# CLEAN-UP DECISION DOCUMENT

# LONG ISLAND
# KODIAK, ALASKA
## (FUDS Property Nos. F10AK0280-01, F10AK0280-02, F10AK0280-03)

# FINAL
# AUGUST 2005

**Prepared for:**
**U.S. Army Corps of Engineers**
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**Total Environmental Restoration Contract**
**Contract No. DACA 85-95-D-0018**
**Task Order No. 06**

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## TABLES

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## FIGURES



## APPENDICES

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ACL | alternative cleanup level |
| ACM | asbestos-containing material |
| ADEC | Alaska Department of Environmental Conservation |
| ANCSA | Alaska Native Claims Settlement Act |
| AOC | area of concern |
| ARAR | applicable or relevant and appropriate requirement |
| AST | aboveground storage tank |
| BLM | Bureau of Land Management |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COC | chemical of concern |
| COPC | contaminant of potential concern |
| CSF | cancer slope factor |
| CSM | conceptual site model |
| DERP | Defense Environmental Restoration Program |
| DoD | U.S. Department of Defense |
| DRO | diesel-range organics |
| EPA | U.S. Environmental Protection Agency |
| $F_{OC}$ | fraction of organic carbon |
| FUDS | formerly used defense sites |
| GRO | gasoline-range organics |
| IRA | interim removal action |
| mg/kg | milligram per kilogram |
| mg/L | milligram per liter |
| NA | not applicable |
| ND | not detected |
| NDAI | No Defense Action Indicated |
| N/E | none established |
| NFRAP | No Further Remedial Action Planned |

| | |
|---|---|
| PAH | polynuclear aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| POL | petroleum, oil, and lubricants |
| QA | quality assurance |
| QC | quality control |
| RAO | remedial action objective |
| RCRA | Resource Conservation and Recovery Act |
| RfD | reference dose |
| RI | remedial investigation |
| RRO | residual-range organics |
| SAIC | Science Applications International Corporation |
| SHPO | Site Historic Preservation Officer |
| SVOC | semivolatile organic compound |
| TBC | to be considered |
| TOC | total organic carbon |
| TRPH | total recoverable petroleum hydrocarbons |
| TSCA | Toxic Substances Control Act |
| USACE | U.S. Army Corps of Engineers |
| USAED | U.S. Army Engineer District, Alaska |
| USC | United States Code |
| UST | underground storage tank |
| VOC | volatile organic compound |
| °C | degrees Celsius |

# PART 1: THE DECLARATION

## 1.1 SITE NAME AND LOCATION

Long Island is the site of Fort Tidball, a former World War Two coastal defense installation. Since 1986, the United States Army Engineer District, Alaska (USAED), has conducted environmental restoration activities on Long Island under the Defense Environmental Restoration Program (DERP) for Formerly Used Defense Sites (FUDS).

The Long Island (Fort Tidball) site is located in the Gulf of Alaska, approximately 6 air miles northeast of the city of Kodiak, Kodiak Island, Alaska. The Long Island site spans 1,320 acres. The site coordinates are 57 degrees, 45 minutes north by 152 degrees, 25 minutes west.

The Long Island (Fort Tidball) site is also known by its U.S. Environmental Protection Agency (EPA) identification number (AK0000707554), its FUDS property number (F10AK0280), and its Alaska Department of Environmental Conservation (ADEC) record key number (198125x902502).

## 1.2 STATEMENT OF BASIS AND PURPOSE

Authorities: DERP, United States Code (USC), Title 10, Section 2701 et seq.; Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), 42 USC 9601 et seq.; Executive Order 12580, Federal Register, Title 52, Chapter 2923 (23 January 1987); the National Contingency Plan, Code of Federal Regulations, Title 40, Chapter 300.

This Decision Document presents the U.S. Army Corps of Engineers (USACE) selected remedy for the Long Island Site, Long Island, Alaska, which was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act, the National Oil and Hazardous Substances Pollution Contingency Plan, and the State of Alaska's Oil and Hazardous Substance Cleanup Regulations. This decision is based on the Administrative Record file for this site.

ADEC concurs with the selected remedy.

## 1.3 ASSESSMENT OF SITE

The response action selected in this Decision Document is necessary to protect public health, welfare, or the environment from actual or threatened releases of pollutants or contaminants from this site, which may present an imminent and substantial endangerment to the public health or welfare.

