.2.2 Cleanup Level for Lead

EPA established soil cleanup levels for lead at 400 milligrams per kilogram (mg/kg) for residential property and 1,000 mg/kg for industrial property (EPA, 1994). ADEC has also adopted these values based on land use. The more restrictive value of 400 mg/kg was selected as the cleanup level for lead in soil at the Sitka NOB.

#### 2.4.2.3 Requirements for Site Closure

In 2009, ADEC revised its site closure policy. Under the new policy, sites ready for closure are designated either "Cleanup Complete" or "Cleanup Complete with Institutional Controls (ICs)" (ADEC 2009).

For conditions at the Sitka NOB, sites can be designated as "Cleanup Complete" if they meet the following criteria:

a) Contaminant concentrations within the soil are below the cleanup levels for the inhalation and direct contact pathways, as provided in 18 AAC 75.341, Tables B1and B2; and,

b) Contaminant concentrations in the groundwater meet the cleanup levels provided in 18 AAC 75.345, Table C.

A designation of "Cleanup Complete with ICs" applies to sites where current or potential future exposure to contaminated soils or groundwater does not allow for unrestricted land or groundwater use.

In reviewing the remaining soil and groundwater contaminant concentrations for determining an appropriate action under this Decision Document in light of the new ADEC closure policy, the determination was made that most of the areas met the more conservative guidelines for a "cleanup complete" designation even though ACLs had been used. Only two areas at the Sitka NOB, Area F and Area K, were required to have ICs established prior to closure. Therefore, in the sections of this document describing Areas A, B, C, D, E, H, I, and J, the data will demonstrate that the remaining contamination in these areas meets not only the ACLs which would require ICs but also the more conservative requirements for closure without ICs.

**Table 2 – Alternative Cleanup Levels used at Sitka NOB from 2002 to Present**

| Compound | Alternative Soil Cleanup Levels (mg/kg)[1] | Alternative Groundwater Cleanup Levels (mg/L)[2] |
|---|---|---|
| Gasoline Range Organics (GRO) | 1,400 | 13 |
| Diesel Range Organics (DRO) | 2,300[3] | 15 |
| Residual Range Organics (RRO) | 8,300 | 11 |
| Benzene | 0.2[3] | 0.05 |
| Ethylbenzene | 50[3] | 7.0 |
| Toluene | 48[3] | 10 |
| Xylenes | 81[4] | 100 |
| Benz(a)anthracene | 9[5] | 0.01 |
| Benzo(a)pyrene | 0.9[5] | 0.002 |
| Benzo(b)fluoranthene | 9[5] | 0.01 |
| Benzo(k)fluoranthene | 93 | 0.1 |
| Chrysene | 930 | 1.0 |
| Dibenzo(a,h)anthracene | 0.9[5] | 0.001 |
| Indeno(1,2,3,-cd)pyrene | 9[5] | 0.01 |
| Lead | 400 | 0.015[6] |

[1] Soil clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Groundwater cleanup levels based on 10 times the values from 18 AAC 75 Table C, as amended December 30, 2006
[3] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[4] Cleanup level for xylene is the inhalation value because it is the lowest value.
[5] At Area F, soil cleanup levels for these PAHs were reduced for cumulative risk based on a risk evaluation as follows:
Benzo(a)anthracene: 1.8 Dibenzo(a,h)anthracene = 0.18
Benzo(a)pyrene = 0.18 Indeno (1,2,3,-cd) pyrene = 1.8
Benzo(b)flouranthene = 1.8
[6] Cleanup level for lead in groundwater is based on an EPA drinking water standard and is not affected by the 10-times rule.

Notes: mg/kg = milligrams per kilogram
mg/L = milligrams per liter

## 2.5 Site Characteristics

This section describes the site characteristics of the eleven sites associated with the NOB FUDS site, shown in Figure 2. All sites are located on Japonski Island.

### 2.5.1 Current and Future Land Use

The land is currently used for commercial, institutional, and recreational. Residents are in the general area, but not on project sites.

### 2.5.2 Current and Future Groundwater Use

The usability of any potential groundwater on Japonski Island is impacted by saltwater intrusion. The City of Sitka derives it drinking water from a reservoir on Blue Lake and Indian River on Baranof Island. (ADCRA 2008). Drinking water is supplied to Japonski Island.

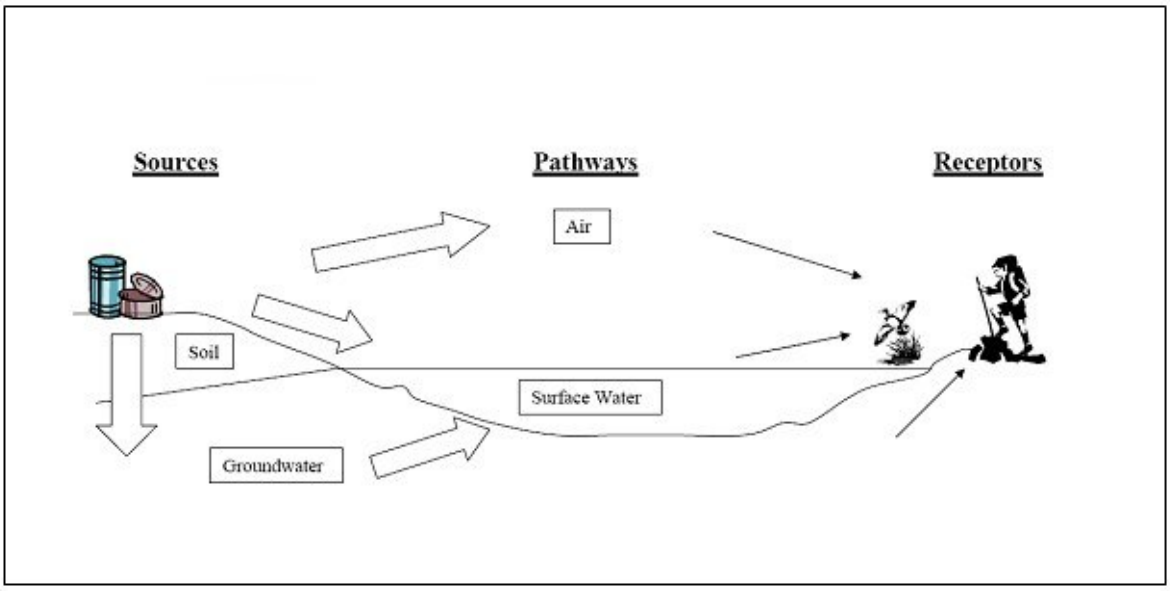


**Figure 3 – Conceptual Site Model for the Sitka NOB**

### 2.5.3 Conceptual Site Model

The first step in analyzing the sources, nature, and extent of contamination is to develop a conceptual site model (CSM). The CSM provides a framework for characterizing the chemicals of concern at a site and is useful for analyzing the basic information relevant to site exposure. It is a visual representation of the site characteristics and presents hypotheses regarding the COCs, their routes of migration, and their potential impact on sensitive receptors (whether human or ecologically significant).

Figure 3 shows the general CSM for the Sitka NOB. The following paragraphs briefly discuss the various aspects of the CSM for the Sitka NOB site.

#### 2.5.3.1 Potential Sources

The most significant potential sources of contamination were the many USTs and ASTs with their associated piping. This system was used to store and transport gasoline, diesel, and Bunker C fuels to various facilities throughout the former Sitka NOB. Leaks from the tanks and piping and spills at filling ports were potential sources for contamination. The principle fuel contaminants include fuel components such as benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and lead. Potential sources for lead were leaded gasoline and lead-based paint. For many years, tetra-ethyl lead was added to gasoline as an anti-knock compound. Thus, leaks and spills of leaded gasoline could be potential sources of lead. As well, many of the buildings were painted with lead-based paint. In time, the paint would crack, peel, and fall to the ground. In addition, many of the former buildings were demolished by burning. Thus, ash and residue from the demolition could also have been a potential source of lead.

#### 2.5.3.2 Potentially Affected Media

Based on the various investigations and removal actions, the affected media and COCs remaining at each area of the former Sitka NOB site are as follows:

Area A: Diesel Range Organics (DRO), polycyclic aromatic hydrocarbons (PAHs), and lead all exceeded the approved ACLs but not the inhalation and direct contact pathways levels in the soil. No contaminants exceeded the approved ACLs or more stringent Table C levels in the groundwater.

Area B: No contamination remains in either the soil above the ACLs or inhalation and direct contact pathway levels or the groundwater above the approved ACLs or more stringent Table C levels.

Area C: Lead is the only contaminant exceeding the approved ACL in the soils. No contaminants exceeded the approved ACLs or more stringent Table C levels in the groundwater.

Area D: DRO and lead are the only contaminants that exceed the approved ACLs in the soils. No contaminants exceeded the approved ACLs or more stringent Table C levels in the groundwater.

Area E: DRO and lead are the only contaminants that exceed the approved ACLs in the soils. Lead exceeded the approved ACL in the groundwater.

Area F: DRO, RRO, PAHs, and lead all exceeded the approved ACLs in the soils. No contaminants exceeded the screening levels in either the sediments or surface water, and no contaminants exceeded the approved ACLs or more stringent Table C levels in the groundwater.

Area H: No contamination was reported above the approved ACLs in the soil.

Area I: No contamination was reported above the approved ACLs in the soil.

Area J: DRO is the only contaminant exceeding the approved ACL in the soils. No contaminants exceeded the approved ACLs or more stringent Table C levels in the groundwater.

Area K: DRO and PAHs exceeded the approved ACLs and the inhalation and direct contact pathway levels in the soils. DRO also exceeded screening levels in the sediments, and lead exceeded screening levels in the surface water. No contaminants exeeded the approved ACLs in the groundwater.

#### 2.5.3.3 Contaminant Fate and Transport

The chemicals of concern identified at the former Sitka NOB site include GRO, DRO, lead, VOCs, and SVOCs. Within the air pathway, the fate and transport of lead from the soil shows little evidence of a health risk. Volatile chemicals of concern probably do not represent a health risk because volatilization and biodegradation in surface waters or underground reduce volatile concentrations. On the other hand, the PAHs, which are also a component of fuels, will be relatively persistent within the soils. This is due to their high adsorption, low aqueous solubility, low volatilization rates, and long biodegradation half-lives (WC, 1996).

Commonalties among all the areas regarding transport mechanisms and potential exposure pathways include the following:

a. Groundwater uptake is not a potential exposure pathway because the groundwater on Japonski Island is not used as a drinking water supply (WC, 1996).
b. Wind is not a potential release mechanism because of the high annual precipitation in Sitka (over 100 inches or 254 cm per year), the low average wind speed (7 mi/hr or 11.5 km/hr), and the high ground cover due to vegetation and development. Inhalation of fugitive dust may be a complete, but minor exposure pathway (WC, 1996).
c. Volatilization is not a potential exposure pathway due to the lack of significant concentrations of volatile compounds at the site, and the cool, moist climate (WC, 1996).
d. Leaching or percolation of groundwater into surface water is a potential exposure pathway because shallow ground water probably discharges to surface water in low areas of the site and/or along the

island's coast. A secondary release mechanism includes consumption of marine plants and animals (WC, 1996).

e. Groundwater discharge or storm water runoff by direct discharge to the ocean via storm drains is a potential exposure pathway to aquatic (marine) species and for secondary consumers of affected species (WC, 1996).

f. Direct contact with soil is a potential exposure pathway because the site is accessible to the public, including area residents, hospital staff and patients, high school staff and students, airport workers and passengers, construction personnel, and maintenance crews (WC, 1996).

g. Ingestion is the most likely exposure route for the direct contact and surface water pathways and is therefore a potential major pathway (WC, 1996).

Dermal contact could be a potential major pathway for school students in the area, but not for other receptors, because the cool wet climate necessitates wearing clothes that cover most of the body for most of the time. Except for students, dermal contact is not as significant a pathway as ingestion (WC, 1996).

#### 2.5.3.4 Potential Receptors

Potential human receptors include hospital staff and patients, high school staff and students, construction personnel, maintenance crews, and occasional recreational users. Portions of the school and hospital are located on or near the former Sitka NOB. Off-site human receptors include workers at the adjacent Sitka Airport and Coast Guard Station on the north end of Japonski Island. Residents and visitors in the City of Sitka are not likely to be affected by the site because the Sitka Channel separates the site from Sitka (WC, 1996).

Potential ecological receptors include terrestrial and marine species. Potentially exposed biological components in the wetlands or upland communities at the Sitka NOB site include terrestrial vegetation, soil invertebrates, small mammals, upland birds, aquatic invertebrates, migratory waterfowl, and raptors. Potential biological components of the marine ecosystem adjacent to Sitka NOB are large marine algae, benthic invertebrates, fish, shorebirds, and marine mammals (WC, 1997).

#### 2.5.3.5 Potentially Completed Exposure Pathways

The following direct pathways are considered potentially complete and significant as a result of onsite exposure only.

- Ingestion and dermal exposure to surface soil on the site may be significant for current youth visitors and office workers in Areas A and F.
- Ingestion and dermal exposure to surface water and sediments may be significant for current youth visitors and future family residents.
- Ingestion and dermal exposure to a surface or subsurface soil mixture in areas of future construction or excavation may be significant for students, office workers in Areas B, C, and E, construction workers, and family residents.
- Dermal exposure to groundwater on the site may be significant for future construction workers (WC, 1997).

Inhalation of indoor air in buildings on the site was considered unlikely to contribute significantly to human health risk; however, the Baseline Risk Assessment included the indoor- air pathway for future buildings. Inhalation of fugitive dust onsite and offsite is an insignificant pathway because the surface soil is usually damp and very little wind-borne dust is produced (WC, 1997).

Groundwater on Japonski Island is not used for domestic purposes, therefore ingestion, inhalation, or dermal exposures to constituents in groundwater during domestic use are incomplete pathways. Drinking water is

piped to the residents of Japonski Island by the City of Sitka. Currently, there are no institutional controls to prevent future domestic use of groundwater on Japonski Island. Ingestion of groundwater by construction workers is an insignificant pathway because little or no incidental ingestion of ground water is expected to occur (WC, 1997).

Inhalation of volatile constituents in ambient air is an insignificant pathway because concentrations of VOCs in soil and ground water are low, few volatiles will be released from the damp soil, and dispersion will be high in ambient air (WC, 1997).

Ingestion of freshwater fish is an incomplete pathway because ponds, streams, and drainage ditches on the site do not support these types of organisms. Ingestion of fish caught on the shore adjacent to the site is an insignificant pathway because (1) chemicals of potential concern, even if transported to shore and dissolved in water, are not likely to bio-accumulate in fish (*e.g.*, fish metabolize PAHs) and (2) subsistence fishing from the shoreline adjacent to the site does not occur because fishing in those areas is considered poor, while fishing in nearby, accessible areas is much better (WC, 1997).

Incidental ingestion and dermal exposure to marine surface water/sediment on the shore adjacent to the site is an insignificant pathway, because (1) significant wading probably does not occur because the water is cold and the steep, rocky, and often very slippery shoreline is difficult to traverse and (2) outdoor swimming does not occur because the water is cold throughout the year (WC, 1997).

## 2.6 Summary of Sites

### 2.6.1 Area A – Power Plant

#### 2.6.1.1 Site Description and History

Area A is the power plant located on the eastern side of Japonski Island, near the current location of the Coast Guard Station (see Figure 2). At one time, Area A consisted of a 55,000-barrel (bbl), bolted-steel above ground storage tank (AST) that contained Bunker C fuel, an outfall drain, an attached valve shed, a tank farm, a power plant, associated piping, and concrete utilidors. The 55,000-bbl AST was surrounded by a large, 10-ft high earth and rock berm. The power plant and some of the associated piping remain. Bunker C fuel was mixed with diesel and burned in the power plant to generate electricity. The power plant and associated piping are no longer in use. Piping for the power plant fuel system extended from the old Navy dock to the 55,000-barrel AST, from the AST to two former USTs, and from the USTs to the power plant. The former USTs were used as day tanks and were filled with Bunker C fuel via underground piping from the 55,000-barrel AST (WC, 1996). An outfall drain ran from the 55,000-bbl AST to Sealing Cove.

Alaska Department of Education and Early Development formerly operated a filling station in Area A. The filling station was taken out of service in 1993 and the USTs containing diesel and gasoline were removed. The extent of contamination from the filling station USTs and piping is unknown. It was not included in the current project because it is not eligible for DERP-FUDS cleanup (WC, 1996).

A PSA was conducted in 1991. A Storage Tank Decommissioning and Pipeline Closure Assessment followed this in 1994 and 1995, during which the 55,000-bbl AST and its associated piping were removed, and 41 soil samples were collected. An RI was also conducted in 1994-95. Additional soil samples were collected from 31 test pits and three groundwater monitoring wells were installed and sampled. In 1997 a Baseline Risk Assessment was conducted, followed by a Removal Action in 1999. During the removal action, over 1,100 tons of fuel-contaminated soil was removed from 5 excavations. Additional Site Investigations were conducted in 2000 and 2001.

The property encompassing Area A is currently owned by the Alaska Area Native Health Service.

### 2.6.1.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area A were the various ASTs, USTs, and associated piping. These sources had the potential to contaminate the surface and subsurface soils, and the groundwater in this area. Lead, DRO, and other POL-related constituents were the primary contaminants of concern.

Table 3 shows the evaluation of the soil sample analytical data from the confirmatory samples collected during the 1999 removal action and the 2000 site investigation. As shown on the table, most of the COCs were below the approved ACLs, with the following exceptions:

- DRO exceeded the ACL in 7 of 38 samples;
- Benzo(a)pyrene exceeded the ACL in 2 of 23 samples;
- Benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene exceeded the ACL in 1 of 23 samples (all in the same sample); and
- Lead exceeded the ACL in 2 of 24 samples.

**Table 3 – Evaluation of Analytical Results for Area A Soil Samples**

| Compound of Potential Concern | Detection Frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs1 | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| DRO | 37 / 38 | 21 | 8,400 | 10 – 190 | 2,300[2] | 7 / 38 |
| RRO | 15 / 15 | 17 | 6,900 | 5.3 – 7.4 | 8,300 | 0 / 15 |
| Benzene | 1 / 31 | 0.170 | 0.170 | 0.0014 – 0.0047 | 0.2[2] | 0 / 31 |
| Ethylbenzene | 1 / 31 | 0.030 | 0.030 | 0.00048 – 0.0018 | 50[2] | 0 / 31 |
| Toluene | 2 / 31 | 0.046 | 0.072 | 0.0052 – 0.018 | 48[2] | 0 / 31 |
| Total Xylenes | 4 / 31 | 0.018 | 0.28 | ---- | 81[3] | 0 / 31 |
| Benzo(a)anthracene | 17 / 23 | 0.032 | 8.60 | 0.013 – 0.026 | 9 | 0 / 23 |
| Benzo(a)pyrene | 14 / 23 | 0.019 | 17.0 | 0.013 – 0.018 | 0.9 | 2 / 23 |
| Benzo(b)fluoranthene | 12 / 23 | 0.050 | 11.0 | 0.017 – 0.025 | 9 | 1 / 23 |
| Benzo(k)fluoranthene | 7 / 23 | 0.047 | 4.40 | 0.016 – 0.023 | 93 | 0 / 23 |
| Chrysene | 18 / 23 | 0.049 | 9.40 | 0.020 – 0.029 | 930 | 0 / 23 |
| Dibenzo(a,h)anthracene | 2 / 23 | 0.60 | 1.50 | 0.012 – 0.017 | 0.9 | 1 / 23 |
| Indeno(1,2,3-cd)pyrene | 3 / 23 | 0.200 | 9.10 | 0.015 – 0.021 | 9 | 1 / 23 |
| Lead | 24 / 24 | 11.4 | 480 | 0.012 – 0.06 | 400 | 2 / 24 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two, ingestion values from the over 40 inch zone (as amended December 30, 2006), unless otherwise noted.
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit

Table 4 provides details for the samples with contaminant concentrations that exceeded the approved ACLs. As the table shows, all of the exceedences were detected in samples from the 1999 Removal Action, and all were from three of the five excavations (shown in Figure 4). While DRO exceeded the ACL in several samples, the two sidewall samples from excavation A007 accounted for all of the PAH and lead exceedences.

**Table 4 – Samples Exceeding Approved ACLs at Area A**

| Sample Location / ID[1] | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACL[2] (mg/kg) | Sample Concentration (mg/kg) | Rationale for Leaving in Place |
|---|---|---|---|---|---|---|
| SKA-A-017 | Floor of Excavation A006 | 2 | Benzo(a)pyrene | 0.9 | 5.1 | Excavation floor samples collected from top of bedrock; further excavation not possible |
| SKA-A-027 | Floor of Excavation A-AST | 1.5 | DRO | 2,300[3] | 8,400 | |
| SKA-A-028 | | 2 | | | 7,900 | |
| SKA-A-029 | | 1 | | | 7,400 | |
| SKA-A-039 | | 1 | | | 4,700 | |
| SKA-A-040 | | 1 | | | 4,300 | |
| SKA-A-031 | | 1.5 | | | 2,300 | |
| SKA-A-043 | Wall of Excavation A007 | 2 | DRO | 2,300[3] | 5,500 | Excavation side-wall samples collected at or below the water table; further excavation not practicable |
| | | | Lead | 400 | 460 | |
| SKA-A-044 | | 3.5 | Benzo(a)pyrene | 0.9 | 17 | |
| | | | Benzo(b)fluoranthene | 9 | 11 | |
| | | | Dibenzo(a,h)anthracene | 0.9 | 1.5 | |
| | | | Indeno(1,2,3-cd)pyrene | 9 | 9.1 | |
| | | | Lead | 400 | 490 | |

[1] All samples collected during 1999 Removal Action.
[2] Soil clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone (as amended December 30, 2006), unless otherwise noted
[3] Cleanup levels for DRO is 10-times the migration-to-groundwater values because that is lower than the ingestion value for this contaminant.

**Excavation A006.** One sample collected from the floor of this excavation exceeded the approved ACL for benzo(a)pyrene (see Figure 5). Because this excavation went to bedrock, no additional excavation was possible. Since the sample was collected from the top of the bedrock, there are no underlying soils and therefore it does not pose a potential risk of exposure either humans or environmental receptors.

**Excavation A-AST.** Six samples collected from the floor of this excavation exceeded the approved ACL for DRO (see Figure 5). As discussed above, because this excavation went to bedrock, no additional excavation was possible and therefore these samples are not representative of soil remaining at the site and do not represent a potential risk of exposure.

**Excavation A007.** Two sidewall samples collected from this excavation had exceedences of DRO, lead, and/or four PAHs (see Figure 6). Both of these samples were collected from a depth of at least 2 ft-bgs. Since the water table was encountered at this site at a depth of approximately 2 ft-bgs, these samples

were collected at or below the water table. Since soil cleanup levels are calculated based upon conditions in the unsaturated zone and these soils were present at depth below the groundwater table, these soils do not pose a potential risk of exposure.

A cumulative risk calculation was conducted for this site because five carcinogenic compounds [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indo(1,2,3-cd)pyrene] exceeded the cumulative risk screening levels of one-tenth the ACLs. The cumulative risk calculations are shown in Appendix B. The calculated cumulative risk (CR) for Area A was $2 \times 10^{-4}$, which is above the ADEC target cancer risk level of $1 \times 10^{-5}$. However, because all the samples with elevated concentrations of PAHs were collected from the bedrock interface in the floor of the excavations, they do not represent a potentially complete exposure pathway and are therefore not a concern.

Samples collected from the four monitoring wells at this site have shown POL contaminants in the groundwater, but not at concentrations exceeding the approved ACLs. Total lead was the only contaminant found to exceed the ACL. Total lead exceeded the ACL in one well during the 1994-95 RI, but samples of dissolved lead from the same well were below the approved ACL. Lead concentrations were not above the ACL during either the 2000 or the 2001 groundwater sampling efforts.

#### 2.6.1.3 Selected Remedy

The major sources of contamination (55,000-bbl AST and associated piping, and various USTs) at Area A have been removed from the site. In addition, over 1,100 tons of fuel-contaminated soil and 300 tons of lead-contaminated soil were removed during the 1999 Removal Action. Several of the confirmatory soil samples collected from the excavations during this removal action indicated the presence of contaminants such as DRO, lead, and PAHs above the approved ACLs. However, all the samples with contaminants exceeding the ACLs were collected either from the bedrock interface or from beneath the water table and therefore do not represent a potential risk of exposure to human or environmental receptors. No POL contaminants have been detected at concentrations above ACLs in any of the groundwater samples collected at the site, indicating that any residual soil contamination in the soils beneath the water table has not adversely affected the groundwater. All of the remaining soil confirmation sample results are below the inhalation and direct contact pathway levels. In addition, no contaminants in the groundwater exceeded the 18 AAC 75.345 Table C cleanup levels.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels and the groundwater sample results are below the Table C levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area A be designated as Cleanup Complete.

### 2.6.2 Area B – Former Army / Navy Service Station

#### 2.6.2.1 Site Description and History

The former Army/Navy Service Station dispensed gasoline and diesel fuel to military personnel on the island. The service station has been removed, and Area B currently consists of two buildings, the former paint and oil storage (Building [Bldg] 287) and the former fire station (Bldg 288), neither of which is currently in use. The fuel pipes that previously carried aviation gasoline (AVGAS), diesel, and motor gasoline were located near Airport Road and went from Tank Farm No. 1 (Area D) to the former Navy dock (see Figure 2). These pipelines were reported to have been drained, flushed, and capped. Airport Road was rerouted near Area B in 1994. The road appears to have been relocated directly on top of the former service station site and covers a portion of the piping that leads to Tank Farm No. 1 (see Figure 7). Pipes formerly on the south side of the road are now on the north side of the rerouted road in this area (WC, 1996). The topography in and around the former station has been significantly altered since it went out of use. An outfall runs from the former service station to Sealing Cove.

The USTs for the former Army/ Navy Service Station have reportedly been removed. It is unknown whether hydrocarbons were released from the fuel storage and dispensing facilities. A RI was conducted in 1994 and 1995, during which soil samples were collected from 11 test pits and groundwater samples collected from two monitoring wells. This was followed by a Risk Assessment in 1997. A Removal Action was scheduled for 1999, but preliminary samples collected prior to soil removal showed that soil concentrations were below the project action levels, so a decision was made not to excavate any additional soil.

The property encompassing Area B is currently owned by the Alaska Department of Education and Early Development.

#### 2.6.2.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area B were the service station USTs and the piping associated with Tank Farm No. 1 that ran across the site. These sources had the potential to contaminate the surface and subsurface soils, as well as the groundwater in this area. DRO, GRO, and other POL-related constituents were the primary contaminants of concern in the soils and groundwater.

Table 5 provides an evaluation of the soil sample analytical data from the 1994 and 1995 RI and the confirmatory samples from the 1999 field effort for Area B. The table shows that the concentrations of all COCs for all samples were below the approved ACLs established in 2002.

**Table 5 – Evaluation of Analytical Results for Area B Soil Samples**

| Compound of Potential Concern | Detection Frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 3 / 31 | 5.1 J | 970 J | 0.17 – 0.45 | 1,400 | 0 / 31 |
| DRO | 29 / 35 | 4.7 Z | 1,260 | 10 – 190 | 2,300[2] | 0 / 35 |
| RRO | 2 / 2 | 250 | 1,500 | 5.3 – 7.4 | 8,300 | 0 / 2 |
| Benzene | 0 / 33 | ---- | ---- | 0.0014 – 0.0047 | 0.2[2] | 0 / 33 |
| Ethylbenzene | 0 / 33 | ---- | ---- | 0.00048 – 0.0018 | 50[2] | 0 / 33 |
| Toluene | 0 / 33 | ---- | ---- | 0.0052 – 0.018 | 48[2] | 0 / 33 |
| Total Xylenes | 0 / 33 | ---- | ---- | ---- | 81[3] | 0 / 33 |
| Benzo(a)anthracene | 1 / 16 | 0.220 J | 0.220 J | 0.013 – 0.026 | 9 | 0 / 19 |
| Benzo(a)pyrene | 3 / 16 | 0.064 J | 0.730 J | 0.013 – 0.018 | 0.9 | 0 / 19 |
| Benzo(b)fluoranthene | 3 / 16 | 0.061J | 0.570 J | 0.017 – 0.025 | 9 | 0 / 19 |
| Benzo(k)fluoranthene | 3 / 16 | 0.790 J | 0.600 J | 0.016 – 0.023 | 93 | 0 / 19 |
| Chrysene | 2 / 16 | 0.250 J | 0.270 J | 0.020 – 0.029 | 930 | 0 / 19 |
| Dibenzo(a,h)anthracene | 1 / 16 | 0.043 J | 0.043 J | 0.012 – 0.017 | 0.9 | 0 / 16 |
| Lead | 27 / 34 | 2.0 | 194 | 0.012 – 0.06 | 400 | 0 / 34 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
SQL = sample quantitation limit
Data Flags: J = Analyte detected above the instrument detection limit, but below the analytical reporting limit.
Z = Sample chromatographic pattern does not resemble that of a fuel hydrocarbon.

The highest concentrations of GRO and benzo(a)pyrene and the second highest of DRO were found in the surface sample at test pit B004 during the 1994 sampling effort. Although the highest concentration of DRO

was found at depth in the MW-B2 boring, the next four highest DRO concentrations were all found in surface samples at test pits B001, B005, and B011. These results indicate that the contamination was generally limited to the surface soils in very specific areas. Confirmatory samples collected at test pits B004 and B005 in 1999 detected no contaminants at concentrations exceeding either the project action levels or the approved 2002 ACLs for any analytes.

Samples collected from the two monitoring wells at this site showed POL contaminants in the groundwater at one location (MW-2B), but at concentrations below the approved ACLs and the Table C cleanup levels. The sample collected from MW-1B did not show contaminants above reporting limits.

No cumulative risk calculations were necessary for this site because only one carcinogenic compound [benzo(a)pyrene] and no non-carcinogens exceeded the risk screening levels of one tenth the ACLs, and no contaminants exceeded the approved ACLs.

#### 2.6.2.3 Selected Remedy

The USTs for the former Army/ Navy Service Station have reportedly been removed. The site has been significantly altered by construction of the Airport Access Road and other activities, making it difficult to determine the exact location of the station and its associated tanks. Soil sampling has been done throughout the site and the results indicate that there may be some residual contamination in the soils, but that concentrations were all below the approved ACLs as well as the inhalation and direct contact pathway levels. Groundwater sampling results also indicate that any residual soil contamination has not adversely affected the groundwater in the area.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels and the groundwater sample results are below the Table C levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area B be designated as Cleanup Complete.

### 2.6.3 Area C – Water Tower Tank Farm

#### 2.6.3.1 Site Description and History

The former Water Tower Tank Farm consisted of six 10,000-gal storage tanks and the associated piping. Three of the tanks were ASTs, and three were classified as USTs because more than 10 percent of each tank was underground. This tank farm was located near the top of a hill adjacent to the water tower (see Figure 2). The pipelines ran downhill toward the former Army/Navy Service Station (Area B), along the Airport Access Road, and toward the former Navy dock located in Sitka Harbor. The tanks held gasoline and possibly diesel fuel (WC, 1995).

A PSA was conducted in 1991. A Storage Tank Decommissioning and Pipeline Closure Assessment were conducted in 1994 and 1995, during which all 6 tanks and associated piping were removed, and 40 soil samples were collected. An RI was conducted in 1994 and additional soil samples were collected. A Baseline Risk Assessment was completed in 1997 followed. A Removal Action was planned for 1999, but the preliminary samples collected prior to soil removal showed that soil concentrations were below the project action levels, so a decision was made not to excavate any additional soil.

The property encompassing Area C is currently owned by the Alaska Department of Education and Early Development.

#### 2.6.3.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area C were the six fuel storage tanks and associated piping. These sources had the potential to contaminate the surface and subsurface soils, and the groundwater in this area. DRO, GRO, BTEX, and lead were the primary contaminants of concern.

Table 6 provides an evaluation of the soil sample analytical data based from all historical investigations at Area C. The concentrations of COCs for all samples were below the approved ACLs established in 2002 with the following exceptions: Two samples out of 51 had lead concentrations greater than the ADEC cleanup level.

**Table 6 – Evaluation of Analytical Results for Area C Soil Samples**

| Compound of Potential Concern | Detection Frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration Above SQL | Detection Limits | Approved ACLs[1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 26 / 53 | 0.8 | 502 | 0.17 – 0.45 | 1,400 | 0 / 53 |
| DRO | 42 / 53 | 5.31 | 1,620 | 10 – 190 | 2,300[2] | 0 / 53 |
| RRO | 8 / 8 | 37 | 410 | 5.3 – 7.4 | 8,300 | 0 / 8 |
| Benzene | 2 / 43 | 0.047 | 0.056 | 0.0014 – 0.0047 | 0.2[2] | 0 / 43 |
| Ethylbenzene | 10 / 43 | 0.045 | 1.270 | 0.00048 – 0.0018 | 50[2] | 0 / 43 |
| Toluene | 13 / 43 | 0.013 | 1.230 | 0.0052 – 0.018 | 48[2] | 0 / 43 |
| Total Xylenes | 14 / 43 | 0.066 | 5.750 | ---- | 81[3] | 0 / 43 |
| Benzo(a)anthracene | 4 / 13 | 0.042 | 0.099 | 0.013 – 0.026 | 9 | 0 / 13 |
| Benzo(a)pyrene | 2 / 8 | 0.051 | 0.100 | 0.013 – 0.018 | 0.9 | 0 / 8 |
| Benzo(b)fluoranthene | 3 / 8 | 0.036 | 0.120 | 0.017 – 0.025 | 9 | 0 / 8 |
| Chrysene | 3 / 8 | 0.047 | 0.120 | 0.020 – 0.029 | 930 | 0 / 8 |
| Benzo(k)fluoranthene | 0 / 8 | ---- | ---- | 0.016 – 0.023 | 93 | 0 / 8 |
| Dibenzo(a, h)anthracene | 0 / 8 | ---- | ---- | 0.012 – 0.017 | 0.9 | 0 / 8 |
| Indeno(1,2,3-cd)pyrene | 1 / 8 | 0.048 | 0.048 | 0.015 – 0.021 | 9 | 0 / 8 |
| Lead | 51 / 51 | 1.7 | 1,200 | 0.012 – 0.06 | 400 | 2 / 51 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit

Table 7 provides details for both samples with contaminant concentrations that exceeded the approved ACL. Both of the samples were collected from the surface soils (0 to 0.5 ft-bgs) beneath AST-1 during the 1994 Tank Decommissioning effort (see Figure 8). Test pits were excavated and sampled from those same locations during the 1999 investigation. None of the analytes from those samples exceeded the approved ACLs. These results indicate that the exceedences detected in 1994 were likely isolated occurrences.

A cumulative risk calculation was conducted for this site because two carcinogenic compounds [benzene and benzo(a)pyrene] exceeded the cumulative risk screening levels of one-tenth the ACLs (see Appendix B). The CR for Area C was $4 \times 10^{-6}$, which is well below the ADEC target cancer risk level of $1 \times 10^{-5}$. No non-carcinogenic compounds exceeded the cumulative risk screening levels. The only contaminant that exceeded the approved ACLs was lead, which is not considered in cumulative risk calculations.

### 2.6.3.3 Selected Remedy

The six tanks and associated piping at the Water Tower Tank Farm (Area C) were removed in 1994. Confirmatory soil sampling indicated that there was residual contamination remaining in the soils at the former tank farm area. However, only one contaminant, lead, exceeded the approved ACL in two samples. Subsequent soil sampling conducted in 1999 from the same locations did not detect soil contamination above the approved ACLs nor the inhalation and direct contact pathways. Because the follow-up sampling could not

**Table 7 – Samples Exceeding Approved ACLs at Area C**

| Sample Number / ID | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACL[1] (mg/kg) | Sample Concentration (mg/kg) | Rational for Leaving in Place |
|---|---|---|---|---|---|---|
| 94SITK006SL[2] | Beneath SE end of AST 1 | 0 – 0.5 | Lead | 400 | 1,200 | Follow up sampling in 1999 found no exceedences |
| 94SITK007SL[2] | Beneath center of AST 1 | 0 – 0.5 | | | 880 | |

[1] Clean up level from 18 AAC 75 Tables B2 Method Two Ingestion value from the over 40 inch zone (as amended December 30, 2006).
[2] Collected during the Storage Tank Decommissioning and Closure Assessment, 1994.

confirm the 1994 results, the two exceedences appear to have been isolated occurrences and do not indicate widespread contamination at the site. The solitary nature of the exceedences makes prolonged exposure to the contaminated soils highly unlikely. Therefore, these isolated spots of contamination are not expected to pose a risk to human health or the environment. Although no monitoring wells were installed at this site, analytical results from adjacent sites downgradient (Areas B and D) showed no groundwater contamination above the Table C values.

As the soil contaminant concentrations are below the ingestion and direct contact pathway levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area C be designated as Cleanup Complete.

## 2.6.4 Area D – Tank Farm No. 1

### 2.6.4.1 Site Description and History

Former Tank Farm No. 1, which was also known as the Hospital-Access-Road Tank Farm, was an aqua-fuel system consisting of eight 25,000-gal USTs, associated piping, and a tank truck loading rack. Aqua-fuel systems used water pressure from water tanks to move the fuel along the pipelines (WC, 1996). This tank farm was located near the intersection of Tongass Drive and Airport Road (see Figure 2).

The USTs were installed in the 1940s to store fuel for seaplanes. The USTs were reportedly later used to store heating fuel (diesel) for home heating purposes. Archived drawings indicate that the avgas piping made a circular route that extended form the old Navy dock, and subsequently the new dock, along the Airport Access Road and the Hospital Access Road to the seaplane docks. Later, heating fuel was reportedly stored in the USTs and transported by truck to day tanks located in the various housing areas at the site.

Additional structures in Area D include two outfall drains that discharge to an unnamed cove located southwest of the tank farms, and a foundation that was thought to be the location of an electrical building that may have held transformers.

A PSA was conducted in 1991. A Storage Tank Decommissioning and Pipeline Closure Assessment were conducted in 1994 and 1995 during which all 8 tanks and their associated piping were removed, and 42 soil samples were collected. An RI was also conducted in 1994-95. An additional 75 soil samples were collected and three groundwater monitoring wells were installed and sampled. A Baseline Risk Assessment was completed in 1997 that determined no further remediation was necessary at this site. Additional Site Investigations were conducted in 2000 and 2001.

The property encompassing Area D is currently owned by the Alaska Department of Transportation and Public Facilities.

### 2.6.4.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area D were the eight fuel storage tanks and associated piping, tank truck loading rack, numerous concrete vaults, former electrical building, and two outfall drains. These sources had the potential to contaminate surface and subsurface soils, and the groundwater in this area. DRO, GRO, BTEX, and lead were the primary contaminants of concern.

Table 8 provides an evaluation of the soil sample analytical data based on all the historical investigations at Area D. The concentrations of COCs for all samples were below the approved ACLs, with the following exception:

- DRO exceeded in five of 122 samples;
- Lead exceeded in two out of 122 samples.

**Table 8 – Evaluation of Analytical Results for Area D Soil Samples**

| Compound of Potential Concern | Detection Frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 50 / 120 | 0.288 | 1,150 | 0.17 – 0.45 | 1,400 | 0 / 120 |
| DRO | 107 / 122 | 7.6 | 3,700 | ? – 190 | 2,300[2] | 5 / 122 |
| Benzene | 4 / 101 | 0.063 | 0.18 E | 0.0014 – 0.0047 | 0.2[2] | 0 / 101 |
| Ethylbenzene | 11 / 101 | 0.066 | 0.908 | 0.00048 – 0.0018 | 50[2] | 0 / 101 |
| Toluene | 20 / 101 | 0.035 | 1.45 | 0.0052 – 0.018 | 48[2] | 0 / 101 |
| Total Xylenes | 22 / 101 | 0.033 | 5.42 | ---- | 81[3] | 0 / 101 |
| Benzo(a)anthracene | 3 / 14 | 0.550 J | 1.10 | 0.013 – 0.026 | 9 | 0 / 14 |
| Benzo(a)pyrene | 4 / 14 | 0.250 J | 0.660 | 0.013 – 0.018 | 0.9 | 0 / 14 |
| Benzo(b)fluoranthene | 4 / 14 | 0.290 J | 0.910 | 0.017 – 0.025 | 9 | 0 / 14 |
| Chrysene | 4 / 14 | 0.360 J | 1.10 | 0.020 – 0.029 | 930 | 0 / 14 |
| Benzo(k)fluoranthene | 4 / 14 | 0.240 J | 0.540 | 0.016 – 0.023 | 93 | 0 / 14 |
| Dibenzo(a,h)anthracene | 2 / 14 | 0.090 J | 0.110 J | 0.012 – 0.017 | 0.9 | 0 / 14 |
| Indeno(1,2,3-cd)pyrene | 3 / 14 | 0.110 J | 0.180 J | 0.015 – 0.021 | 9 | 0 / 14 |
| Lead | 108 / 122 | 3.1 | 8,490 DF, DT | 0.012 – 0.06 | 400 | 2 / 122 |
| TCLP Lead | 1 / 2 | 0.35 | 0.35 | 0.05 | ---- | ---- |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit
Data Flags: DF = Reporting limit elevated due to matrix interference
DT = Method detection limit elevated
E = Value estimated
J = Analyte detected above the instrument detection limit, but below the analytical reporting limit.

Table 9 provides details for the samples with contaminant concentrations that exceeded the approved ACLs.

**DRO.** All five of the samples with DRO exceedences were collected during the 1994-1995 storage tank and pipeline decommissioning effort. Three of the samples (94SITK028SL, -035SL, and -047SL) were collected from below the water table from tank pits 4, 2, and 5, respectively (see Figure 9). Since soil cleanup levels are calculated based upon conditions in the unsaturated zone and these

**Table 9 – Samples Exceeding Approved ACLs at Area D**

| Sample Number / ID | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACL[1] (mg/kg) | Sample Concentration (mg/kg) | Rationale for Leaving in Place |
|---|---|---|---|---|---|---|
| 312SL[3] | Beneath pipeline from Tank 2 to Vault 2 | 4.3 | DRO | 2,300[2] | 3,700 | Subsurface samples pose no risk of direct exposure; also isolated occurrences |
| 320SL[3] | Beneath 6-inch pipeline near Tongass Road | 2.4 | | | 2,700 | |
| 94SITK028SL[4] | Bottom of Tank 4 excavation | 19 | | | 3,530 | Samples collected from below the water table, further excavation is not practicable |
| 94SITK035SL[4] | Bottom of Tank 2 excavation | 18 | | | 3,130 D | |
| 94SITK047SL[4] | Bottom of Tank 5 excavation | 17 | | | 2,760 D,J | |
| 95SNOB064SL[5] | MW-D3 boring | 12.5 | Lead | 400 | 8,490 DF,DT | |
| 94SNOB029SL[6] | Test Pit D010 | 8 | | | 436 | Subsurface samples pose no risk of direct exposure |

[1] Clean up level for lead from 18 AAC 75 Tables B2 Method Two Ingestion value from the over 40-inch zone (as amended December 30, 2006) unless otherwise noted.
[2] Cleanup level for DRO is 10-times the migration-to-groundwater value because that is lower than the ingestion value for this contaminant.
[3] Collected during the Storage Tank and Pipeline Closure Assessment, 1995.
[4] Collected during the Storage Tank Decommissioning and Closure Assessment, 1994.
[5] Collected during the Remedial Investigation, Phase II, 1995.
[6] Collected during the Remedial Investigaiton, Phase I, 1994.

Data Flags: D = Secondary dilution
DF = Reporting limit elevated due to matrix interference
DT = Method detection limit elevated
J = Estimated value

soils were present at depth below the groundwater table, these soils do not pose a risk for potential exposure now or in the future. The other two samples (312SL and 320SL) were collected during the second phase of the tank decommissioning effort from the subsurface at depths of 4.3 and 2.4 ft-bgs, respectively (see Figure 9). Neither of them represents a current risk of direct dermal exposure, but could pose a risk in the event of future excavation in this area. Additional samples surrounding both locations had concentrations below the ACL, indicating that these are isolated occurrences and not indicative of widespread contamination at the site.

**Lead.** The two samples with lead exceedences were collected from southwest of the former tank locations during the RI. The highest concentration was collected from the MW-D3 boring at a depth of 12.5 ft-bgs, which was beneath the water table. Therefore, this sample does not pose a potential risk

for exposure. In addition, it should be noted that the lead concentration in this sample was an order of magnitude higher than in any other sample collected. This, coupled with the fact that there was some laboratory quality control issues associated with the sample, may indicate it was an anomalous reading. The other sample was an isolated occurrence collected from the subsurface at a depth of 8 ft-bgs from test pit D010 (see Figure 9). It does not indicate widespread contamination at the site, and does not pose a current risk of direct dermal exposure, but could pose a risk in the event of future excavation in this area.

A cumulative risk calculation was conducted for this site because five carcinogenic compounds [benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene] exceeded the cumulative risk screening levels of one-tenth the ACLs (see Appendix B). The CR for Area D was $2 \times 10^{-5}$, which slightly exceeds the ADEC target cancer risk level of $1 \times 10^{-5}$. However, it should be noted that the maximum benzene concentration was an estimated value that was estimated high due to matrix spike interference. In addition, the high values for the PAHs included in the CR calculation were all detected in a single sample collected during Phase I of the RI. The next highest detections of PAHs were less than half the highest value detected. Since the purpose of the cumulative risk calculation is to quantify the risk from multiple sources or exposure pathways, the fact that the risks at this site are driven by a single sample location indicates that they are not a concern. No noncarcinogenic compounds exceeded the cumulative risk screening levels. The only two contaminants that exceeded the approved ACLs were DRO and lead, neither of which is considered in cumulative risk calculations.