Prior response actions for Long Island primarily addressed contaminated soil and groundwater and included:

- Limited excavation and offsite treatment of petroleum oil, and lubricants (POL)-contaminated soil
- Removal of surface soil with polychlorinated biphenyl (PCB) concentrations greater than 1 milligram per kilogram (mg/kg) and subsurface soil greater than 10 mg/kg. PCB-contaminated soil with concentrations between 1 and 10 mg/kg was left in place below 2 feet below ground surface.
- Building demolition and debris removal
- Risk screening and development of alternative cleanup levels (ACL)
- Groundwater monitoring
- Informational institutional controls in the form of deed notices

The purpose of the response actions conducted from 1986 through 2003 was to reduce the risks associated with potential exposure to chemical contaminants or metals in the soil, sediment, groundwater, and surface water. Based on the results of the site inspections and the 1994 Remedial Investigation (RI), discrete sites in each area of concern (AOC) were targeted for cleanup actions or further investigation. During previous investigations or removal actions, the primary contaminant sources were removed and samples of the soil, sediment, groundwater, and surface water were collected for laboratory analysis. The primary contaminant sources included underground storage tanks (UST), transformers containing PCBs, and aboveground storage tanks (AST) that once contained fuel or heating oil. PCB-contaminated soil and the associated transformers were packaged and disposed of at a Toxic Substances Control Act-permitted landfill in Grandview, Idaho. Fuel-contaminated soil associated with the tanks was removed and thermally treated in Kodiak, Alaska. Asbestos-containing materials (ACM) associated with demolished buildings and debris were packaged and transported to a permitted treatment, storage, and disposal facility. Table 1-1 lists the cleanup level and closure delineation associated with each site.

**Table 1-1**
**Site Closure Delineation**

| Site Name | Cleanup Level | Closure Delineation |
|---|---|---|
| Burt Point<br>North Cape | Method Two | Site closed under Method Two cleanup levels, no further action required. NFRAP and NDAI status will be applied. |
| Castle Bluff<br>Deer Point<br>Garage Area<br>Headquarters Area<br>Point Head | Method Three Alternative Cleanup Levels: 1,200 mg/kg DRO | Informational institutional controls in the form of deed notices will be attached to the property for locations where Method Three cleanup levels were applied. NFRAP and NDAI status will be applied. |

**Note**: For definitions, see the Acronyms and Abbreviations section.

## 1.4 DESCRIPTION OF SELECTED REMEDY

Based on the results of the RIs, removal actions, and risk analyses, ADEC and USAED have determined that the selected remedy will:

- Apply ADEC Method Three ACLs established using site-specific soil data.
- Apply informational institutional controls to all sites where Method Three ACLs are applied.
- Apply No Further Remedial Action Planned (NFRAP) and No Defense Action Indicated (NDAI) status. NFRAP status and NDAI determination indicate that no further investigation, monitoring, cleanup work, or site improvements are necessary to address chemical contamination from past U.S. Department of Defense (DoD) activities at the site.

Informational institutional controls will document cleanup work done to date and the fact that low-level (below ACLs) petroleum-contaminated soil remains onsite and needs to be properly managed in the future. Institutional controls at these sites will be in the form of a deed notice attached to the property records. The deed notice will inform current and future land owners of the prior cleanup activities, approved cleanup levels, and remaining contaminants to help limit the movement, without prior notification to ADEC, of any soil from the sites where the Method Three cleanup levels were applied. Leisnoi Inc., the current landowner of Long Island, has agreed to implement these institutional controls. Twenty-two out of the 38 discrete sites on Long Island have Method Three ACLs and will have a deed notice registered. These 22 discrete sites are identified on Figures 4-2 through 4-10 and have been surveyed in order to identify the respective site boundaries. This information will be used to update land records. The remaining 16 sites are considered closed as they meet Method Two and Table C cleanup levels.

## 1.5 STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions to the maximum extent practicable. Prior treatment of the POL-contaminated soil on Kodiak Island satisfies the statutory preference for treatment as a principal element. Because the remedy will not result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a five-year review will not be required for this selected remedy.