#### 2.6.4.3 Selected Remedy

All of the tanks, concrete vaults, the truck fill rack pad, and associated piping have been removed from Area D. Numerous soil samples have been collected from the former tank locations, around the concrete vaults, the truck fill rack, and from beneath the associated piping. Only two contaminants, DRO and lead, were detected at concentrations above the approved ACLs. DRO exceeded the ACL in five samples out of 122, at locations scattered across the site. All five samples were collected from the subsurface, and three from beneath the water table. Likewise, lead exceeded the ACL in only two samples out of 122, both of which were collected from at least 8 ft-bgs. These results demonstrate that there is no significant contamination in the surface soils and the contamination in the subsurface soils occurs in isolated locations. Therefore, there is no current risk of dermal exposure and there is no indication of widespread soil contamination at the site. Groundwater samples have been collected from the existing wells at the site on three different occasions and no contaminants have been detected above either ACLs or Table C cleanup levels. This demonstrates that any residual soil contamination is not adversely affecting the groundwater.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels and the groundwater sample results are below the Table C levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area Dbe designated as Cleanup Complete.

### 2.6.5 Area E – Millerville Housing Area

#### 2.6.5.1 Site Description and History

The Millerville Housing Area was a collection of duplex dwellings for married personnel located in the middle of the former Sitka NOB (see Figure 2). It consisted of over 30 single-family homes, none of which remains (see Figure 10). According to PHS personnel, many of the houses in this area were burned as a method of demolition. Paint on the former houses was probably lead based. PHS personnel reported that debris from the houses was buried in the area, which is now heavily overgrown with dense vegetation (WC, 1996).

A 10,000-gal AST was located in the area to supply diesel-heating fuel to the homes via a network of underground pipelines. The exact location of the former AST is uncertain because the road that previously passed by the AST has been rerouted. The AST has been removed (exact date unknown) and the configuration and location of the underground piping network is unknown. It is also unknown whether leaks or spills from the AST or the underground piping have occurred in the past.

In addition, two underground pipelines (a northern branch and a southern branch) ran through the housing area to Tank Farm No. 3 (Area K). The pipelines ran from the old Navy dock and subsequently the new dock, along Airport Road and Tongass Drive, and through the Millerville Housing Area. Drawings indicated that the pipelines contained diesel, but subsequent investigations determined that it also contained avgas.

A PSA was conducted in 1991. A Storage Tank Decommissioning and Pipeline Closure Assessment was conducted in 1994 and 1995. All of the pipelines were drained and flushed, and approximately 1,000 feet of the southern pipeline was removed from the site. During the 1994-95 RI, over 120 soil samples were collected and four monitoring wells were installed and sampled. A Baseline Risk Assessment was completed in 1997 followed by a Removal Action in 1999. During the removal action, over 700 tons of fuel- and lead-contaminated soils were removed from three excavations. An additional Site Investigation was conducted at the site in 2001.

Within the past few years, ADOT&PF removed all of the remaining buildings and rerouted Airport Road to pass through part of the Millerville Housing area. At that time, they conducted additional characterization activities. The property encompassing Area E is currently owned by the Alaska Department of Education and Early Development.

### 2.6.5.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area E were the 10,000-gal AST and the underground pipelines that ran through the housing area from the old Navy dock to Tank Farm No. 3 (Area K). These sources had the potential to contaminate the surface and subsurface soils, and the groundwater in this area. DRO, GRO, and lead were the primary contaminants of concern.

Table 10 provides an evaluation of the soil sample analytical data from the 1999 removal action confirmatory sampling. Soils data from the RI is not included in this table because the majority of the soils sampled during that effort were removed during the removal effort. The concentrations of COCs for all samples were below

**Table 10 – Evaluation of Analytical Results for Area E Soil Samples**

| Compound of Potential Concern | Detection Frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration Above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 6 / 6 | 2.5 | 14 | 0.17 – 0.45 | 1,400 | 0 / 6 |
| DRO | 22 / 22 | 19 | 8,100 | 10 – 190 | 2,300[2] | 2 / 22 |
| RRO | 9 / 9 | 58 | 5,100 | 5.3 – 7.4 | 8,300 | 0 / 9 |
| Benzene | 0 / 22 | ---- | ---- | 0.0014 – 0.0047 | 0.2[2] | 0 / 22 |
| Ethylbenzene | 4 / 22 | 0.016 | 0.210 | 0.00048 – 0.0018 | 50[2] | 0 / 22 |
| Toluene | 3 / 22 | 0.029 | 0.540 | 0.0052 – 0.018 | 48[2] | 0 / 22 |
| Total Xylenes | 7 / 22 | 0.011 | 0.220 | ---- | 81[3] | 0 / 22 |
| Benzo(a)anthracene | 1 / 3 | 0.076 | 0.076 | 0.013 – 0.026 | 9 | 0 / 3 |
| Benzo(a)pyrene | 1 / 3 | 0.045 | 0.045 | 0.013 – 0.018 | 0.9 | 0 / 3 |
| Benzo(b)fluoranthene | 1 / 3 | 0.073 | 0.073 | 0.017 – 0.025 | 9 | 0 / 3 |
| Benzo(k)fluoranthene | 0 / 3 | ---- | ---- | 0.016 – 0.023 | 93 | 0 / 3 |
| Chrysene | 1 / 3 | 0.066 | 0.066 | 0.020 – 0.029 | 930 | 0 / 3 |
| Dibenzo(a,h)anthracene | 0 / 3 | ---- | ---- | 0.012 – 0.017 | 0.9 | 0 / 3 |
| Indeno(1,2,3-cd)pyrene | 1 / 3 | 0.033 | 0.033 | 0.015 – 0.021 | 9 | 0 / 3 |
| Lead | 31 / 31 | 11 | 2,500 | 0.012 – 0.06 | 400 | 7 / 31 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit

the ACLs approved in 2002, with the following exceptions:

- DRO exceeded in 2 of 22 samples, both of which were from the E023/E036 area, and from the floor of the excavation.
- Lead exceeded in 7 of 31 samples, all of which were from the excavation floors; six from the E036 excavation (which extended to bedrock at 1.5 to 3 ft-bgs) and one from the E044 excavation (which went to a depth of 2 ft-bgs).

Table 11 provides details for the samples with contaminant concentrations that exceeded the approved ACLs.

**DRO**. The sample with the highest DRO concentration (SKA-E-039) was collected from the floor of the E036 excavation at the top of the bedrock. Since it is not possible to excavate any additional soil at this location, this sample is not considered representative of residual soil contamination and does not pose a potential risk of exposure. The other sample with a DRO exceedence (SKA-E-TP014) was collected from a test pit located next to RI test pit TP-023. This sample was composited from a sample interval of 0 to 2 ft-bgs. Additional samples collected from nearby locations had DRO concentrations below the ACL, indicating that this is an isolated occurrence and not indicative of widespread contamination at the site (see Figure 11).

**Lead.** Six of the seven samples with lead exceedences were collected from the floor of the E036

**Table 11 – Samples Exceeding Approved ACLs at Area E**

| Sample Number / ID[1] | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACLs[2] (mg/kg) | Sample Concentration (mg/kg) | Rational for Leaving in Place |
|---|---|---|---|---|---|---|
| SKA-E-TP014 | Test Pit TP014 (Area E023) | 0 - 2 | DRO | 2,300[3] | 2700 | Isolated occurrence, does not indicate widespread contamination |
| SKA-E-039 | Floor of Excavation E036 | 1 | | | 8100 | Excavation floor samples collected from top of bedrock |
| SKA-E-026 | | 3 | Lead | 400 | 2500 | |
| SKA-E-027 | | 3 | | | 2400 | |
| SKA-E-041 | | 2 | | | 2300 | |
| SKA-E-023 | | 2 | | | 1200 | |
| SKA-E-021 | | 3.5 | | | 410 | |
| SKA-E-038 | | 3.5 | | | 410 | |
| SKA-E-036 | Floor of Excavation E044 | 2 | | | 600 | Subsurface sample poses no risk of direct exposure |

[1] All samples collected during 1999 Removal Action.
[2] Clean up level for lead from 18 AAC 75 Tables B2 Method Two Ingestion value from the over 40 inch zone (as amended December 30, 2006) unless otherwise noted.
[3] Cleanup level for DRO is 10-times the migration-to-groundwater value because that is lower than the ingestion value for this contaminant.

excavation, which was at the bedrock interface so additional soil excavation was not possible. Therefore these samples are not considered representative of residual soil contamination and do not pose a risk of exposure. The other sample with a lead exceedence was collected from the floor of the E044 excavation, which extended to a depth of 2 ft-bgs (see Figure 11). Since the sample was collected from a depth of 2 ft-bgs, it does not pose a risk of direct dermal exposure. As well, since it is an isolated occurrence in this area, it does not indicate the presence of widespread contamination at the site.

A cumulative risk calculation was not conducted for this site because no carcinogenic or non-carcinogenic compounds exceeded the cumulative risk screening levels. The only two contaminants that exceeded the approved ACLs were DRO and lead, neither of which is considered in cumulative risk calculations.

#### 2.6.5.3 Selected Remedy

The AST that once supplied heating fuel to the houses at Area E was removed at some unknown time in the past. The location of this AST and its underground-piping network is unknown. The underground pipeline that previously ran from Tank Farm No. 3 (Area K) to the Navy Docks was removed in 1995.

Forty-four test pits were excavated and sampled throughout the area during the RI in 1994-95. While the sampling was concentrated on the route of the pipelines that were removed in 1995, the test pits were located at or near over half the houses in the area. Several areas of contaminated soils were located, but follow up sampling found only two areas with contaminant concentrations exceeding the approved ACLs. Based on these results, a USACE contractor removed 764 tons of fuel and lead contaminated soil from the two areas. The fuel contaminated soil was thermally treated and backfilled in the excavations. The lead-contaminated soil was transported to a RCRA landfill in Washington State for disposal. Clean fill from a borrow pit in the Sitka area was used to backfill the rest of the excavations as needed. Subsequent confirmatory soil sampling showed that the lateral extent of the contamination had been successfully removed at both excavation sites. The excavation at one of the areas (E023 / E036) extended to the top of bedrock so no additional soil removal was possible. The excavation at the other area (E044) extended to a depth of 2 ft-bgs. Although one confirmatory soil sample collected from the floor of this excavation did have a lead concentration that exceeded the ACL, the contaminated soil is covered with at least 2 feet of clean soil, which minimizes any potential risk to human receptors from dermal exposure. As well, the fact that only one of the many samples collected from the floor of this excavation exceeded the ACL demonstrates that this is an isolated occurrence and not indicative of widespread contamination at the site.

Groundwater samples collected at the site in 1995 and again in 2001 detected no POL contaminant concentrations above the ACLs, indicating that residual POL soil contamination is not adversely affecting the groundwater in this area. Although lead did exceed the ACL and actual Table C value in the 2001 sample from MW-E1 (0.0914 mg/L), lead concentrations in the surrounding and downgradient monitoring wells were below the Table C value, indicating that this contamination was very limited in extent and is not moving from the site. Groundwater is not a current or potential future drinking water source since the City of Sitka supplies potable water to the island.

The contaminant concentrations in the soil confirmation samples are below the ingestion and direct contact pathway levels and, with the exception of a very limited area, the groundwater sample results are below the Table C levels. Therefore, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area E be designated as Cleanup Complete.

### 2.6.6 Area F – Tank Farm No. 2

#### 2.6.6.1 Site Description and History

Little information is available regarding the historic use of this area. Aerial photographs and archived drawings indicate that an aqua-fuel system once existed in this area. The Tank Farm No. 2 system appears to have consisted of two large ASTs and a UST tank farm. The exact locations of the former tanks are uncertain. A PHS employee speculated that the large ASTs were constructed of redwood and were probably used as water

tanks. The UST tank farm was removed at some unknown time. PHS personnel indicated they had dumped debris into the UST hole and the hole was subsequently filled. Lumber, wood, plastic bags, and piping debris were visible in the fill area during the RI (WC, 1996).

Drainage is poor in this area and much of it is heavily overgrown with dense vegetation. There are two large ponds and one small pond located at the former tank farm location. The two larger ponds are designated as South Pond and Middle Pond, and the smaller pond is designated as North Pond. No outlet for runoff from the ponds was found.

A manhole constructed of wood timbers was located near North Pond during the 1994 investigation. A former aboveground pipe exits the manhole toward the south.

A PSA was conducted in 1991. A RI was conducted in 1994 and 1995, during which 38 soil samples were collected from around the area, and sediment and surface water samples were collected from the ponds. A Baseline Risk Assessment was completed in 1997. In 2002, an additional Site Investigation was conducted at the request of the IHS to assess an area where construction of a hospital-related building was planned. Samples of the soil, sediment, surface water, and groundwater were collected. This was followed by a Removal Action in 2005, when almost 7,500 cubic yards of fuel- and lead-contaminated soils were removed from eight excavations at the site (see Figure 12). In 2007, another SI was conducted. A Rapid Optical Screening Tool (ROST)[1] was used to assess any remaining contamination in the soil. Over 120 ROST borings were completed throughout the area (see Figure 13).

The property encompassing Area F is currently owned primarily by the Alaska Area Native Health Services, although a small portion of the area (on the northwest corner) is owned by the Alaska Department of Education and Early Development.

#### 2.6.6.2 Nature of and Extent of Contamination

The most significant potential sources of contamination at Area F were the ASTs and USTs at Tank Farm No. 2 and their associated piping. These sources had the potential to contaminate the surface and subsurface soils, surface water and sediments in the nearby ponds, and the underlying groundwater. Lead, DRO, and other POL-related constituents were the primary contaminants of concern.

Table 12 provides an evaluation of the soil sample analytical data from the 2005 removal action and 2007 ROST investigation for Area F. The table shows that the concentrations of COCs for all samples were below the site-specific ACLs with the following exceptions:

- DRO exceeded in 4 of 91 samples, three of which were side wall samples from various 2005 soil excavations and one from a 2007 ROST boring;
- RRO exceeded in 4 of 18 samples, three of which were from the Middle Pond area, and one collected from a ROST investigation boring;
- Benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene exceeded in 1 of 80 samples; all three exceedences were in the same sample, which was collected from a depth of 13 ft-bgs from a ROST boring located south of the F-8 excavation area;
- Lead exceeded in 5 of 25 samples, four of which were from the floor of the 2005 lead soil excavation and one from the side wall of the excavation.

[1] The ROST technology utilizes a geoprobe to push a probe into the ground where a laser is used to detect the fluorescent signature of POL contaminants in the soils. The ROST provides a real-time log showing the presence and amount of POL contamination in-situ. More detailed information about the ROST system and how it functions can be found in Appendix C.

**Table 12 – Evaluation of Analytical Results for Area F Soil Samples**

| Compound of Potential Concern | Detection frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 10 / 12 | 0.56 J | 170 B | 2.2 - 24 | 1,400 | 0 / 12 |
| DRO | 81 / 91 | 7.1 J | 5,700 | 22 - 140 | 2,300[2] | 4 / 91 |
| RRO | 18 / 18 | 27 J | 18,000 | 56 - 340 | 8,300 | 4 / 18 |
| Benzene | 0 / 6 | ---- | ---- | 0.0043 - 0.0073 | 0.2[2] | 0 / 6 |
| Ethylbenzene | 0 / 6 | ---- | ---- | 0.022 - 0.036 | 50[2] | 0 / 6 |
| Toluene | 2 / 6 | 0.38 | 0.54 | 0.022 - 0.036 | 48[2] | 0 / 6 |
| Total Xylenes | 0 / 6 | ---- | ---- | ---- | 81[3] | 0 / 6 |
| Benzo(a)anthracene | 60 / 86 | 0.0004 J | 1.8 | 0.0027 - 0.059 | 1.8[4] | 1 / 86 |
| Benzo(a)pyrene | 55 / 86 | 0.00036 J | 1.6 | 0.0027 - 0.059 | 0.18[4] | 1 / 80 |
| Benzo(b)fluoranthene | 53 / 86 | 0.00067 J | 1.7 | 0.0027 - 0.0096 | 1.8[4] | 0 / 86 |
| Dibenzo(a,h)anthracene | 41 / 86 | 0.00042 J | 0.18 | 0.0027 - 0.059 | 0.18[4] | 1 / 86 |
| Indeno(1,2,3-cd)Pyrene | 55 / 86 | 0.0003 J | 1.1 | 0.0027 - 0.059 | 1.8[4] | 0 / 86 |
| Lead | 25 / 25 | 18.9 | 10,600 | 0.012 – 0.06 | 400 | 5 / 25 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.
[4] Site-specific alternative cleanup level for Area F (see Table 2).

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit
Data Flags: B = Analyte also detected in the laboratory method blank.
J = Analyte detected above the instrument detection limit, but below the analytical reporting limit.

Table 13 provides details for the samples with contaminant concentrations that exceeded the approved ACLs.

**DRO.** The three highest DRO concentrations were in samples collected from the sidewalls of excavations located adjacent to paved parking areas. The fourth DRO exceedence was from a ROST boring that was drilled through a paved parking area. Since these all represent soils that are essentially capped by the pavement, the soils do not pose a potential risk of exposure, unless the soil is exposed by excavating within the parking area itself.

**RRO.** Four samples exceeded the ACL for RRO, all of which were collected near Middle Pond. Upon further examination of the laboratory chromatograms, the RRO in the three samples collected during the 2005 Removal Action was determined to be due to naturally occurring substances and not the result of fuel contamination. The fourth sample was collected from a ROST boring but in the same vicinity as the other three. Since it was the only ROST sample with significant RRO concentrations, and the location corresponds to the 2005 samples, it seems logical to assume that the RRO in this sample is the result of naturally occurring substances. Even if not, the sample was collected from a depth of 6.5 ft-bgs, which minimizes any potential risk of direct exposure.

**PAHs.** Three PAHs [benzo(a)anthracene, benzo(a)pyrene, and dibenzo(a,h)anthracene] were found at concentrations exceeding the site-specific ACLs. All three exceedences occurred in the same sample, which was collected from a depth of 13 ft-bgs in a ROST boring. The depth of the sample minimizes any potential risk of direct exposure to these soils, and the fact that only one sample had

**Table 13 – Samples Exceeding Approved ACLs at Area F**

| Sample Number / ID[1] | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACL[3] (mg/kg) | Sample Concentration (mg/kg) | Rational for Leaving in Place |
|---|---|---|---|---|---|---|
| PBAEC010722SB | Western wall of Excavation F013 | NA | DRO | 2,300[4] | 5,700 | Soils beneath paved parking area |
| PBAEC390806SB | Northern wall of Excavation F-5/F010 | NA | | | 5,400 | |
| FTFAEC120829SB | Eastern wall of Excavation F-8 | NA | | | 3,100 | |
| 07SNOB04RC[2] | ROST Boring SNOB-109 | 7.5 | | | 2,400 B | Collected from beneath paved parking area |
| 07SNOB05RC[2] | ROST Boring SNOB-19 | 6.5 | RRO | 8,300 | 18,000 | Collected in same area as other RRO exceedences, so likely naturally-occurring |
| MPAC070812SB | Middle Pond | NA | | | 18,000 | Results determined to be naturally-occurring and not due to fuel contamination |
| MPAC010812SB | Middle Pond | NA | | | 13,000 | |
| MPAC020812SBD | Middle Pond | NA | | | 9,900 | |
| 07SNOB11RC[2] | ROST Boring SNOB-82 | 13 | Benzo(a)anthracene | 1.8[5] | 1.8 | Subsurface samples pose no risk of direct exposure; also isolated occurrences |
| | | | Benzo(a)pyrene | 0.18[5] | 1.6 | |
| | | | Dibenzo(a,h)anthracene | 0.18[5] | 0.18 | |
| PBASL190817SB | Floor of Lead Excavation | NA | Lead | 400 | 10,600 | Below water table and therefore not considered a risk of exposure |
| LEC040901SB | | NA | | | 1,120 | |
| LEC110909SB | | NA | | | 637 | |
| PBASL240823SB | | NA | | | 417 | |
| LEC090909SB | Eastern wall of Lead Excavation | NA | | | 466 | Soils beneath paved road |

[1] Samples collected during 2005 Removal Action unless otherwise noted.
[2] Sample from 2007 ROST investigation.
[3] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[4] Cleanup level for DRO is 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[5] Site-specific alternative cleanup level (see Table 2)
NA = sample depth not provided in 2005 Removal Action Report.

exceedences of PAHs indicates that this is an isolated occurrence and not indicative of widespread contamination.

**Lead.** All five of the samples with concentrations of lead exceeding the cleanup level were collected from the 2005 lead excavation. Four of the samples were collected from the floor of the excavation, which was beneath the water table, since soil cleanup levels are calculated based upon conditions in the unsaturated zone and these soils were present at depth below the groundwater table, they are not deemed to pose a potential risk of exposure. The fifth sample was collected from the sidewall that was adjacent to Tongass Drive, so the soil that it represents is essentially capped by the pavement in the road. These soils do not pose a current risk based on the direct contact exposure pathway and would pose a potential risk in the future only if the road is excavated (in the future).

A cumulative risk calculation was conducted for this site because five carcinogenic compounds [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indo(1,2,3-cd)pyrene] exceeded the cumulative risk screening levels. The cumulative risk calculations are shown in Appendix B. The CR for Area F was $2 \times 10^{-5}$, which is slightly above the ADEC target cancer risk level of $1 \times 10^{-5}$. However, the high values for all five PAHs were detected in a single sample collected during the 2005 Removal Action. The next highest values for all these PAHs were an order of magnitude less than the highest values detected. Since the purpose of the cumulative risk calculation is to quantify the risk from multiple sources or exposure pathways, the fact that the risks at this site are from a single source indicates that they are not a site-wide concern. No noncarcinogenic compounds exceeded the cumulative risk screening levels. The only other contaminants that exceeded the approved ACLs were DRO, RRO, and lead, none of which is considered in cumulative risk calculations.

#### 2.6.6.3 Selected Remedy

The two ASTs, eight USTs, and associated piping from Tank Farm No.2 have been removed from the site. During the 2005 Removal Action, over 6,000 cubic yards of POL contaminated soils and 400 cubic yards of lead contaminated soils were also removed from the site. Confirmatory soil sampling results verified that the excavations were successful in finding the limits of the contaminated soils. Although eight of the confirmatory samples did have exceedences of DRO and lead, the soils are either beneath paved parking areas or below the water table and so do not pose a potential risk to human health.

During the 2007 ROST investigation, over 120 borings were advanced across the site. The results indicated that even though there is some residual soil contamination at the site, it is generally in small areas and in the subsurface. No soil contamination was detected in the surface soils (0 to 2 ft-bgs) in any of the ROST borings. The contamination that was found during this investigation was limited in extent and the highest concentrations were found at depths of 5 to 10 ft-bgs. The lack of any surface soil contamination demonstrated that there is not a current risk from direct contact for the dermal exposure pathway at this site.

Numerous surface water and sediment samples have also been collected from the three ponds in the area. The results show that while there has been some POL contamination in the sediments, the surface water sample results have always been below the water quality standards.

Due to the presence of contamination in the soils in numerous locations, it is recommended that Area F be designated as "Cleanup Complete with ICs". ICs at this site will include keeping the asphalt “cap” in place and the need for possible sampling and appropriate disposal of soil if excavated from under the cap or in an area with elevated concentrations. ICs can be established through placing control language on the as-built survey for the new building at Area F.

### 2.6.7 Area H – Seaplane Dock

#### 2.6.7.1 Site Description and History

The former Seaplane Dock is located north of Mt Edgecumbe Hospital, adjacent to the Sitka Harbor on the east side of Japonski Island (see Figure 2). It covers an area approximately 400 ft (122 m) wide by 1,600 ft (488 m) long. The area housed a network of fuel lines and pits for dispensing AVGAS, and also included a

former truck loading rack (WC, 1995). The dock area is covered with rebar-reinforced concrete approximately 1-ft (0.3-m) thick.

A RI was conducted in 1994 and soil samples were collected from the site. This was followed by a Baseline Risk Assessment in 1997.

The site is currently owned by the Alaska State Department of Education and Early Development. Several buildings are located on the former Seaplane Dock, including the new Mt. Edgecumbe High School, the Mt. Edgecumbe gymnasium and tennis courts, and the building housing the University of Alaska – Southeast (see Figure 14).

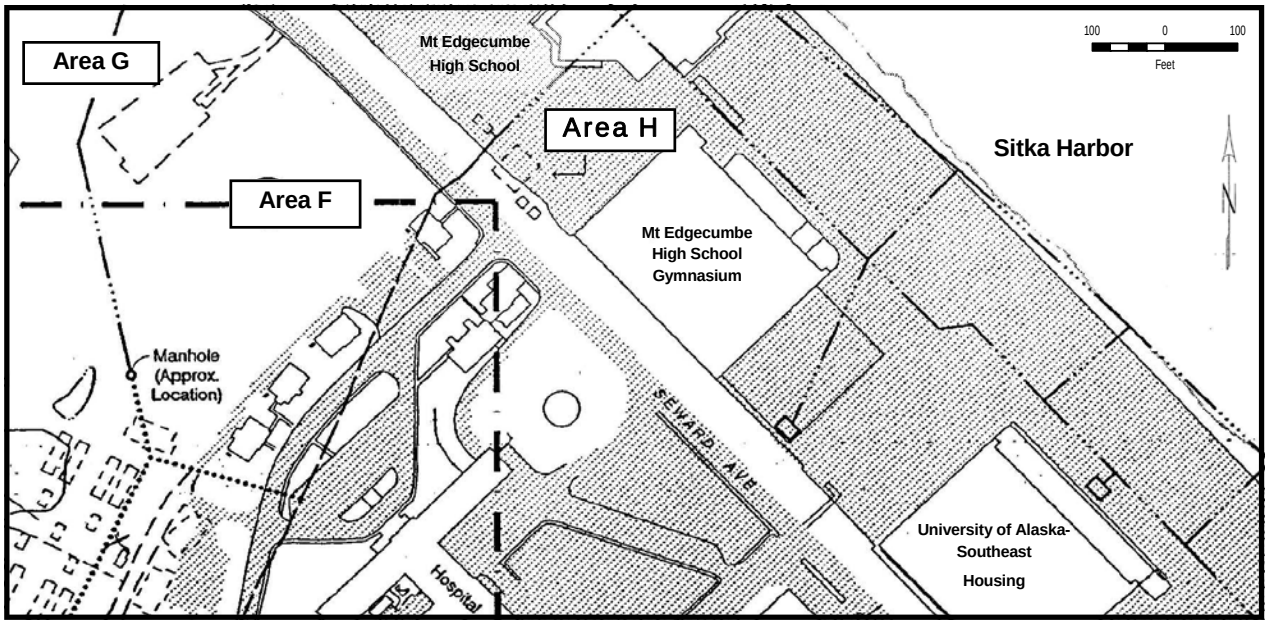


**Figure 14 – Area H Location Map**

### 2.6.7.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area H were the underground fuel lines and the tank truck loading rack. These sources had the potential to contaminate the surface and subsurface soils, and the groundwater in this area. POL-related constituents would have been the primary contaminants of concern, but no significant contaminant concentrations were reported in the soils at this site.

Table 14 shows the evaluation of the soil sample analytical data for Area H from the Phase I RI. The baseline risk assessment concluded that contaminants in this area did not pose an unacceptable risk, so this area was not included in investigations subsequent to the 1994 RI. The concentrations of COCs for all samples were below the approved 2002 ACLs and the inhalation and direct contact pathway levels. Therefore, the site does not pose a risk to any receptors.

No cumulative risk calculations were necessary for this site because no carcinogenic or non-carcinogenic compounds exceeded the screening levels, and no contaminants exceeded the approved ACLs.

**Table 14 – Evaluation of Analytical Results for Area H Soil Samples**

| Compound of Potential Concern | Units | Detection frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|---|
| GRO | mg/kg | 0 / 5 | ---- | ---- | 0.17 – 0.45 | 1,400 | 0 / 5 |
| DRO | mg/kg | 4 / 5 | 11 Z | 22 H | 10 – 190 | 2,300[2] | 0 / 5 |
| Benzene | mg/kg | 0 / 5 | ---- | ---- | 0.0014 – 0.0047 | 0.2[2] | 0 / 5 |
| Ethylbenzene | mg/kg | 0 / 5 | ---- | ---- | 0.00048 – 0.0018 | 50[2] | 0 / 5 |
| Toluene | mg/kg | 0 / 5 | ---- | ---- | 0.0052 – 0.018 | 48[2] | 0 / 5 |
| Total Xylenes | mg/kg | 0 / 5 | ---- | ---- | ---- | 81[3] | 0 / 5 |
| Benzo(a)anthracene | mg/kg | 2 / 4 | 0.083 J | 0.300 J | 0.013 – 0.026 | 9 | 0 / 4 |
| Benzo(a)pyrene | mg/kg | 1 / 4 | 0.097 J | 0.097 J | 0.013 – 0.018 | 9 | 0 / 4 |
| Benzo(b)fluoranthene | mg/kg | 1 / 4 | 0.066 J | 0.066 J | 0.017 – 0.025 | 9 | 0 / 4 |
| Benzo(k)fluoranthene | mg/kg | 1 / 4 | 0.110 J | 0.110 J | 0.016 – 0.023 | 93 | 0 / 4 |
| Chrysene | mg/kg | 3 / 4 | 0.064 J | 0.400 J | 0.020 – 0.029 | 930 | 0 / 4 |
| Lead | mg/kg | 5 / 5 | 6.20 | 72.5 | 0.012 – 0.06 | 400 | 0 / 5 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: SQL = sample quantitation limit
Data Flags: H = Sample results quantified as diesel but the chromatographic pattern is not indicative of diesel.
J = Analyte detected above the instrument detection limit, but below the analytical reporting limit.
Z = Sample chromatographic pattern does not resemble that of a fuel hydrocarbon.

#### 2.6.7.3 Selected Remedy

One of the major sources of contamination at Area H, the tank truck loading rack, has been removed. Although the underground piping is still in place, it is overlain by a 1-ft thick concrete pad. The current landowner does not have any current plans to dig up or remove this concrete pad.[2] Sampling during the 1994 RI indicated that no significant contamination exists in the exposed soils at the site, and the subsequent baseline risk assessment concluded that contaminants in the soils did not pose an unacceptable risk. Due to the low soil contaminant concentrations, no groundwater monitoring wells were installed at this site. The primary exposure pathways at this site are from ingestion or dermal exposure to surface soils. However, the concrete pad overlying the area has eliminated these exposure pathways.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area H be designated as Cleanup Complete.

### 2.6.8 Area I – Tank Farm No. 4

#### 2.6.8.1 Site Description and History

Former Tank Farm No. 4 appears on old drawings and in aerial photographs taken in 1938 and 1939. The drawings and photographs indicate that four gasoline and water ASTs were located at the top of the hill south

[2] Personal communication with Mt Edgecumbe High School facilities manager on 12 September 2008.

of the current girls' dormitory (for Mt. Edgecumbe High School) and north of the water tower. The four ASTs and associated piping have been removed from the site. There is an 18-inch thick concrete slab, approximately 40 ft long by 40 ft wide, located near the top of the hill southwest of the dormitory, where the former ASTs were reportedly located. Whether or not the pad was associated with the former tanks or what it was used for is uncertain. The site is currently overgrown with trees and underbrush and is not being utilized for anything.

The former tank farm apparently stored gasoline and/or water in four ASTs. No other information has been found for this area (WC, 1995).

A RI was conducted in 1994 during which soil samples were collected from the site (see Figure 15). A Baseline Risk Assessment was conducted in 1997.

The property encompassing Area I is currently owned by the Alaska Department of Education and Early Development.

#### 2.6.8.2 Nature and Extent of Contamination

The most significant potential sources of contamination at Area I were the four ASTs and associated piping. These sources had the potential to contaminate the surface and subsurface soils in the area, as well as the groundwater. POL-related constituents would have been the primary contaminants of concern, but no significant contaminant concentrations were reported in the soils at this site.

Table 15 shows the evaluation of the soil sample analytical data for Area I from the Phase I RI. The baseline risk assessment concluded that contaminants in this area did not pose an unacceptable risk, so this area was not included in any investigations subsequent to the 1994 RI.

**Table 15 – Evaluation of Analytical Results for Area I Soil Samples**

| Compound of Potential Concern | Detection frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 0 / 10 | ---- | ---- | 0.17 – 0.45 | 1,400 | 0 / 10 |
| Benzene | 0 / 10 | ---- | ---- | 0.0014 – 0.0047 | 0.2[2] | 0 / 10 |
| Ethylbenzene | 0 / 10 | ---- | ---- | 0.00048 – 0.0018 | 50[2] | 0 / 10 |
| Toluene | 0 / 10 | ---- | ---- | 0.0052 – 0.018 | 48[2] | 0 / 10 |
| Total Xylenes | 0 / 10 | ---- | ---- | ---- | 81[3] | 0 / 10 |
| Benzo(a)anthracene | 0 / 8 | ---- | ---- | 0.013 – 0.026 | 9 | 0 / 8 |
| Benzo(a)pyrene | 0 / 8 | ---- | ---- | 0.013 – 0.018 | 9 | 0 / 8 |
| Benzo(b)fluoranthene | 0 / 8 | ---- | ---- | 0.017 – 0.025 | 9 | 0 / 8 |
| Benzo(k)fluoranthene | 0 / 8 | ---- | ---- | 0.016 – 0.023 | 93 | 0 / 8 |
| Chrysene | 0 / 8 | ---- | ---- | 0.020 – 0.029 | 930 | 0 / 8 |
| Dibenzo(a,h)anthracene | 0 / 8 | ---- | ---- | 0.012 – 0.017 | 0.9 | 0 / 8 |
| Indeno(1,2,3-cd)pyrene | 0 / 8 | ---- | ---- | 0.015 – 0.021 | 9 | 0 / 8 |
| Lead | 10 / 10 | 3 | 221 | 0.012 – 0.06 | 400 | 0 / 10 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
SQL = sample quantitation limit

The concentrations of COCs for all samples were below the approved ACLs established in 2002. Therefore, no COCs in Area I pose a risk to any receptors.

No cumulative risk calculations were necessary for this site because no carcinogenic or non-carcinogenic compounds exceeded the screening levels, and no contaminants exceeded the approved ACLs or the inhalation and direct contact pathway levels. .

#### 2.6.8.3 Selected Remedy

All of the major sources of contamination, the four ASTs and associated piping, have been removed from the site. Sampling results showed that there is no significant contamination in the soils at the site. The primary exposure pathways at this site are from ingestion or dermal exposure to surface soils. The baseline risk assessment concluded that contaminants in the soils did not pose an unacceptable risk to human health or the environment. Although no monitoring wells were installed at this site, analytical results from adjacent sites downgradient (Areas B and D) showed no groundwater contamination above the Table C values.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area I be designated as Cleanup Complete.

### 2.6.9 Area J – Tank Farm No. 5

#### 2.6.9.1 Site Description and History

The former Tank Farm No. 5 appears on old site drawings and in aerial photographs from 1938 and 1939, which indicate that eight diesel fuel ASTs were located south of the school administration building and northeast of the former fire station (see Figure 2). There is currently a small hill at this location. An inspection of the area revealed several horizontal wooden beams, a wooden post, and a utility pole on top of the hill. It is uncertain whether the wood remnants on the hill represent the former tank farm. Measurements from the aerial photograph place the tank farm slightly south of the hill. The hill currently appears to be too small in size to have held all eight ASTs; however, part of the hill may have been removed at some time in the past as a source for fill material for roadwork or construction of nearby buildings. Other ASTs at the Sitka NOB were located on hills to use gravity flow, so it is likely that Tank Farm No. 5 was also located on a hill (WC, 1996).

The former tank farm apparently stored diesel fuel. The ASTs that once existed in Area J were removed at some unknown time in the past. No other information has been found for this area.

A RI was conducted in 1994 and 1995. Soil samples were collected for screening and laboratory analysis and one groundwater monitoring well was installed and sampled (see Figure 16). This was followed by a Baseline Risk Assessment in 1997. A Removal Action was planned in 1999, but the preliminary samples collected prior to soil removal showed that soil concentrations were below the project action levels, so a decision was made not to excavate any additional soil. One additional Site Investigation was conducted in 2001.

The property encompassing Area J is currently owned by the Alaska Department of Education and Early Development.

#### 2.6.9.2 Nature and Extent of Contamination

The primary potential sources of contamination at Area J were the eight ASTs in the former tank farm and associated piping. These sources had the potential to contaminate surface and subsurface soils and groundwater. Contaminants of concern at this site included POL constituents and lead.

Table 16 shows the evaluation of the soil sample analytical data for Area J. The table shows the data from the two phases of the RI, as well as the 1999 Removal Action. The concentrations of COCs for all samples were

**Table 16 – Evaluation of Analytical Results for Area J Soil Samples**

| Compound of Potential Concern | Detection frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| DRO | 19 / 23 | 6.7 Z | 43,000 | 10 – 190 | 2,300[2] | 2 / 23 |
| RRO | 6 / 6 | 360 | 1,400 | 5.3 – 7.4 | 8,300 | 0 / 6 |
| Benzene | 0 / 17 | ---- | ---- | 0.0014 – 0.0047 | 0.2[2] | 0 / 17 |
| Ethylbenzene | 0 / 17 | ---- | ---- | 0.00048 – 0.0018 | 50[2] | 0 / 17 |
| Toluene | 0 / 17 | ---- | ---- | 0.0052 – 0.018 | 48[2] | 0 / 17 |
| Total Xylenes | 0 / 17 | ---- | ---- | ---- | 81[3] | 0 / 17 |
| Benzo(a)anthracene | 1 / 9 | 0.038 J | 0.038 J | 0.013 – 0.026 | 9 | 0 / 9 |
| Benzo(a)pyrene | 1 / 9 | 0.076 J | 0.076 J | 0.013 – 0.018 | 9 | 0 / 9 |
| Benzo(b)fluoranthene | 1 / 9 | 0.080 J | 0.080 J | 0.017 – 0.025 | 9 | 0 / 9 |
| Benzo(k)fluoranthene | 1 / 9 | 0.047 J | 0.047 J | 0.016 – 0.023 | 93 | 0 / 9 |
| Chrysene | 2 / 9 | 0.055 J | 0.079 J | 0.020 – 0.029 | 930 | 0 / 9 |
| Indeno(1,2,3-cd)pyrene | 1 / 9 | 0.080 J | 0.080 J | 0.015 – 0.021 | 9 | 0 / 9 |
| Lead | 12 / 12 | 3.70 | 134 | 0.012 – 0.06 | 400 | 0 / 12 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than ADEC cleanup values.
SQL = sample quantitation limit
Data Flags: J = Analyte detected above the instrument detection limit, but below the analytical reporting limit.
Z = Sample chromatographic pattern does not resemble that of a fuel hydrocarbon.

below the approved ACLs with the following exception: two samples out of 23 had DRO concentrations greater than the approved ACLs.

Table 17 provides details for both samples with contaminant concentrations that exceeded the approved ACLs. Both of the samples were collected from the soils on top of the hill at the same location but different depths.

- The highest concentration was found in the sample from hand-auger boring J003, collected during the Phase I RI from a depth of 1 ft-bgs (see Figure 16). This sample location was re-located and sampled again during the 1999 Remedial Action. The 1999 sample collected from this location and depth (0 to 2 ft-bgs) had a DRO concentration of 730 mg/kg, which is below the approved ACL. This, and the fact that other samples collected in this area were all below the ACL, indicates that the 1994 sample was an isolated occurrence.
- The other sample was collected from the same location during the 1999 Remedial Action, but from a depth of 2 to 4 ft-bgs. This sample had a DRO concentration of 3,000 mg/kg, which is only slightly above the ACL of 2,300 mg/kg. Since this sample was collected from a depth of at least 2 ft-bgs, it does not pose a potential risk of direct dermal exposure unless the site is excavated in the future. Additional samples surrounding this locations had concentrations below the ACL, indicating that this is an isolated occurrence and not indicative of widespread contamination at the site.

**Table 17 – Samples Exceeding Approved ACLs at Area J**

| Sample Number / ID | Sample Location | Sample Depth (ft-bgs) | Contaminant of Concern | Approved ACL[1] (mg/kg) | Sample Concentration (mg/kg) | Rational for Leaving in Place |
|---|---|---|---|---|---|---|
| 94SNOB J007 SL[3] | Boring J003 | 1 | DRO | 2,300[2] | 43,000 | Follow up sample from same depth in 1999 found no exceedences; also isolated occurrence |
| SKA-J-HA-086[4] | Boring J003 (relocated) | 2 - 4 | | | 3,000 | Subsurface samples pose minimal risk of direct exposure; also isolated occurrence |

[1] Clean up level from 18 AAC 75 Tables B2 Method Two Ingestion value from the over 40 inch zone (as amended December 30, 2006).
[2] Cleanup level for DRO is 10-times the migration-to-groundwater value because that is lower than the ingestion value for this contaminant..
[3] Collected during the Remedial Investigation, Phase I, 1994.
[4] Collected during the Remedial Action, 1999.

No cumulative risk calculations were necessary for this site because no carcinogenic or non-carcinogenic compounds exceeded the screening levels. The only contaminant that exceeded the approved ACLs was DRO, which is not considered in cumulative risk calculations.

#### 2.6.9.3 Selected Remedy

The primary source of contamination, the ASTs, has been removed from this site. Sample results from the assumed locations of the tanks show that only one COC, DRO, exceeded the approved ACL. DRO exceeded the ACL in two samples, both of which were collected from the same location but at different depths. This indicates that these are isolated occurrences and not indicative of widespread contamination at the site. As well, these samples were collected from on top of a densely wooded hill, which is not likely to be visited with any frequency, which reduces the likelihood of exposure.

Results from groundwater samples collected in 1995 and in 2000 from monitoring well MW-J1, located downgradient of the site, detected no contamination above the approved ACLs or above the Table C values. This data indicates that residual contamination in the soil has not adversely affected the groundwater.

As the soil confirmation sample contaminant concentrations are below the ingestion and direct contact pathway levels and the groundwater sample results are below the Table C levels, in accordance with the 2009 Site Cleanup policy (discussed in Sec 2.4.2.3), based on the above information, it is recommended that Area J be designated as Cleanup Complete.

### 2.6.10 Area K – Tank Farm No. 3

#### 2.6.10.1 Site Description and History

Area K is the former location of Tank Farm No. 3, located on the southwestern side of the island, next to the current location of the Sitka airport (see Figure 2). Tank Farm No. 3 consisted of eight former USTs. Some archive drawings indicate that Tank Farm No. 3 was a former diesel-fuel storage area, but other drawings indicate it was an aqua-fuel system supplying AVGAS for a seaplane hangar located on the southwest side of the island. The underground piping for the tank farm ran along Airport Road and Tongass Drive, through the Millerville Housing Area (Area E), to the former Navy dock (WC, 1996). Currently a drainage ditch that provides drainage from the Sitka Airport runs through the middle of the site and along Airport Road to an outlet into a brackish lagoon referred to as Airport Pond (WC 1997). The lagoon/pond does not directly connect or outlet to any marine waters.

A Storage Tank Decommissioning and Pipeline Closure Assessment was conducted in 1994 and 1995. All eight storage tanks and associated piping were removed and 47 soil samples were collected. A RI was conducted in 1995. A total of 78 soil samples were collected, along with sediment and surface water samples from the drainage ditch, and five groundwater monitoring wells were installed and sampled. A Baseline Risk Assessment was completed in 1997 followed by a Removal Action in 1999. Over 3,200 tons of fuel-contaminated soil was removed from the site (see Figure 17). Additional Site Investigations were conducted in 2000, 2001, 2002, and 2007. Sediment, surface water, and groundwater samples were collected during these investigations.

The property encompassing Area K is currently owned by the Alaska Department of Transportation and Public Facilities.

### 2.6.10.2 Nature and Extent of Contamination

The primary sources of potential contamination at Area K were the eight USTs, fourteen concrete vaults, and the associated piping. These sources had the potential to contaminate the surface and subsurface soils, as well as the surface water and sediments in the nearby drainage ditch, and the underlying groundwater. DRO, GRO, BTEX, and other POL-related constituents were the primary contaminants of concern at this site.

Soils Data

Table 18 provides an evaluation of the analytical data for the soils from the 1999 Removal Action confirmatory sampling (see Figure 18). Soils data from the Phase II RI is not included in this table because the majority of the soils sampled during that effort were removed during the removal action. As shown in Table 18 the

**Table 18 – Evaluation of Analytical Results for Area K Soil Samples**

| Compound of Potential Concern | Detection frequency above SQL | Minimum Concentration Above SQL | Maximum Concentration above SQL | Detection Limits | Approved ACLs [1] | Detection Frequency above Approved ACLs |
|---|---|---|---|---|---|---|
| GRO | 65 / 66 | 0.6 | 220 | 0.17 – 0.45 | 1,400 | 0 / 66 |
| DRO | 46 / 65 | 17 | 25,000 | 10 – 190 | 2,300[2] | 20 / 70 |
| RRO | 35 / 45 | 10 | 240 | 5.3 – 7.4 | 8,300 | 0 / 45 |
| Benzene | 3 / 65 | 0.0051 | 0.031 | 0.0014 – 0.0047 | 0.2[2] | 0 / 65 |
| Ethylbenzene | 33 / 65 | 0.0037 | 0.840 | 0.00048 – 0.0018 | 50[2] | 0 / 65 |
| Toluene | 22 / 65 | 0.013 | 0.320 | 0.0052 – 0.018 | 48[2] | 0 / 65 |
| Total Xylenes | 40 / 65 | 0.010 | 42.7 | ---- | 81[3] | 0 / 65 |
| Benzo(a)anthracene | 29 / 47 | 0.017 | 3.00 | 0.013 – 0.026 | 9 | 0 / 47 |
| Benzo(a)pyrene | 27 / 47 | 0.024 | 3.50 | 0.013 – 0.018 | 0.9 | 1 / 47 |
| Benzo(b)fluoranthene | 32 / 47 | 0.021 | 3.90 | 0.017 – 0.025 | 9 | 0 / 47 |
| Benzo(k)fluoranthene | 15 / 47 | 0.026 | 3.70 | 0.016 – 0.023 | 93 | 0 / 47 |
| Chrysene | 33 / 47 | 0.022 | 2.50 | 0.020 – 0.029 | 930 | 0 / 47 |
| Dibenzo(a,h)anthracene | 3 / 47 | 0.052 | 0.310 | 0.012 – 0.017 | 0.9 | 0 / 47 |
| Indeno(1,2,3-cd)pyrene | 18 / 47 | 0.025 | 1.80 | 0.015 – 0.021 | 9 | 0 / 47 |

[1] Clean up levels from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone, unless otherwise noted (as amended December 30, 2006)
[2] Cleanup levels for DRO, benzene, ethylbenzene, and toluene are 10-times the migration-to-groundwater values because that is lower than the ingestion value for each contaminant.
[3] Cleanup level for xylene is the inhalation value because it is the lowest value.