## 1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Part 2 of this Decision Document. Additional information can be found in the Administrative Record file for this site:

- Chemicals of concern (COC) and their respective concentrations (Section 5.8, Contaminant Concentrations/Extent of Contamination, and Tables 5-1 through 5-7)
- Baseline risk represented by the COCs (Section 7, Summary of Site Risks)
- Cleanup levels established and basis for the levels (Section 7, Summary of Site Risks, and Table 7-1)
- How contaminated source materials are addressed (Section 12, Selected Remedy)
- Current and reasonably anticipated future land-use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk evaluation and Decision Document (Section 6, Current and Potential Future Land and Water Uses)
- Potential land and groundwater use that will be available at the site as a result of the Selected Remedy (Section 12.3, Expected Outcomes of the Selected Remedy)
- Estimated capital, annual operations and maintenance, and total present-worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (Section 12.2, Cost Estimate for the Selected Remedy)
- Key factors that led to selecting the remedy (Section 10, Comparative Analysis of Alternatives)

## AUTHORIZING SIGNATURES

This Decision Document presents the selected remedy for the Long Island FUDS Property. USACE is the lead agency under the DERP at the Long Island FUDS and has developed this Decision Document consistent with CERCLA, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan. This Decision Document will be incorporated into the larger Administrative Record file for the Long Island site, which is available for public view at the Kodiak Library in Kodiak, Alaska. This document, presenting a selected remedy with anticipated present-worth costs of $18,000, is 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:

[signature] 8 Sep 2005

Timothy J. Gallagher
Colonel, Corps of Engineers
District Engineer
Alaska District

Date

This signature sheet documents the decision made for the Long Island FUDS Property. ADEC concurs with the USACE-selected remedy. The decision may be reviewed and modified in the future if new information becomes available that indicates the presence of previously undiscovered contamination or exposures that may cause unacceptable risk to human health or the environment.

[signature] 9/13/2005

John Halverson
Section Manager
FFERP Manager
Alaska Department of Environmental Conservation

Date

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# PART 2: THE DECISION SUMMARY

## 2.1 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

A detailed description of the site is provided in the *Final Remedial Investigation Report* (USAED 1994). A summary of the site description and a discussion of the evolution of the regulatory status of the site are provided in the following sections.

The Long Island (Fort Tidball) site is located in the Gulf of Alaska, northeast of the city of Kodiak, Kodiak Island, Alaska. The Long Island site spans 1,320 acres and is approximately 6 air miles from the city of Kodiak. The site coordinates are 57 degrees, 45 minutes north by 152 degrees, 25 minutes west.

The ADEC Contaminated Sites record key number is 198125x902502.

The lead agency is USACE, and the lead regulatory agency is ADEC.

The investigation at Long Island (Fort Tidball) and the subsequent environmental restoration activities were conducted under the DoD FUDS Program. DoD plans to pay all regulatory oversight (as part of the Defense and State Memorandum of Agreement), investigation, and cleanup costs from the Defense Environmental Restoration Account.

Long Island is the site of Fort Tidball, a former World War Two coastal defense installation. The island is uninhabited and has no residential or commercial facilities. Portions of Long Island are environmentally sensitive areas, such as wetlands and the intertidal zone. The island also provides habitat for several species of birds, small mammals, deer, bears and feral cattle. Based on historical records, the chemical contaminants and debris found on Long Island were introduced during the operation of Fort Tidball and remained after the fort was decommissioned. The site is currently owned by Leisnoi Inc., an Alaska Native corporation.

## 2.2 SITE HISTORY

The U.S. War Department acquired Long Island from the Bureau of Land Management (BLM) in 1941. Fort Tidball was constructed between 1942 and 1943, and gun batteries were established on the island's eastern coast at Deer Point and Castle Bluff. The other operational areas were the Headquarters Complex, Burt Point, the Garage Area, Point Head and North Cape. The fort was decommissioned in 1945 and abandoned in 1947. Long Island was returned to BLM jurisdiction in 1956 and eventually reserved for Native selection under the Alaska Native Claims Settlement Act (ANCSA). In 1971, Long Island was transferred under ANCSA to Leisnoi Inc., an Alaska Native corporation. Based on historical records, the chemical contaminants and debris found on Long Island were introduced during the operation of Fort Tidball and remained after the fort was decommissioned.