Notes: All concentrations in milligrams per kilogram (mg/kg)
Shaded cells indicate chemicals of concern with concentrations greater than approved ACLs.
SQL = sample quantitation limit

concentrations of COCs for all samples were below the approved ACLs with the following exceptions:

- DRO concentrations exceeded the ACL of 2,300 mg/kg in 20 of 70 samples, all of which were floor samples from the Tank Farm No. 3 excavation;
- Benzo(a)pyrene exceeded the ACL in one sample out of 47; it was also a floor sample from the Tank Farm No. 3 excavation.

Table 19 provides details for the samples with contaminant concentrations that exceeded the approved ACLs. Since all of the samples were collected from below the water table, they are not considered to pose a potential risk of exposure because excavations below the water table are not practicable.

**DRO.** All of the samples with concentrations of DRO exceeding the approved ACL were collected from the floor of the excavation from depths of 3 to 6.5 ft-bgs. Although the highest DRO concentration (25,000 mg/kg) is equivalent to the maximum allowable concentration, no other sample concentrations were close to this level, indicating that this concentration is not representative of the

**Table 19 – Soil Samples Exceeding Approved ACLs at Area K**

| Sample Location / ID[1] | Sample Location | Sample Depth (ft-bgs) | Sample Concentration (mg/kg) | Contaminant of Concern | Approved ACL (mg/kg) | Rational for Leaving in Place |
|---|---|---|---|---|---|---|
| SKA-K-057 | Former Tank Farm No. 3 Excavation: SBK2/K3/K4 Area | 5 | 25,000 | DRO | 2,300[2] | Samples collected from below the water table, therefore no current potential risk of direct exposure unless excavated. |
| SKA-K-054 | | 5 | 15,000 | | | |
| SKA-K-059 | | 6.5 | 14,000 | | | |
| SKA-K-019 | Former Tank Farm No. 3 Excavation | 4 | 11,000 | | | |
| SKA-K-037 | | 3.5 | 10,000 | | | |
| SKA-K-050 | Former Tank Farm No. 3 Excavation: SBK9/K12 Area | 4 | 9,900 | | | |
| SKA-K-055 | Former Tank Farm No. 3 Excavation: SBK2/K3/K4 Area | 4 | 8,700 | | | |
| SKA-K-048 | Former Tank Farm No. 3 Excavation: SBK9/K12 Area | 4 | 8,300 | | | |
| SKA-K-45 | | 3 | 7,100 | | | |
| SKA-K-042 | | 4 | 6,900 | | | |
| SKA-K-046 | | 4 | 6,900 | | | |
| SKA-K-044 | | 4 | 6,000 | | | |
| SKA-K-058 | Former Tank Farm No. 3 Excavation: SBK2/K3/K4 Area | 4 | 5,500 | | | |
| SKA-K-052 | | 4 | 4,700 | | | |
| SKA-K-060 | | 4.5 | 4,500 | | | |
| SKA-K-051 | | 4 | 3,700 | | | |
| SKA-K-033 | Former Tank Farm No. 3 Excavation | 3.5 | 3,000 | | | |
| SKA-K-034 | | 3 | 2,700 | | | |
| SKA-K-028 | | 3 | 2,700 | | | |
| SKA-K-049 | Former Tank Farm No. 3 Excavation: SBK9/K12 Area | 4 | 2,600 | | | |
| SKA-K-027 | Former Tank Farm No. 3 Excavation | 2 | 3.5 | Benzo(a)pyrene | 0.9[3] | |

[1] All samples collected during 1999 Removal Action.
[2] Cleanup levels for DRO is 10-times the migration-to-groundwater values because that is lower than the ingestion value for this contaminant.
[3] Soil clean up level from 18 AAC 75 Tables B1 and B2 Method Two Ingestion values from the over 40 inch zone (as amended December 30, 2006)

entire site. According to the 1999 Remedial Action report, the water table was encountered at a depth of 1.5 to 2 ft-bgs in the excavation, although the water level did fluctuate during the project and eventually allowed an additional 2 to 4 ft of soil to be excavated from some areas. During the 2007 investigation, depth to water in MW-K6 (which is located within the excavation area) was measured at 3.85 ft-bgs, which generally agrees with the water table depth observed during the 1999 action. This information confirms that all of these samples were collected from a depth at or below the water table. Since soil cleanup levels are calculated based upon conditions in the unsaturated zone and these soils were present at depth below the groundwater table, these concentrations do not currently pose a risk of exposure, however they could pose a potential exposure risk if they were excavated.

**PAHs.** One PAH, benzo(a)pyrene, was detected above the approved ACL in one out of 47 samples. As discussed above, this sample was collected from the floor of the excavation, from a depth of 2 ft-bgs. Although this may be slightly above the water table, the fact that the water table is so shallow at this location would make any excavation unlikely, and therefore this sample is not considered to pose a potential risk of exposure.

A cumulative risk calculation was conducted for this site because six carcinogenic compounds [benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indo(1,2,3-cd)pyrene] exceeded the cumulative risk screening levels of one-tenth the ACLs. CR calculations are provided in Appendix B. The CR for Area K was $5 \times 10^{-5}$, which is above the ACEC target cancer risk level of $1 \times 10^{-5}$. However, because all the samples with elevated concentrations of PAHs were collected from the floor of the excavations and at or below the water table, they do not represent a potential risk of exposure.

Only one noncarcinogenic compound, xylene, exceeded the cumulative risk screening level. The calculated hazard index (HI) for this compound at Area K was 0.5, which is below the ADEC target HI of 1. The only other contaminant that exceeded the approved ACLs was DRO, which is not considered in cumulative risk calculations.

Sediment Data

A comparison of DRO sample data from the drainage ditch between 1996 and 2007 is presented in Table 20. Sample locations, with corresponding DRO concentrations, are shown in the order they were collected along the ditch, going in the flow direction from north to south (see Figure 19). For example, sample SD01 from the 2007 effort was collected furthest to the north of all the samples, while sample SD04 was collected from the same general location as sample 6 in 2000 and Sample No. 2 in 2001. DRO concentrations in the northern portions of the ditch continue to be lower than those in the middle or to the south. A comparison of results from similar locations is difficult because concentrations show a great deal of fluctuation from year to year. These fluctuations may result from a couple of factors: 1) the samples may not have been collected from the exact same location or depth from year to year; 2) the dynamic nature of sediments, which can migrate, especially during flooding events. The field notes for the 2007 sediment sampling indicated that no sheen or evidence of contamination was noted until the sediments were disturbed. At three of the four sites, no contamination was observed until sediments from at least a foot beneath the surface were uncovered. This indicates that the recently deposited surface sediments are not contaminated and implies that the contaminated sediments were deposited at some time in the past. Overall, though, DRO concentrations appear to have remained stable or slightly decreased over time. At 2000 sample 6 (corresponding to 2001 No. 1 and 2007 SD4), for example, concentrations have decreased two orders of magnitude since 2000, and the 2007 results show concentrations are still low. This apparent decrease in DRO concentration could be attributed to biodegradation.

The 1997 Baseline Risk Assessment determined that the only potential ecological receptors within the drainage ditch were freshwater invertebrates. Although these could serve as prey to waterfowl in the area, the assessment concluded that there was negligible potential for adverse effects to waterfowl from contaminants in the surface water, sediments, or prey at Area K. The primary hazard to freshwater invertebrates at Area K was from lead and petroleum in the surface water. The lead may have come from runoff from Airport Road

**Table 20 – Comparison of DRO Concentrations in Sediment Samples from Similar Locations along the Area K Drainage Ditch (ascending north to south; flow is to the south)**

| Sample Locations[1] | DRO Concentrations (in mg/kg) | | | | |
|---|---|---|---|---|---|
| | 1996 | 2000 | 2001[2] | 2002[3] | 2007 |
| - - | 155 | - - | - - | - - | 16 J,B |
| 1 | 9,580 | 440 | 99 | 890 | 180 J |
| 2 | - - | 150 | - - | - - | - - |
| 3 | 486 | 94 | - - | - - | - - |
| 4 | - - | 70 | - - | - - | - - |
| 5 | - - | 4,000 | - - | - - | 6,700 J / 10,000 J |
| 6 | 9,430 | 19,000 | 1,500 | 450 | 710 J |
| 7 | - - | 970 | - - | - - | - - |
| 8 | 249 | 730 | 320 | - - | - - |
| 9 | - - | 860 | - - | - - | - - |
| 10 | - - | 420 | - - | - - | - - |
| 11 | - - | 670 | 320 | - - | - - |

[1] See Figure 19 for map sample locations
[2] The 2001 samples were collected within 5 feet of the 2000 sample locations using the 2000 sample location markers, which were still in place.
[3] The 2002 samples were collected within 15 feet of 2000 and 2001 sample locations based on GPS readings and/or sample location markers from previous samples. The 2002 sample locations were closer to the center of the ditch than previous sample locations.

Notes: All concentrations are provided in mg/kg.
Double dash (- -) indicates that no sample was collected at the given time and location.
Data flags: J = Estimated value
B = Analyte present in the blank and the sample

and may not be specifically related to contamination from Area K. For the petroleum products, the primary hazard to freshwater invertebrates was from the $C_{10}$-$C_{25}$ aliphatic fraction, while the $C_{10}$-$C_{25}$ aromatic fraction was well below the hazard quotient.

The assessment also determined that the potential migration of contaminants from Area K appeared to pose a negligible risk to marine receptors (marine mammals and invertebrates) in the outfall lagoon and surrounding area.

Groundwater Data

Table 21 shows a comparison of historical analytical data from the monitoring wells at Area K for GRO, DRO, and lead (the contaminants that have exceeded cleanup levels at this site in the past). The results shown in this table indicate that contaminant concentrations in the groundwater at this site have shown a steadily decreasing trend. With a few exceptions, concentrations of these three analytes have decreased during each sampling event since 1996 in all five monitoring wells. Concentrations of GRO, DRO, and lead were below the approved ACLs and the Table C values in all the wells sampled in 2007.

### 2.6.10.3 Selected Remedy

All of the primary contaminant sources (USTs, concrete vaults, and piping) have been removed from Area K. Over 3,000 tons of fuel-contaminated soils were removed from the former tank locations during the 1999 removal actions. Confirmatory soil samples from the removal action confirmed that the lateral extent of the contamination had been found, although contamination remains in the deeper soils. The excavations were advanced to a depth of at least 2 ft-bgs, where groundwater was initially encountered, but groundwater levels dropped during the course of the removal project and an additional 3 to 4 ft of soil was removed in some areas. Confirmatory samples collected from the floor of the excavation indicated the presence of DRO above

**Table 21 – Comparison of Historical Groundwater Analytical Results at Area K Monitoring Wells**

| Well Number | Sample Date | GRO | DRO | Lead |
|---|---|---|---|---|
| MW-K1 | 1996[1] | 0.155 | 2.33 | **0.052** |
| | 2000 | - - | 1.7 J | - - |
| | 2001 | ND [0.025] J | 0.83 J | 0.0037 B |
| | 2002 | - - | - - | - - |
| | 2007 | ND [0.05] | 0.41 | 0.00021 J,B |
| MW-K2 | 1996[1] | 0.074 | 0.406 CN | 0.014 |
| | 2000 | - - | - - | - - |
| | 2001 | 0.079 J | 4.3 J | 0.0039 B |
| | 2002 | 0.081 | 1.1 | ND [0.0015] J |
| | 2007 | 0.079 | 0.77 | 0.00015 J,B |
| MW-K4 | 1996[1] | 0.313 B | 2.02 J | **0.113** |
| | 2000 | - - | - - | - - |
| | 2001 | ND [0.025] J | 0.39 J | **0.0456** |
| | 2002 | - - | - - | - - |
| | 2007 | ND [0.05] | 0.064 J | 0.00026 J,B |
| MW-K5 | 1996[1] | 0.059 B | 0.590 J | **0.074** |
| | 2000 | - - | 6.1 J | - - |
| | 2001 | 0.08 J | 8.6 J | 0.00446 |
| | 2002 | 0.26 | 1.6 | 0.0019 J |
| | 2007 | ND [0.05] | 0.14 | 0.00037 J,B |
| MW-K6 | 1996[1] | 0.447 B | 2.57 J | **0.126** |
| | 2000 | - - | 1.2 J | - - |
| | 2001 | ND [0.025] J | 0.79 J | 0.00627 |
| | 2002 | - - | - - | - - |
| | 2007[2] | - - | - - | - - |
| Approved ACLs[3] | | 13 | 15 | 0.015 |

[1] 1996 GRO by EPA Method 8015M; DRO by EPA Method 8100M
[2] MW-K6 not sampled in 2007 because well was dry
[3] Alternative groundwater cleanup levels approved in 2002, 10 times the values from 18 AAC 75 Table C, as amended December 30, 2006

Notes: All concentrations given in mg/L
Concentrations in **bold** exceed the approved ACL
Double dash (- -) indicates well either not sampled or parameter not analyzed
ND = not detected; detection limit is provided in brackets
Data flags: B = Analyte present in the method blank and the sample
CN = Hydrocarbon result in diesel range but does not resemble diesel
J = Estimated value

the approved ACL. However, because the excavation extended to the water table, these contaminated soils are not considered to pose a current risk of direct exposure, although they could pose a potential risk of exposure if they were excavated (although it should be noted that additional excavations to depths below the water table are not practicable).

Sediment sampling in the drainage ditch that runs through the site has shown that elevated DRO contamination remains in the sediments. The most recent sediment samples, collected in 2007, had DRO concentrations up to 10,000 mg/kg. However, these samples were collected from 1 to 2 feet below the top of the sediment, and the field notes indicated that no contamination was observed in the sediments above this depth. Since only the deeper sediments are contaminated, this implies that the source of the contaminated sediments has been removed. Analytical results from the surface water samples collected from the ditch indicate that the surface water is not being adversely affected by the contamination in the sediments. Since

the contaminated sediments are not at the surface, there is minimal risk of direct exposure. As long as the sediments are not disturbed, they should not pose a risk to either human health or the environment. The risk assessment determined that there is negligible potential for adverse effects to freshwater or marine receptors.

Analytical results from the groundwater monitoring wells on site have also shown that contaminants in the groundwater have decreased over time and are currently either non-detect or below the approved ACLs and Table C values.

Due to the continued presence of contamination in the sediments in the ditch, and the overall soil contamination at this site, Area K is recommended for a designation of "Cleanup Complete with ICs". ICs will include the appropriate management and disposal of the soil if the soil is excavated and of groundwater if it is accessed. The form of the ICs will be determined based on discussions with the landowner, the Alaska Department of Transportation and Public Facilities.

## 2.7 State Acceptance

The Alaska Department of Environmental Conservation agrees that the preferred alternatives and the designated institutional controls for each of the sites comply with Alaska law.

## 2.8 Community Acceptance

Community acceptance was determined through solicitation of public comments, both through an open public comment period and during public meeting. No comments were received.

## 2.9 Selected Remedies

### 2.9.1 Summary of Rationale for the Selected Remedies

Based on the information available, USACE and ADEC believe the selected remedies will protect human health and the environment, and comply with cleanup requirements.

### 2.9.2 Description of Selected Remedies

Under current ADEC policy, sites can either be designated as "Cleanup Complete" or "Cleanup Complete with ICs". All but two sites at the Sitka NOB (Areas F and K), have been recommended for "Cleanup Complete".. Under "Cleanup Complete" no further investigations or cleanup actions are necessary. This status may be reviewed and modified in the future if new information becomes available which indicates the presence of contamination or exposure routes that may cause a risk to human health or the environment. Table 22 summarizes the "Cleanup Complete" sites.

**Table 22. Sites Recommended for Cleanup Complete at the Sitka Naval Operations Base FUDS**

| Site | Explanation for Cleanup Complete |
|---|---|
| A | DRO concentrations were detected up to 8,400 mg/kg. This is above the migration to groundwater ACL of 2,300 mg/kg, above the ingestion cleanup level of 8,250 mg/kg, and below the inhalation cleanup level of 12,500 mg/kg. However, the remaining contamination is *di minimus* in quantity and located either in bedrock cracks or below the water table. No DRO was detected in the groundwater above the ACLs or Table C. Four fuel-related PAHs (benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were detected above ACLs in one or two soil samples. These samples are co-located with high DRO concentrations, are also limited in volume and located in bedrock cracks or below the water table. Lead was detected in two soil samples out of 24 above the cleanup level of 400 mg/kg (maximum detected was 480 mg/kg). No dissolved lead was detected in the groundwater. |
| B | No COCs remain above the ACLs or Table C values. |
| C | All COC results were below the ACLs except lead. Lead was detected in two soil samples (up to 1,200 mg/kg) above the cleanup level of 400 mg/kg. The two samples were located beneath former tanks. Attempts to relocate |

| Site | Explanation for Cleanup Complete |
|---|---|
| | these locations in a later investigation failed leading to the conclusion they were isolated occurrences and potentially from lead-base paint on the former tanks. |
| D | With the exception of DRO and lead, all COC concentrations were below ACLs. DRO was above ACLs in 5 of 122 samples and lead 2 of 122 samples. The DRO contamination is limited in volume and located subsurface. The two high lead concentrations were at least eight feet below grade. No COC have been detected in the groundwater. |
| E | All COC sample concentrations were below the ACLs except for minor occurrences of DRO and lead. The highest DRO concentration of 8,100 mg/kg was above the migration to groundwater ACL of 2,300 mg/kg, below the ingestion cleanup level of 8,250 mg/kg, and below the inhalation cleanup level of 12,500 mg/kg. No POL contaminant concentrations were detected in the groundwater above ACLs or Table C. Seven of the 31 lead samples were over the ACL of 400 mg/kg. All of these samples were from the bedrock floor at the bottom of two excavations. These are now covered with clean fill. Lead was detected in one unfiltered groundwater sample. These DRO and lead concentrations are considered *di minimus* in quantity and located where there is no complete exposure pathway. |
| H | All COC concentrations are below ACLs. |
| I | All COC concentrations are below ACLs. |
| J | All COC concentrations are below ACLs except for two (out of 23) DRO samples. The two DRO samples were taken from the same location at different depths. A re-sampling of the highest DRO concentration (43,000 mg/kg) had a result of 730 mg/kg. The DRO concentrations are considered limited in volume. |

Under "cleanup complete with ICs", no further actions or cleanups may be necessary, but appropriate ICs must be initiated and remain in place to minimize the risk of exposure. Table 23 summarizes the "cleanup complete with ICs" sites at the Sitka NOB.

**Table 23. Sites recommended for Cleanup Complete with ICs at the Sitka Naval Operations Base FUDS**

| Site | Explanation for Cleanup Complete with ICs |
|---|---|
| F | All COC concentrations were below their respective ACLs except for four (out of 91) DRO samples, four (out of 18) RRO samples, one (out of 86) benzo(a)anthracene samples, one (out of 80) benzo(a)pyrene samples, one (out of 86) dibenzo(a,h)anthracene samples, and five (out of 25) lead samples. The PAHs had their one exceedence all in one sample location that was 13 feet below grade. The highest DRO exceedence was 5,700 mg/kg, which is above the migration to groundwater ACL of 2,300 mg/kg, below the ingestion cleanup level of 8,250 mg/kg, and below the inhalation cleanup level of 12,500 mg/kg. The highest RRO exceedence of 18,000 mg/kg was above ingestion cleanup level of 8,300 mg/kg, below the inhalation cleanup level of 22,000 mg/kg, and migration to groundwater cleanup level of 9,700 mg/kg. The POL constituents (DRO, RRO and PAHs) are considered limited in volume and in locations with low exposure (under paved parking lots). Four of the five lead samples were collected from the floor of an excavation beneath the water table and the fifth from a sidewall adjacent to Tongass Drive. Potential for exposure to the remaining contamination is low due to the depth and as long as the asphalt "cap" remains in place. Samples from surface water in the area have not been above water quality standards. |
| K | The concentrations of COC in soils were below ACLs with the exception of DRO in 20 (of 70) samples. All the high DRO samples were collected at the bottom of excavations that were at, or below the water table. These sampling points are now covered with three to 6.5 feet of clean backfill. The 2007 groundwater-sampling event had no DRO above ACLs or Table C. Benzo(a)pyrene exceeded it's ACL in one (out of 47) soil samples. This sample was collected from the same tank excavation as the high DRO. It is now covered by 2 feet of clean fill. The site could pose a potential exposure risk if soils were excavated. |

### 2.9.3 Compliance of Selected Remedies with ARARs

CERCLA hazardous substances were found at some sites at concentrations that required a response action. Response actions at the Sitka NOB sites complied with ARARs. POLs are not regulated under CERCLA. Therefore, CERCLA requirements as well as state legal authorities are not considered ARARs with respect to the response action to POL. The DERP provides authority to cleanup petroleum contamination when it may pose an imminent and substantial endangerment to public health, welfare or the environment. Alaska's Site Cleanup Rules (18 AAC 75 Article 3) are risk based and indicative of when an imminent and substantial endangerment to the public health or welfare or the environment has been mitigated. Accordingly, the petroleum contamination clean up at these sites was consistent with Alaska's Site Cleanup Rules.

### 2.9.4 Summary of the Estimated Remedy Costs

The only costs associated with the "Cleanup Complete" and "Cleanup Complete with ICs" sites are administrative. No direct remedial costs will be incurred. The estimated administrative cost to close these sites is $20,000.

### 2.9.5 Expected Outcome of the Selected Remedies

Because some isolated areas of soil remain above cleanup levels, these sites will not be available for unrestricted use, but will be subject to the following restrictions:

1) Groundwater cannot be used for drinking water; potable water is currently supplied by the City of Sitka, and all landowners agreed with this restriction in 2002 when groundwater ACLs were requested by USACE and approved by ADEC.

2) If soil is excavated on site, the landowner must check with ADEC prior to disposal. It would be acceptable for the soil to remain on site (as long as it is not placed in an environmentally sensitive area), but disposal of soil off-site must be coordinated with ADEC.

3) The parking lot associated with the hospital at Area F needs to remain in place. The hospital as-built drawings will be annotated to note that soil contamination may be present in isolated locations beneath the asphalt.

4) Deed notice information, including a map showing areas of remaining soil contamination, will be provided to the City of Sitka and all landowners. The deed notice will indicate that soil and groundwater contamination may still be present and that the landowner should contact ADEC prior to disposal of any contaminated soil that may be encountered. Deed notices will also be filed with the Alaska Recorders Office. USACE will also provide this information to ADEC for inclusion in their Contaminated Sites Database.

# Part 3: Responsiveness Summary

This Responsiveness Summary provides responses to comments received by the US Army Corps of Engineers (USACE) regarding the Proposed Plan for the former Sitka NOB Formerly Used Defense Site (FUDS), Sitka, Alaska. The Proposed Plan was issued September 25, 2008. No comments were received.

Efforts to include the public in this process have entailed:

- A 30-day public comment period between October 1 and October 31, 2008.
- A public meeting held in Sitka on October 28, 2008, with representatives from USACE and the Alaska Department of Environmental Conservation (ADEC) to discuss the Proposed Plan (a copy of the presentation given at the meeting is included in Appendix D).
- A website to provide the public with electronic versions of the Proposed Plan.
- Advertisements in the Sitka local newspaper for both the Proposed Plan and for the Public Meeting (a copy of the newspaper ads are provided in Appendix D).

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# Part 4: References

Alaska Administrative Code (AAC), 18 AAC 70, Water Quality Standards, amended December 28, 2006.

AAC, 18 AAC 75, Oil and Hazardous Substances, Pollution Control Regulations, Cleanup Standards, amended October 2008.

Alaska Department of Environmental Conservation (ADEC), 2009, Site Closure Memorandum, July 2009.

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USACE 2004, Environmental Quality Formerly Used Defense Sites (FUDS) Program Policy, ER 200-3-1, May 10, 2004.

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WC, 1996, Final Phase II Remedial Investigation Report - Sitka Naval Operating Base, Sitka, Alaska, August 1996.

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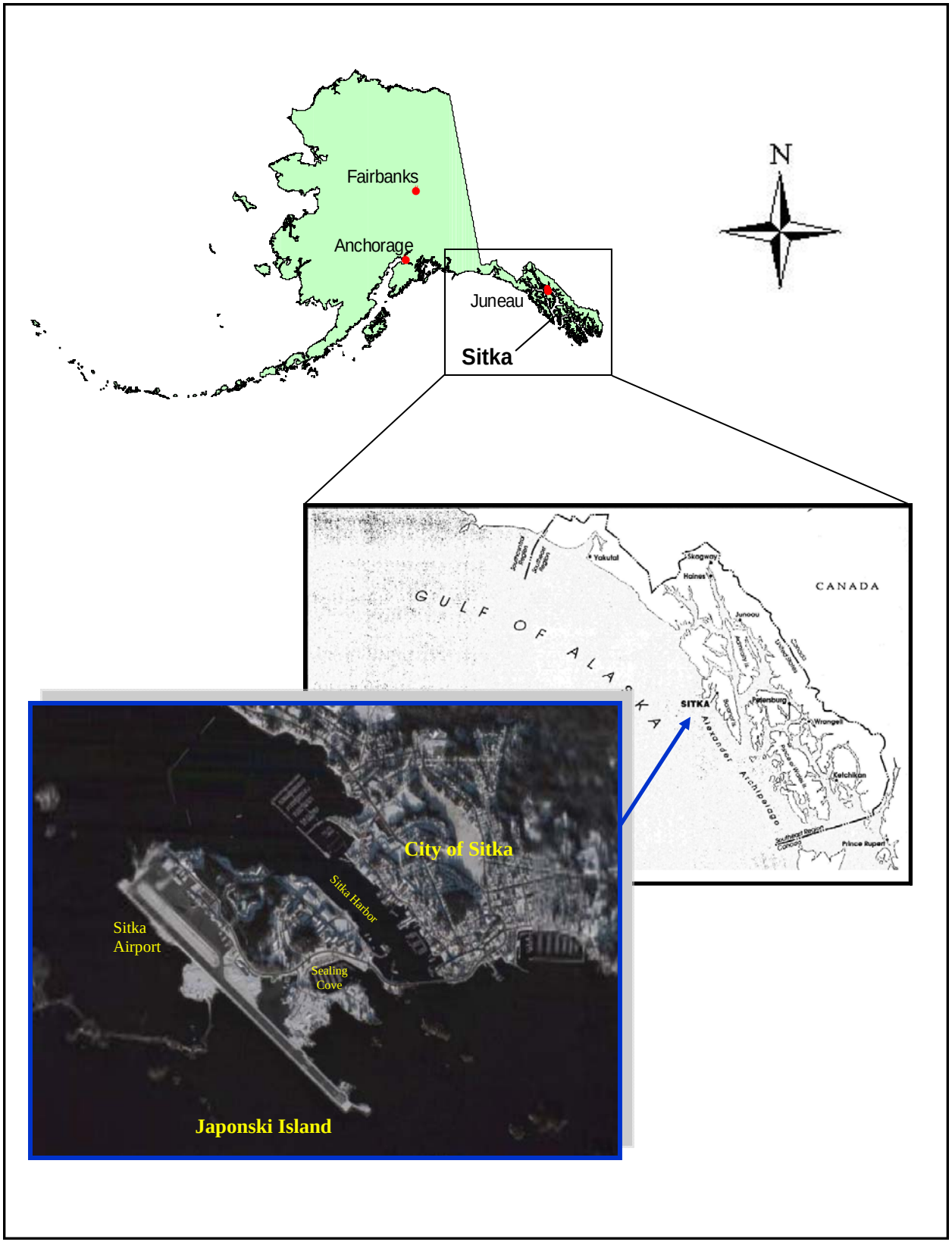
# FIGURES

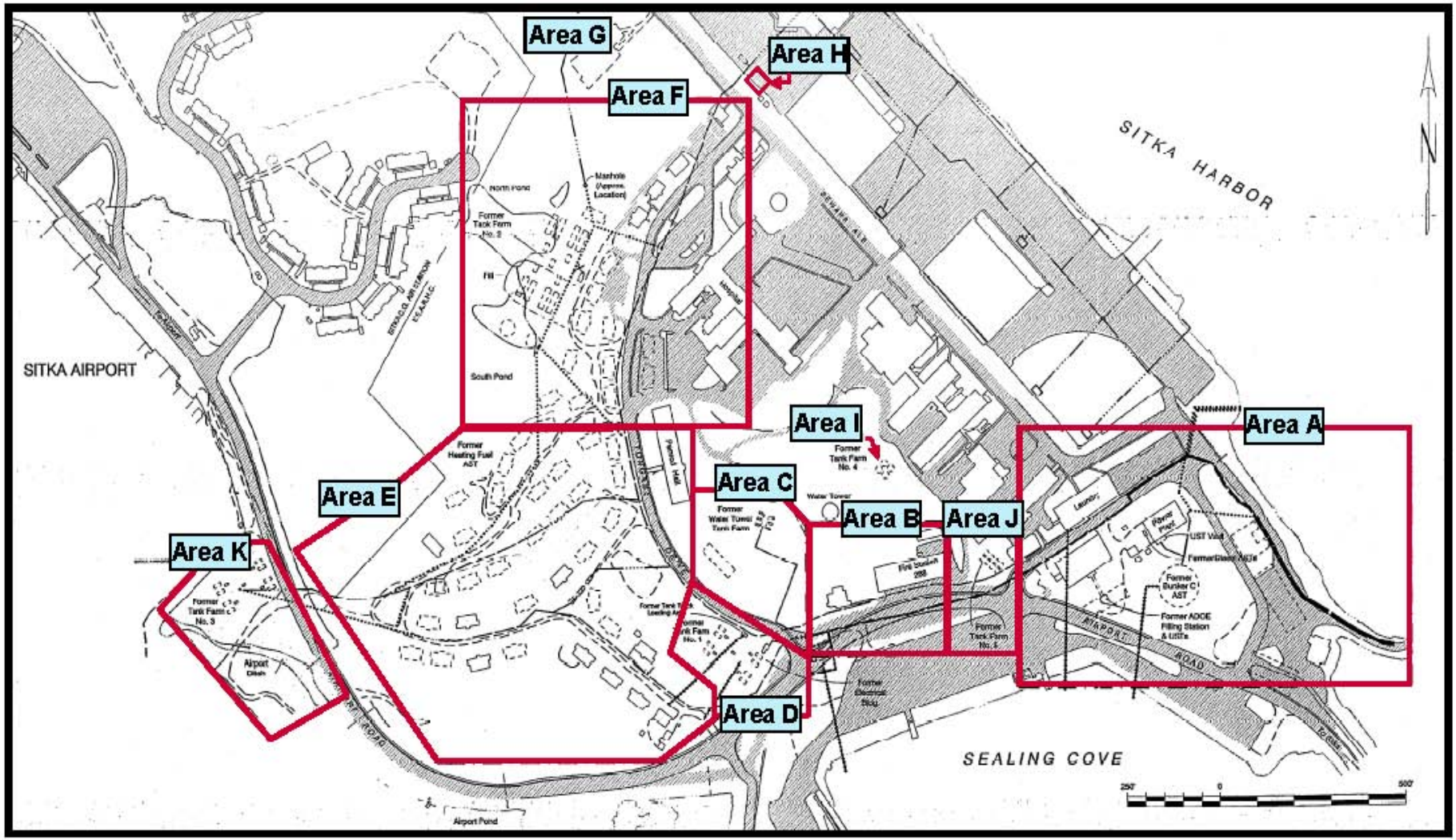



Location Map for Sitka and Japonski Island

U.S. Army
Corps of Engineers
Alaska District

Sitka NOB
Decision Document
Ref: Proposed Plan
USACE, 2008

Figure 1

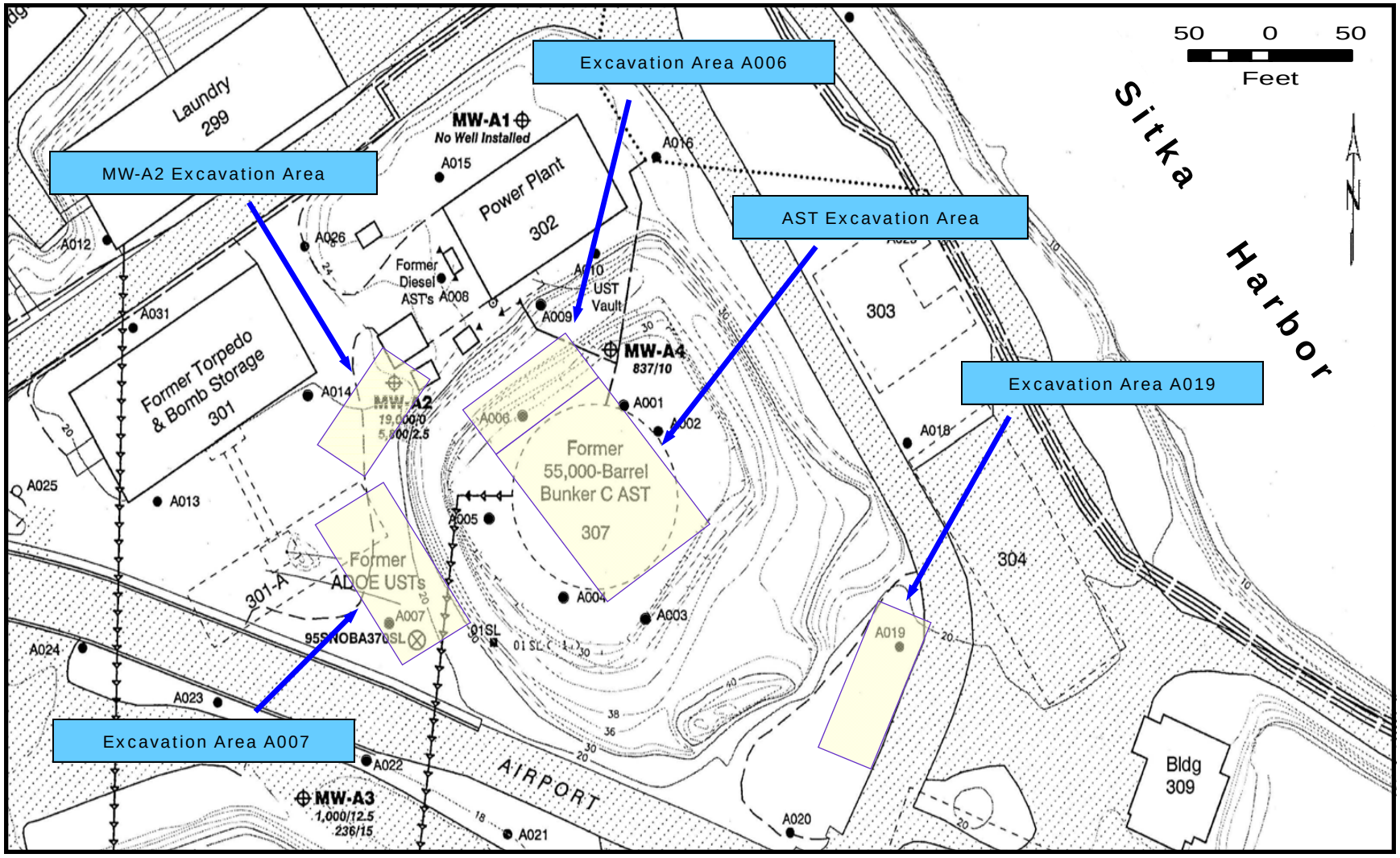



Areas of Concern at the Sitka NOB

U.S. Army
Corps of Engineers
Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 2




**Legend**

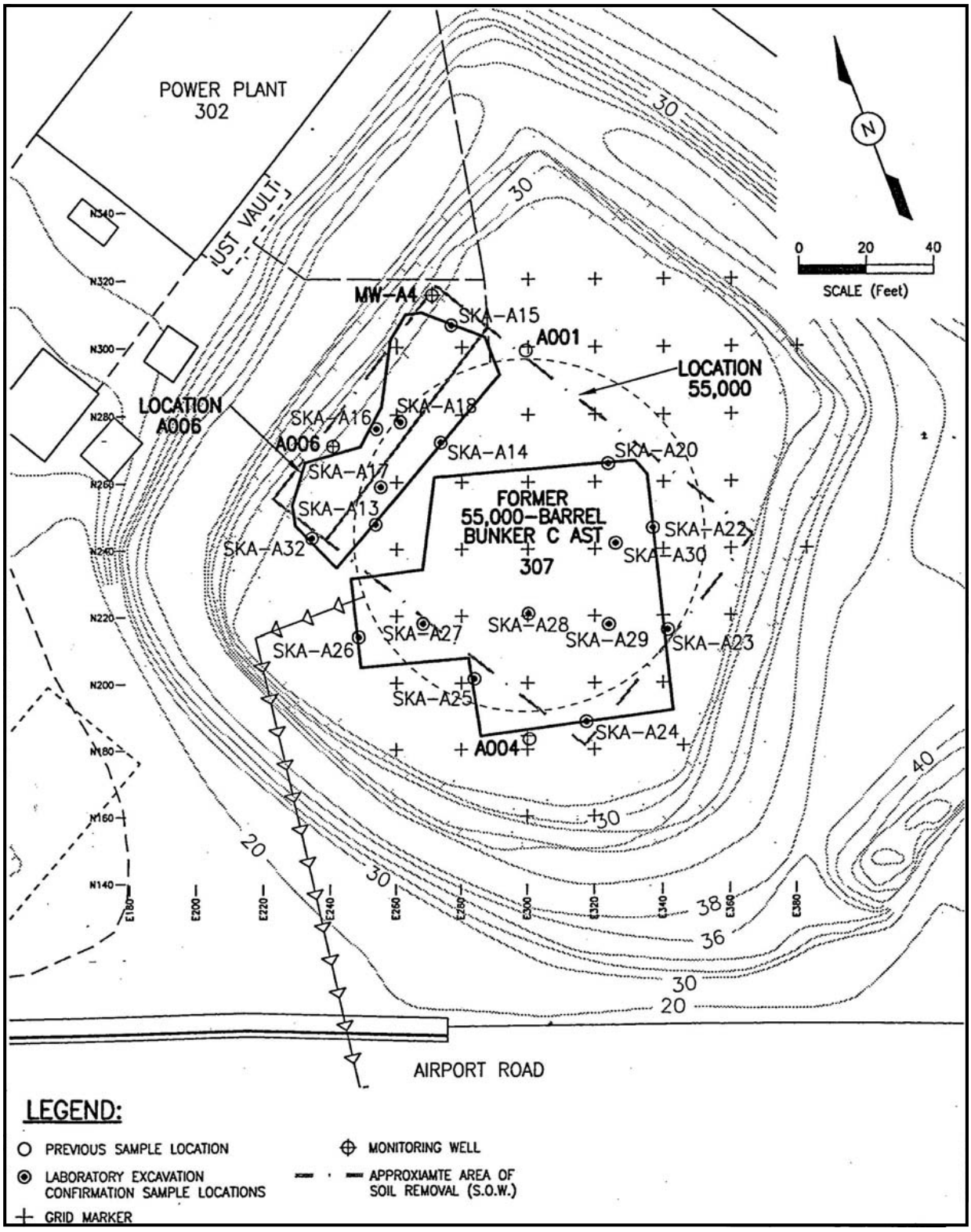
- Excavation area
- A006 Test Pit
- MW-A1 Monitoring Well

Area A—Location of 1999 Removal Action Excavations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 4

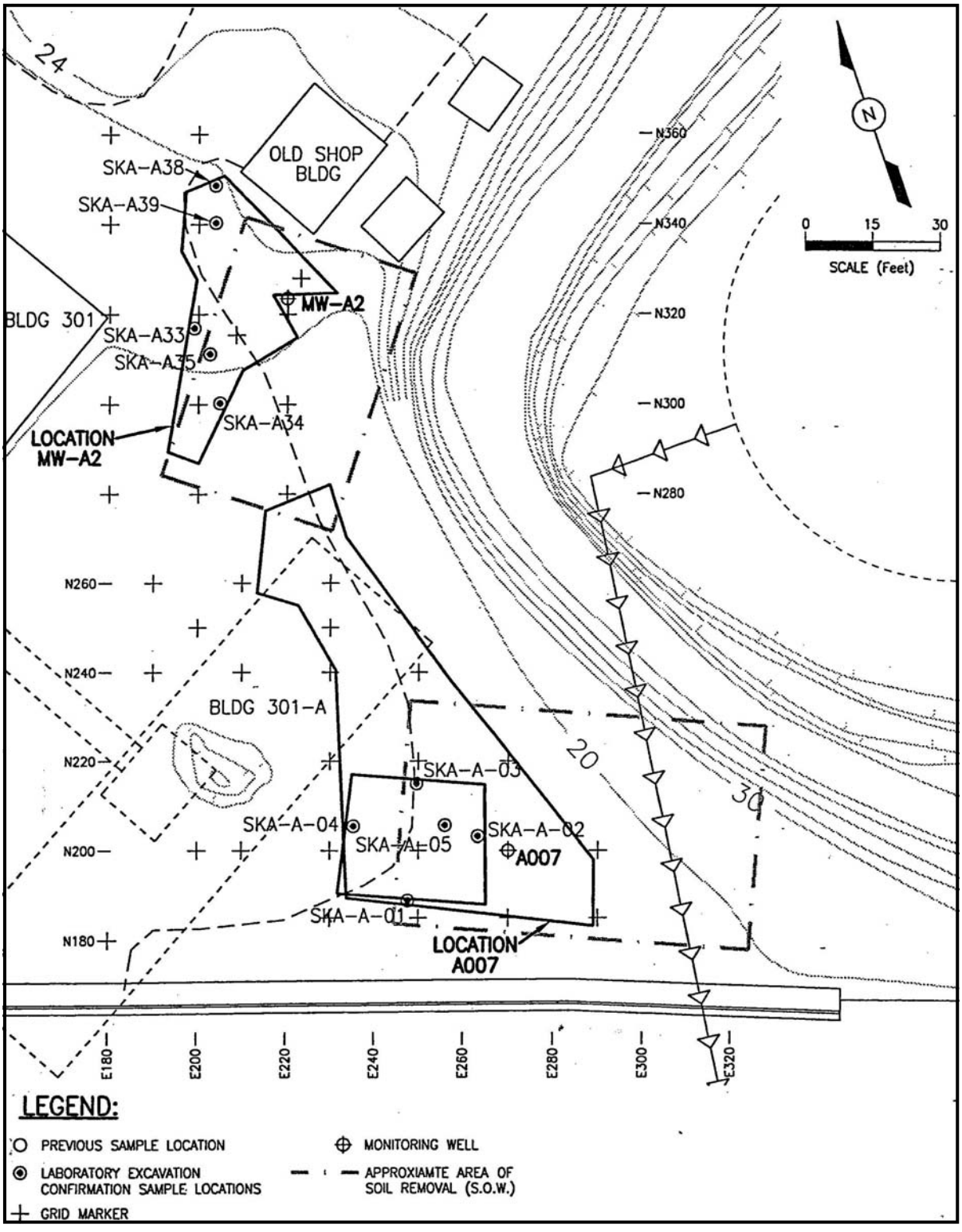



Area A—Location of 1999 A006 and Former AST Excavations and Associated Confirmatory Samples

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Remedial Action Report
OHM Remediation Services, 1999

Figure 5

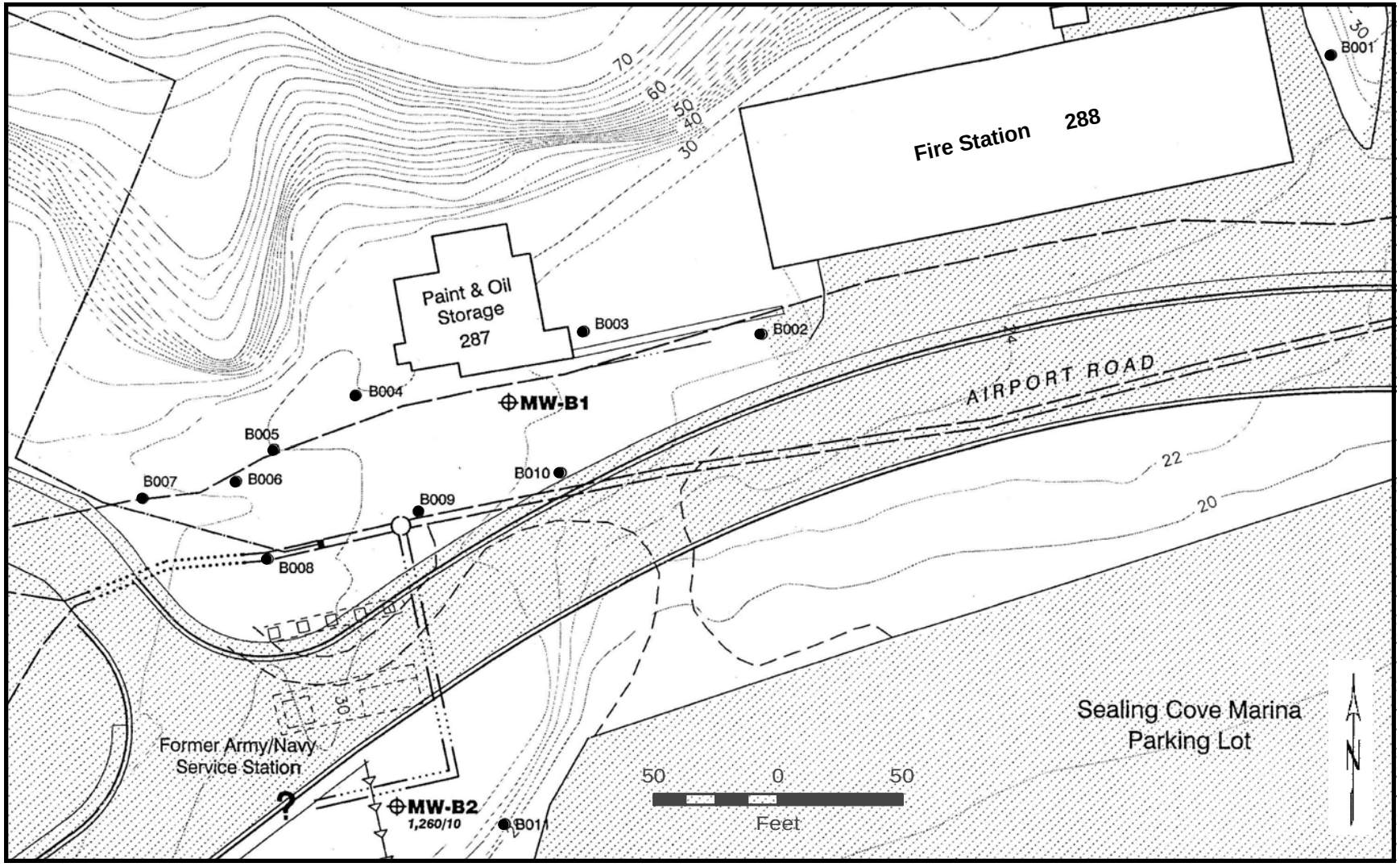



Area A—Location of 1999 A007 and MW-A2 Excavations and Associated Confirmatory Samples