Long Island has been divided into seven geographical areas (referred to as AOCs): Burt Point, Castle Bluff, Deer Point, Garage Area, Headquarters Area, North Cape, and Point Head (Figure 2-1). The AOCs have been further divided into a total of 38 discrete sites.

Restoration/investigation activities for the Long Island site were conducted in 1986, 1991, 1994, 1997, 1998, 2000, 2002, and 2003. Three primary restoration/investigation activities were conducted: site inspections, RIs, and interim removal actions (IRA). During these restoration/investigation activities, POL and PCB contamination in the soil and POL and metals contamination in the groundwater were documented on Long Island (USAED 1994). In addition, an Archive Search Report was never completed as there was no evidence of unexploded ordnance on Long Island.

More detailed information regarding these investigations can be found in the *Phase II Interim Removal Action Report, Long Island, Kodiak, Alaska* (USAED 1999); *2000 Remedial Investigation/Interim Removal Action Report, Long Island, Kodiak, Alaska* (USAED 2002b); and *2002 Long Island Interim Removal Action Report, Kodiak, Alaska* (USAED 2003).

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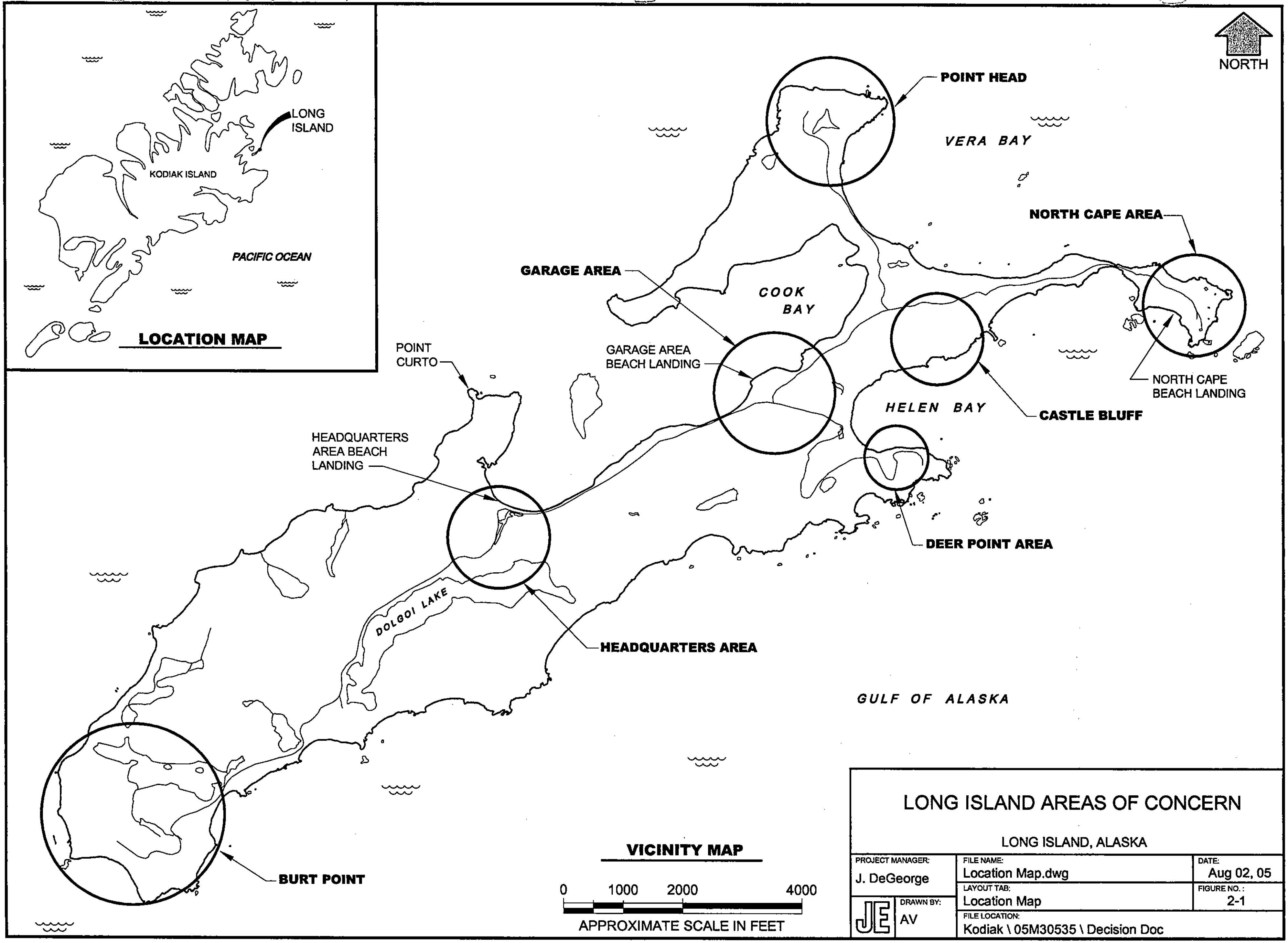

Site inspections were conducted in 1986 and 1991 to collect soil samples, assess building materials, document general site conditions, and produce digitized topographic maps. Data collected during the site inspections and RI in 1994 documented fuel and PCB contamination in the soil and fuel and metals contamination in the groundwater at specific areas on Long Island (USAED 1994).

Based on the results of the site inspections and the 1994 RI, discrete sites in each AOC were targeted for removal actions or further investigation. These IRAs and RIs were conducted in 1997, 1998, 2000, 2002, and 2003. During these investigations and removal actions, the primary contaminant sources were removed and samples of the soil, sediment, groundwater, and surface water were collected for laboratory analysis. The primary contaminant sources included USTs, transformers containing PCBs, and ASTs that once contained fuel or heating oil. PCB-contaminated soil and the associated transformers were packaged for transportation and disposed of at a Toxic Substances Control Act (TSCA) permitted landfill in Grandview, Idaho. Fuel-contaminated soil associated with the tanks was removed and thermally treated in Kodiak, Alaska.

During the 1997 and 2002 IRAs, several of the historic structures required demolition and removal in order to access contaminated soil at some of the sites on Long Island. Demolition of historic structures was coordinated with the State Historic Preservation Officer (SHPO) and complied with a Memorandum of Agreement signed by the USAED, the SHPO, Leisnoi Corporation, and Alaska State Parks in July 2002. Concurring parties included the Kodiak Military History Museum, the Baranov Museum, and the National Archives and Records Administration.

Building demolition and debris-removal activities were performed under a separate federal program, the Native American Lands Environmental Mitigation Program, under which, physical safety hazards such as open vaults were also covered, and ACM was removed.

# PART 3: COMMUNITY PARTICIPATION

As one of the projects scheduled to be addressed under the Total Environmental Restoration Contract, information on Long Island has been freely distributed to and discussed with the public. Information has been distributed through fact sheets and open houses, conducted during the spring and fall beginning in 1997. The open houses were held in the Safeway Lobby on Kodiak Island to provide the community an opportunity to meet with representatives from ADEC and USAED and provide a question and answer forum. In addition, presentations were made at Kodiak Island Borough Assembly meetings which were televised and corresponded to each open house event. The open houses were held on:

- 22 August 1997
- 6 August 1998
- 4 March and 8 October 1999
- 19 May and 20 October 2000
- 4 May and 19 October 2001
- 24 May and 18 October 2002
- 6 June and 5 September 2003
- 20 February 2004

The *Proposed Plan for Long Island (Fort Tidball) Military Cleanup Project, Long Island, Alaska* (USAED 2004) was released for public comment 9 February 2004. A public comment period for the Proposed Plan was held from 9 February to 9 March 2004 to allow the public the opportunity to provide comments pertaining to the selected remedial alternative. In addition, an open house to address any questions from the public on this Proposed Plan was held in Kodiak on 20 February 2004. At this meeting, USAED and ADEC representatives were able to present the Proposed Plan to a broader audience than those already involved in the project and were available to answer questions about the site and the remedial alternatives. The meeting minutes from this open house are provided in the Responsiveness Summary (Part 14).

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# PART 4: SITE CHARACTERISTICS

## 4.1 CONCEPTUAL SITE MODEL

This section presents the conceptual site model (CSM) for the Long Island site (Figure 4-1). This figure presents a generalized flow diagram of complete exposure pathways that may exist at the site. Pathways for exposure to potential human health and ecological receptors from contaminated sources include surface and subsurface soil, air, groundwater, surface water, and sediments.