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Remedial Action Report
OHM Remediation Services, 1999

Figure 6




**Legend**

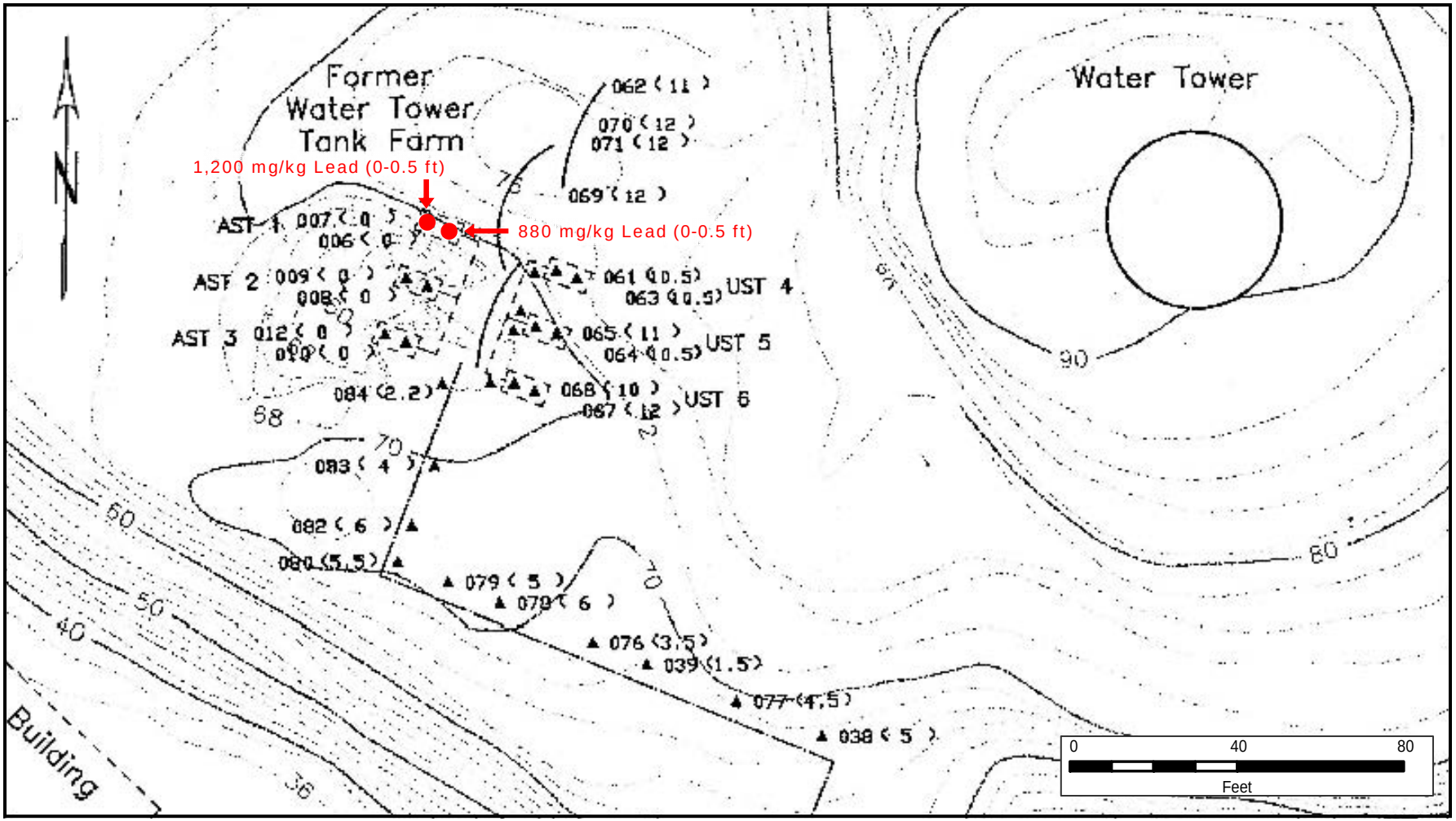
- ● **B001** **Test Pit**
- ⊕ **MW-B1** **Monitoring Well**

Area B—Site Map and RI Sample Locations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 7




**Legend**

▲ Shannon & Wilson Soil Sample (1994)

084 (2.2) Sample Number & Depth

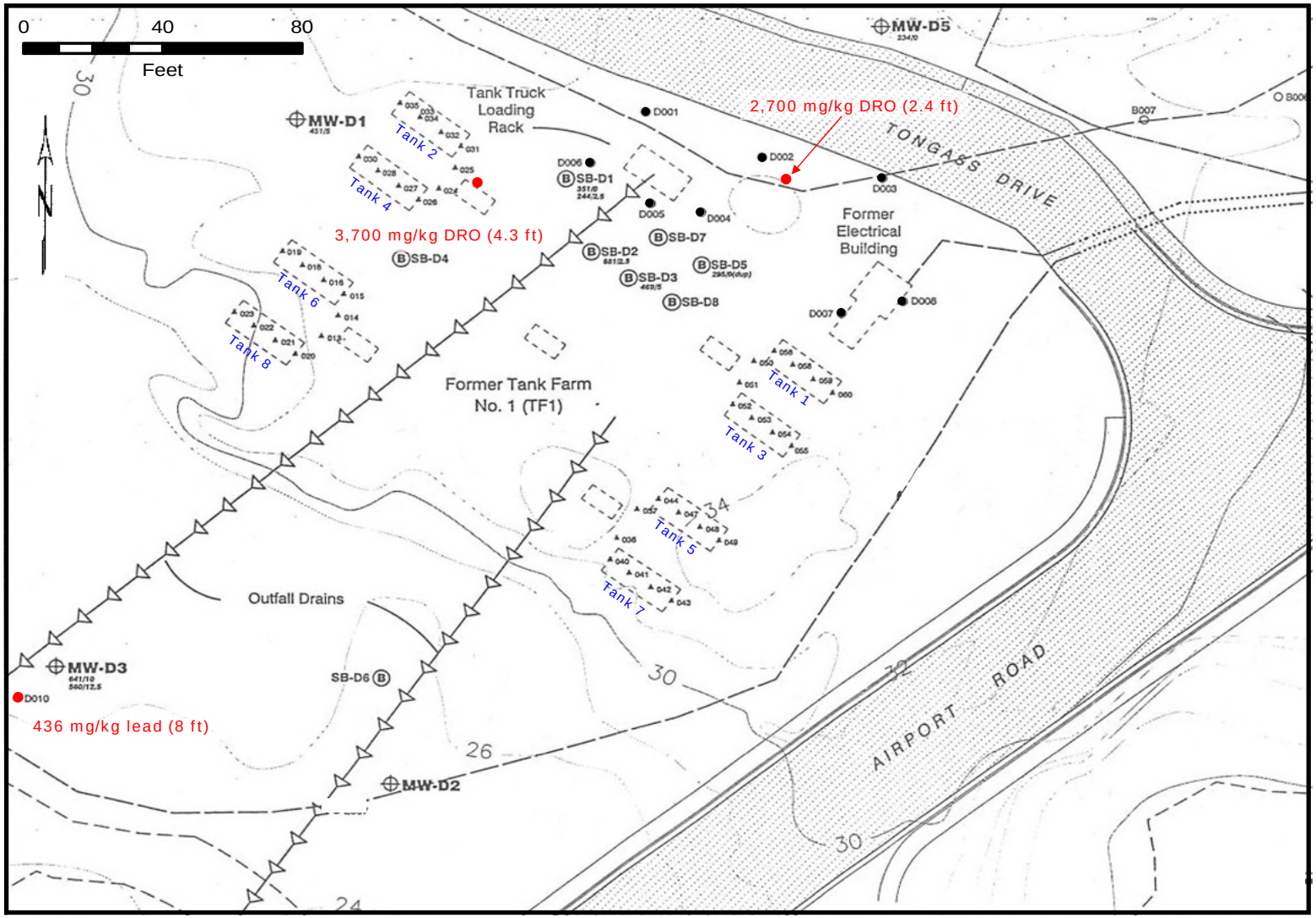
● Sample Exceeding 2002 Approved ACLs

Area C—Sample Locations with ACL Exceedences

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 8




**Legend**

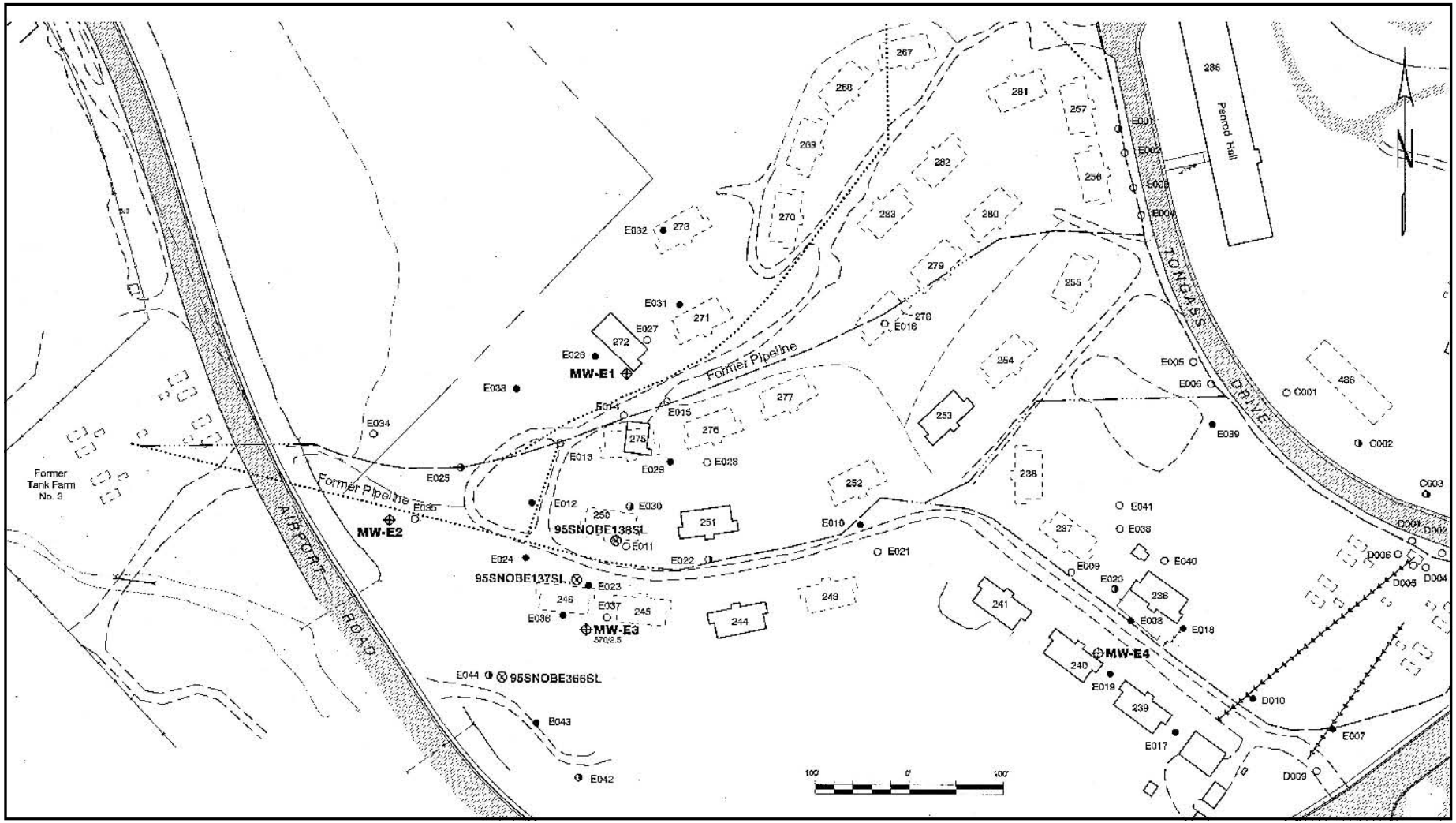
- ▲ **001** Tank removal sample locations
- ● **D006** Test Pit (1994 RI)
- Ⓑ **SS-D1** Soil Boring (1995 RI)
- ⊕ **MW-D1** Monitoring Well
- ● Sample exceeding approved ACLs

# Area D—Sample Locations with ACL Exceedences

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 9




**Legend**

WC 1994 FIELD INVESTIGATION SAMPLES:

- ○ Test Pit w/Groundwater Encountered
- ● Test Pit w/Bedrock Encountered
- ◑ Test Pit w/Groundwater & Bedrock Encountered

E001 Test Pit Number

WC 1995 SAMPLE LOCATIONS

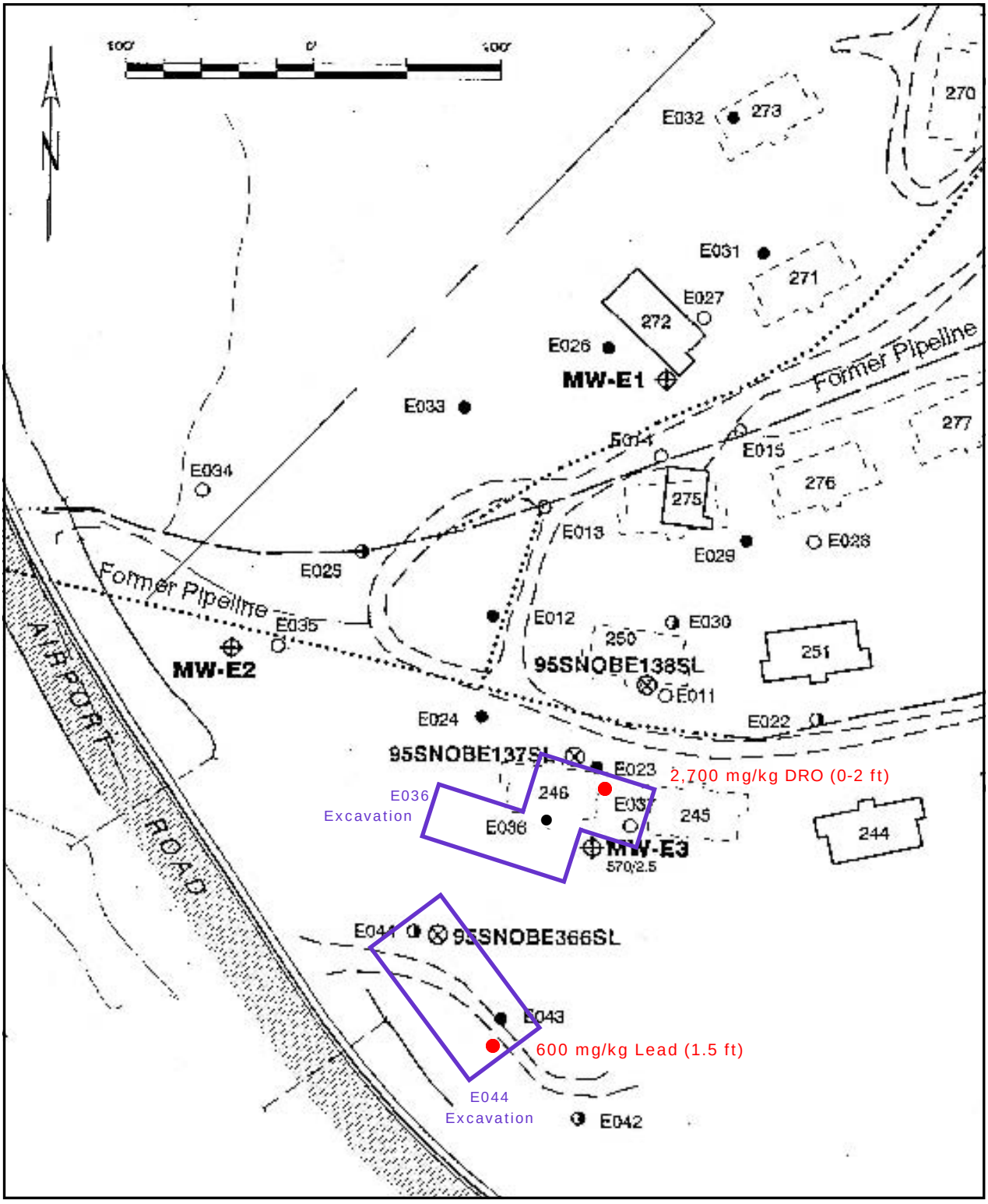
- ⊕MW Monitoring Well
- ⊗ Surface Sample for Lead Analysis
- 570/2.5 DRO (ppm) / Depth bgs (ft)

# Area E—Site Map and RI Sample Locations

U.S. Army
Corps of Engineers
Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI
Woodward-Clyde, 1995

Figure 10




**Legend**

WC 1994 FIELD INVESTIGATION SAMPLES:
- ○ Test Pit w/Groundwater Encountered
- ● Test Pit w/Bedrock Encountered
- ◑ Test Pit w/Groundwater & Bedrock Encountered

E001 Test Pit Number

WC 1995 SAMPLE LOCATIONS
- ⊕MW Monitoring Well
- ⊗ Surface Sample for Lead Analysis
- 570/2.5 DRO (ppm) / Depth bgs (ft)

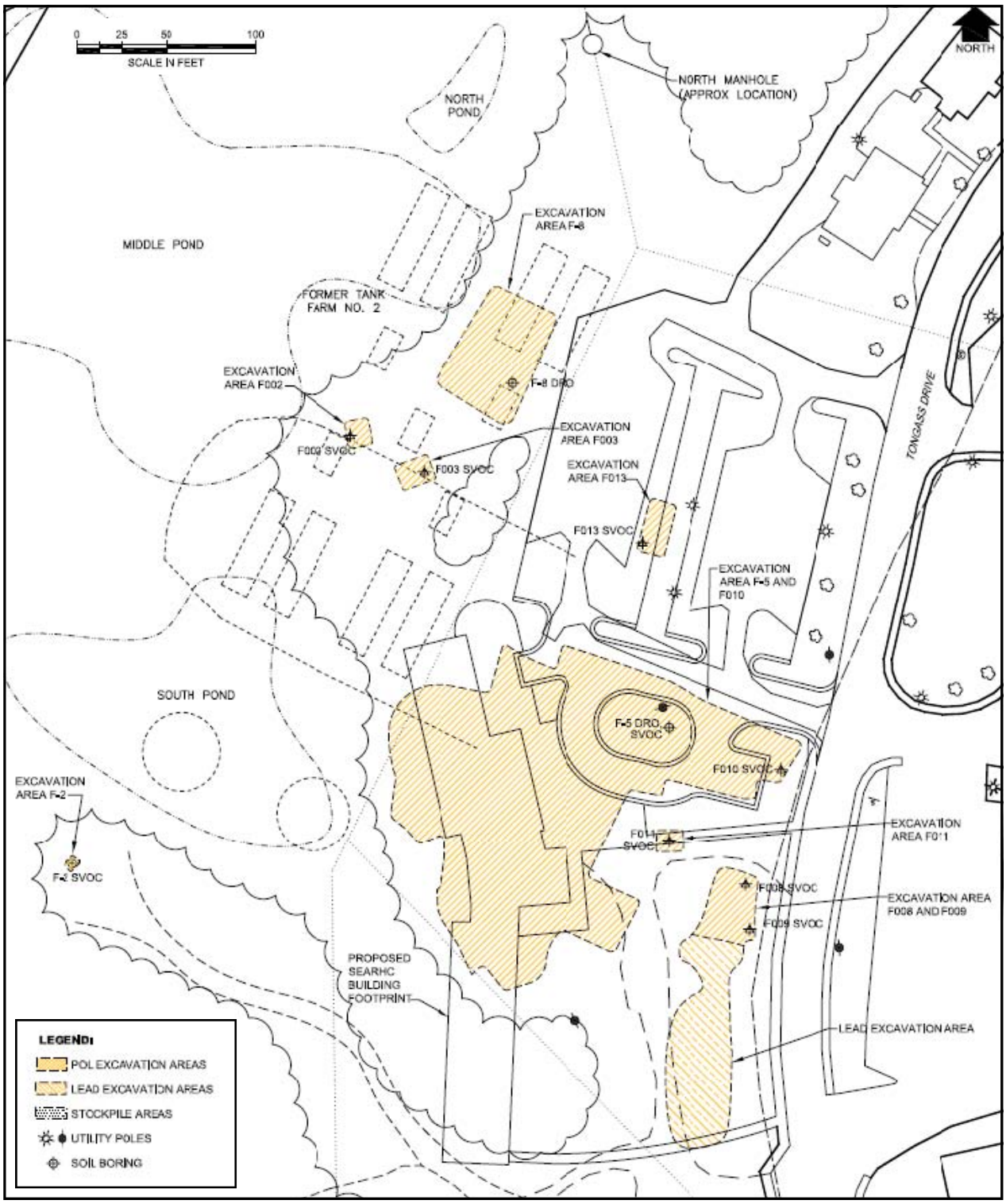
● Location of Samples Exceeding ACLs

Area E—Location of 1999 Removal Action Excavations and Samples Exceeding ACLs

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 11

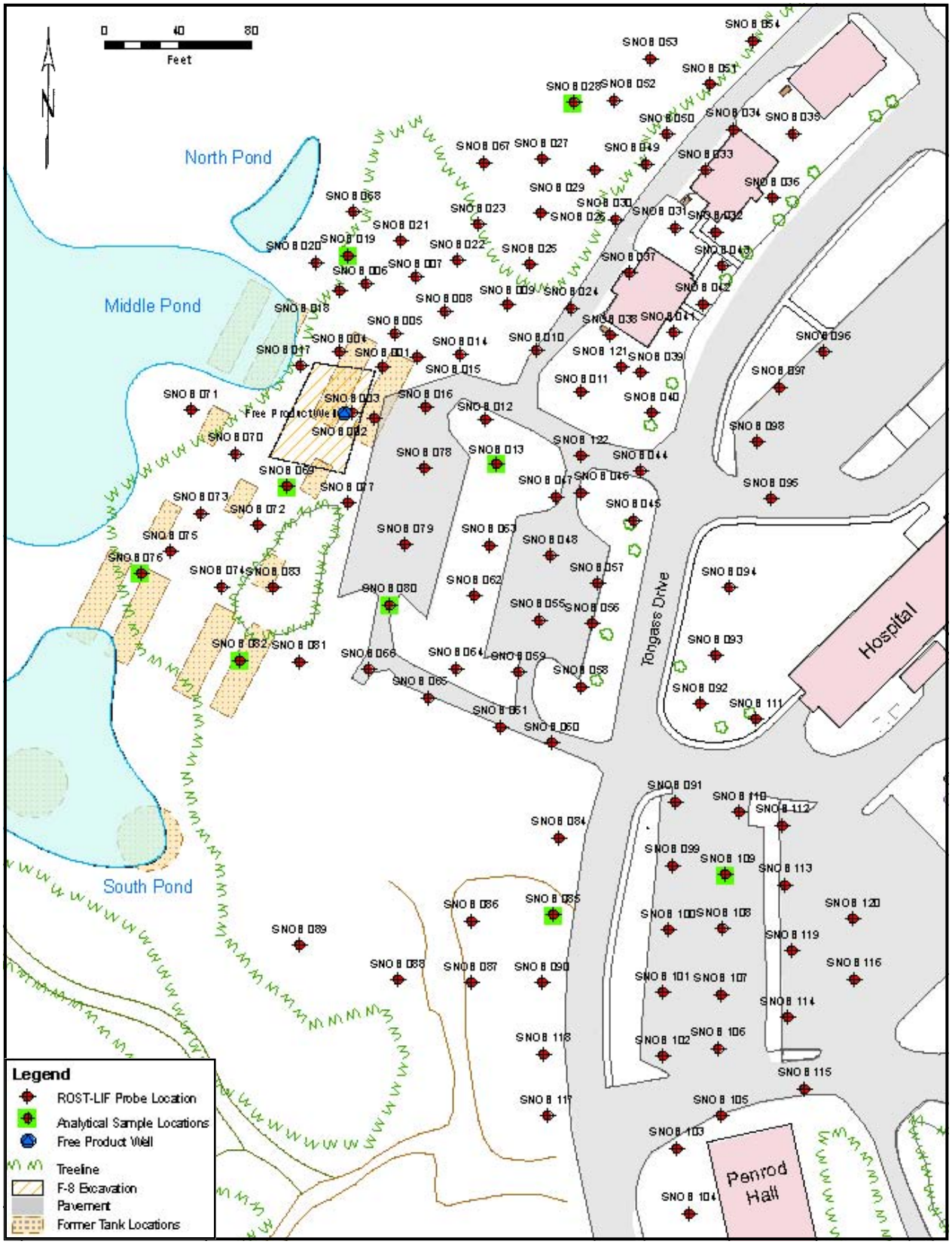



Area F—Location of 2005 Removal Action Excavations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Remedial Action Report
Jacobs Engineering Group, 2006

Figure 12

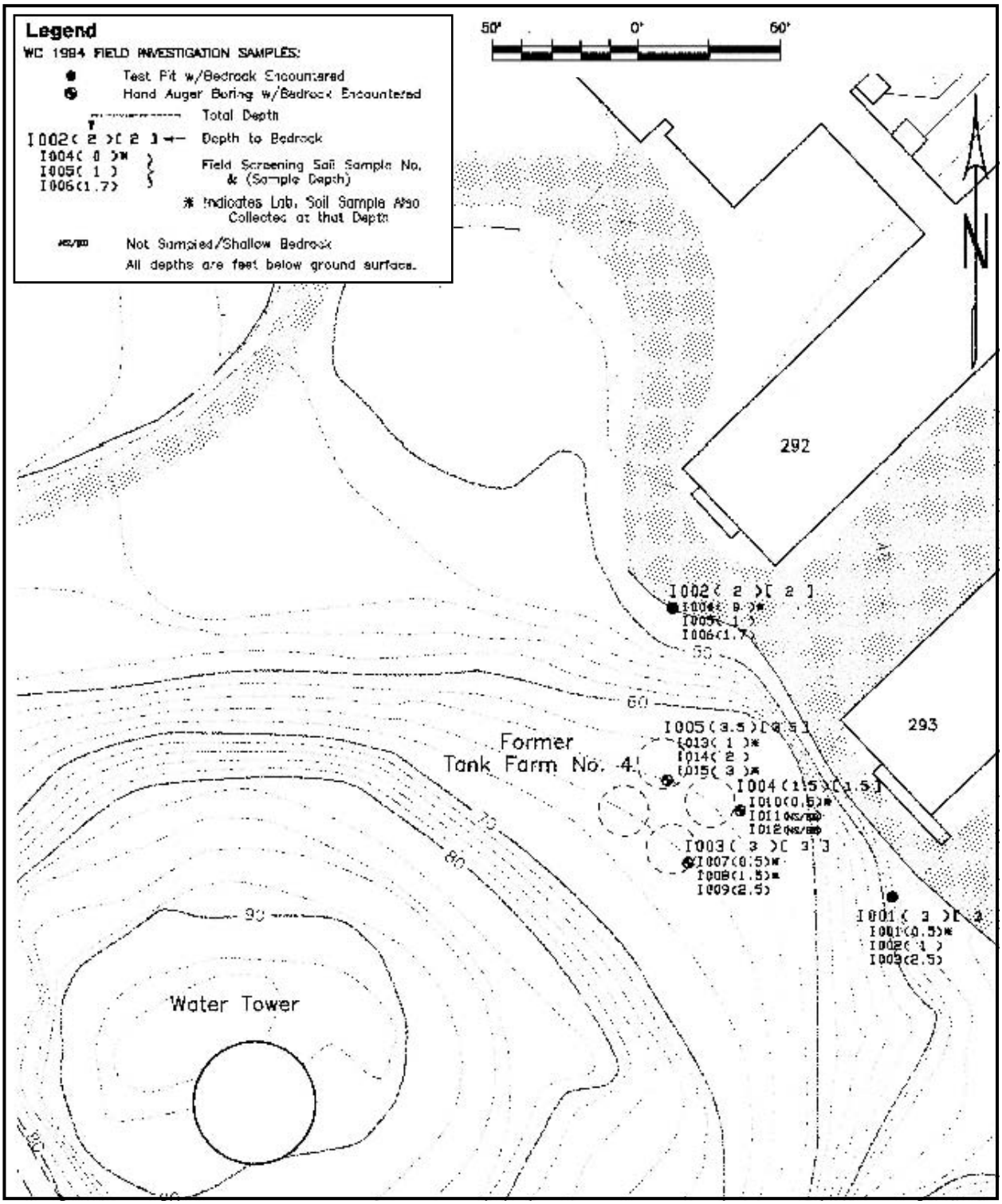



Area F—Location of 2007 ROST Probes

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Site Investigation Report USACE, 2008

Figure 13

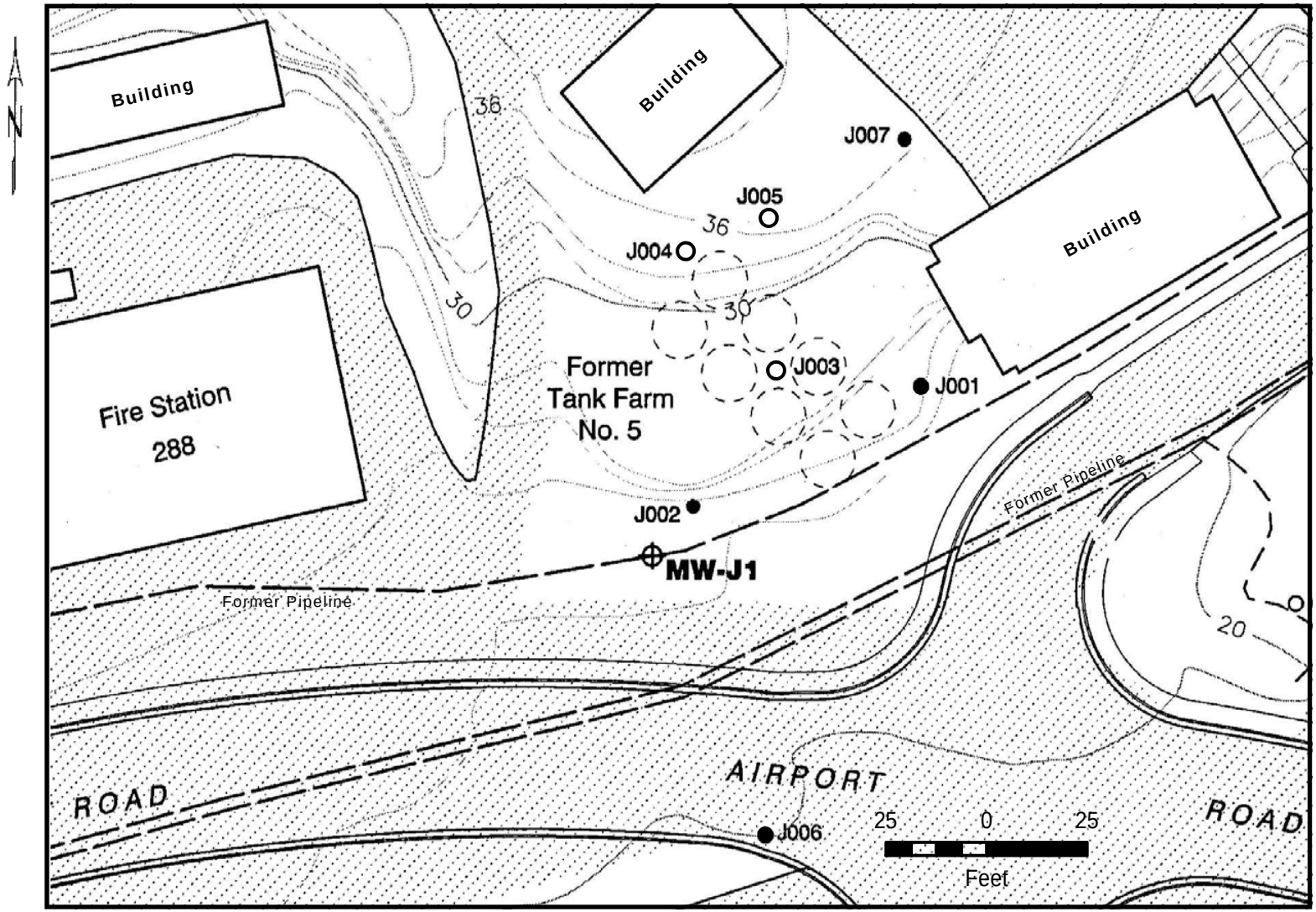



Area I—Site Map and RI Sample Locations

U.S. Army
Corps of Engineers
Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 15




**Legend**

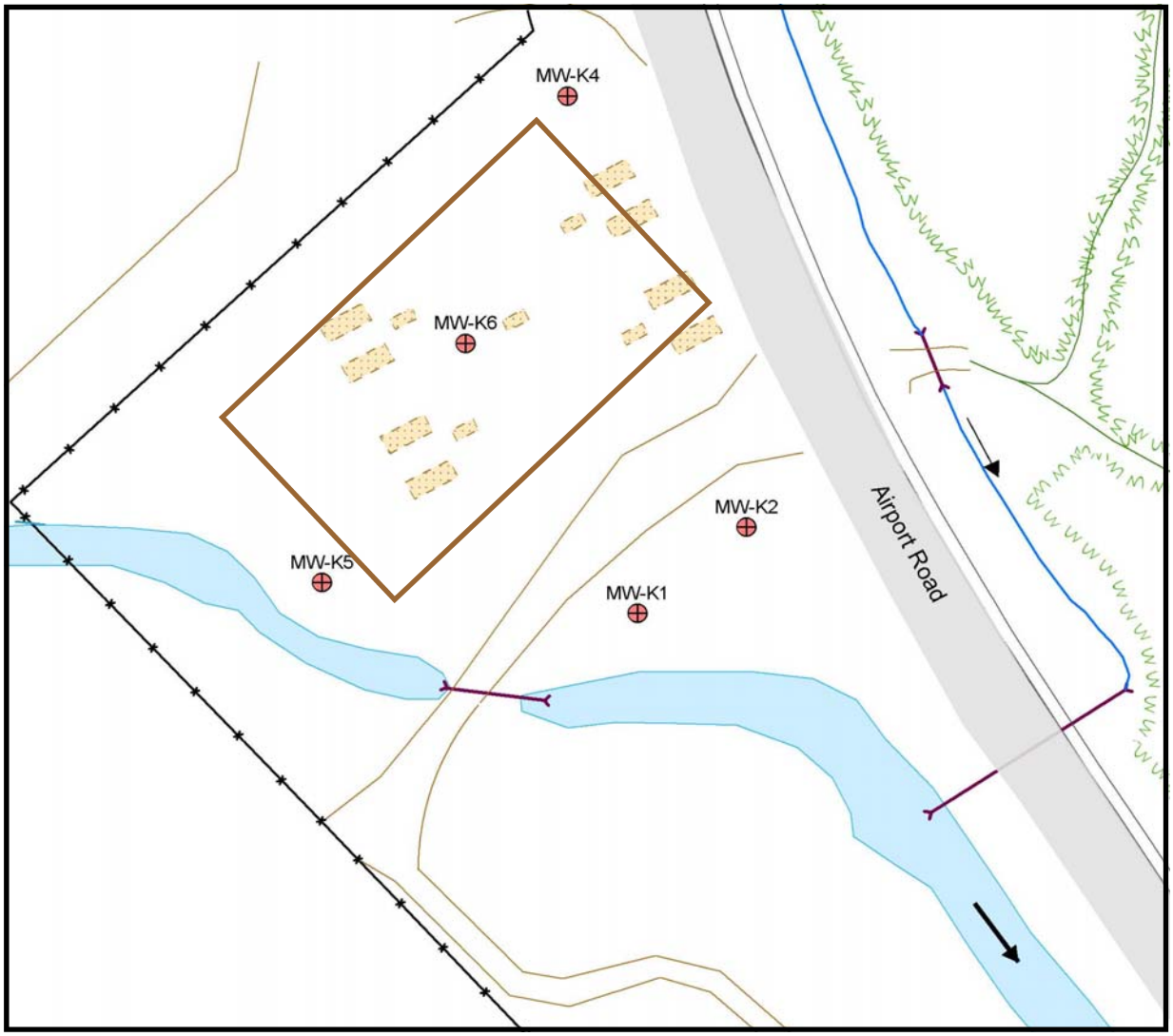
- ● **J001** **Test Pit**
- ○ **J003** **Hand-auger Boring**
- ⊕ **MW-J1** **Monitoring Well**

Area J—Site Map and RI Sample Locations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Phase I RI Report
Woodward-Clyde, 1995

Figure 16




**Legend**

- Monitoring Wells
- Excavation Area
- Culvert
- Flow Direction
- Former Tank Locations

N

0 40 80

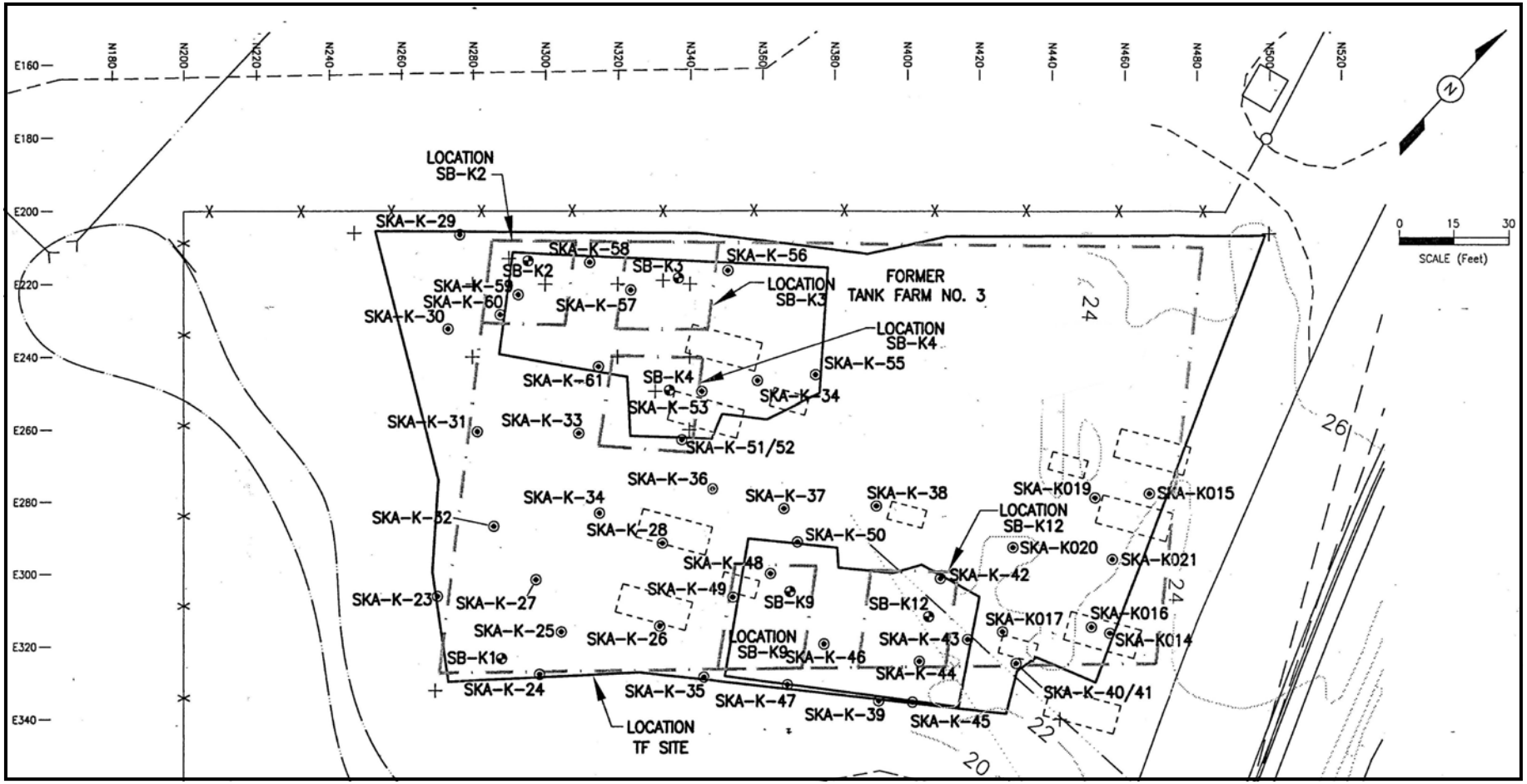
Feet

Area K—Site Map and Location of 1999 Removal Action Excavation

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Remedial Action Report
OHM Remediation Services, 1999

Figure 17




**LEGEND:**

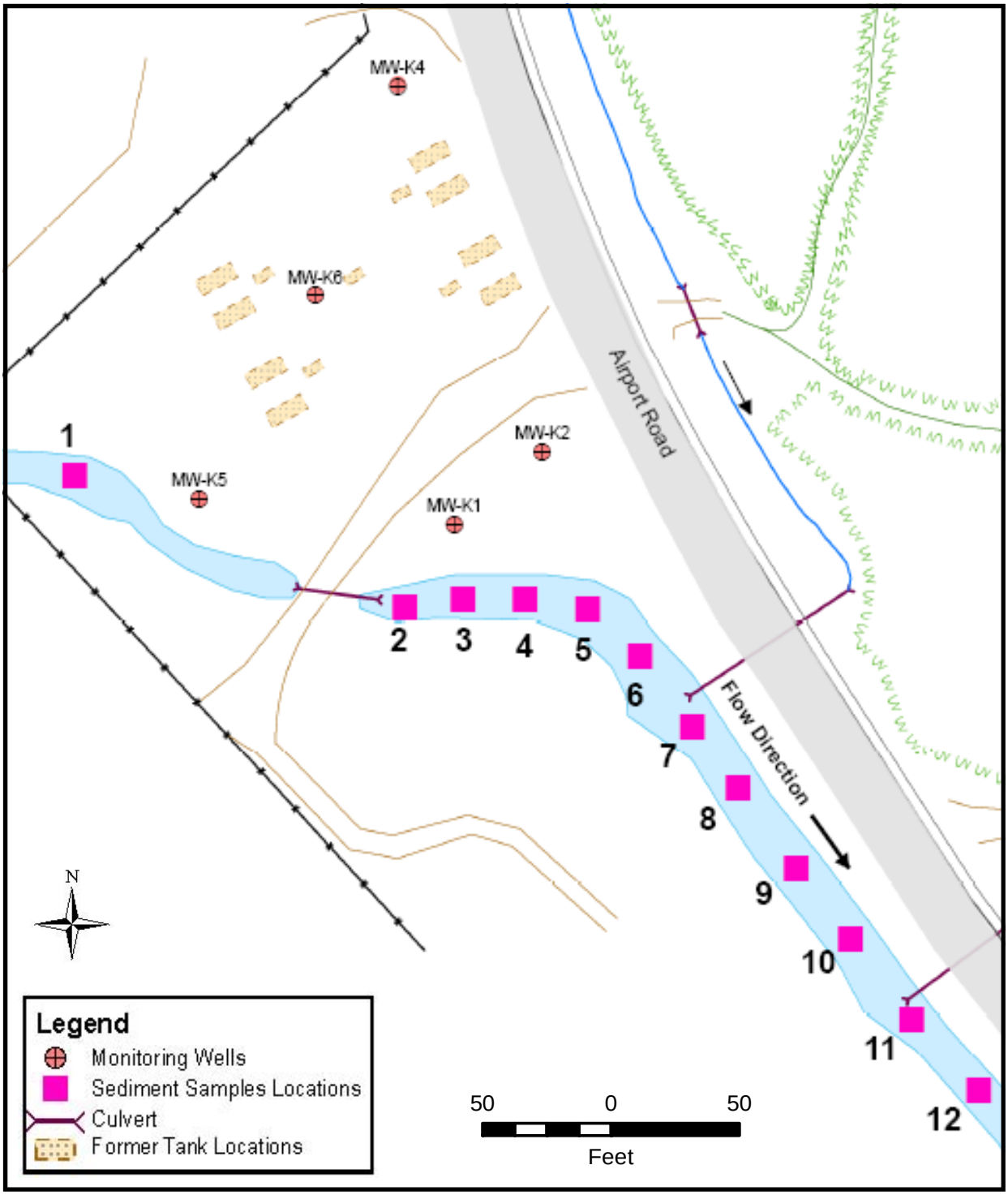
- GRID MARKER
- BORING
- LABORATORY EXCAVATION CONFIRMATION SAMPLE LOCATIONS
- APPROXIAMTE AREA OF SOIL REMOVAL (S.O.W.)

Area K—1999 Removal Action Excavation and Confirmatory Sample Locations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Remedial Action Report
OHM Remediation Services, 1999

Figure 18




Area K—Sediment Sampling Locations

U.S. Army Corps of Engineers Alaska District

Sitka NOB
Decision Document
Ref: Site Investigation Report USACE, 2008

Figure 19