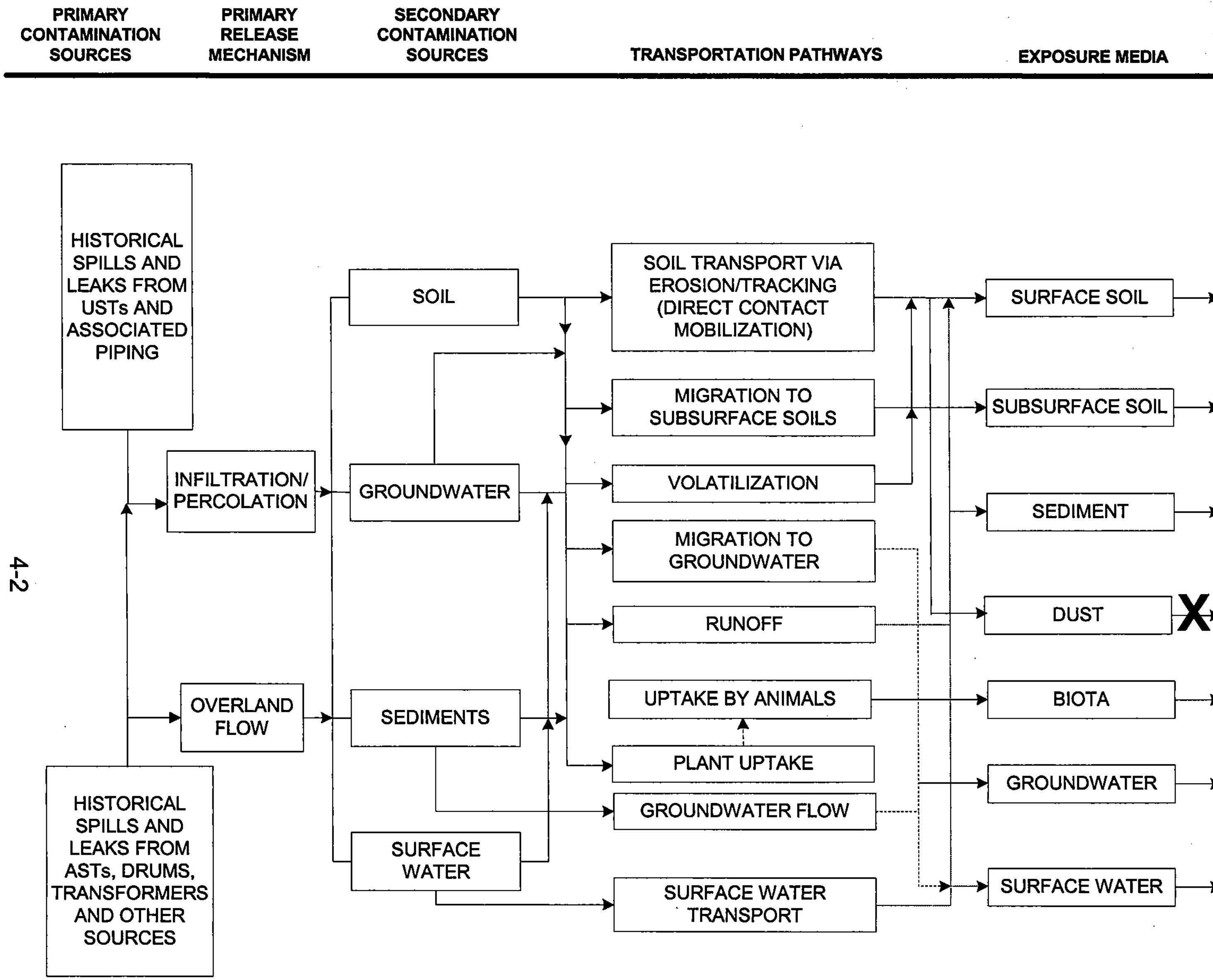
## 4.2 SITE OVERVIEW

The Long Island site is an island approximately 0.75 miles wide by 4 miles long. The coastline is characterized by steep, rocky cliffs and outcrops. Most of the interior topography of the island is relatively flat, with the highest elevations found at the northeastern sea cliffs. Elevations across the island range from sea level to approximately 100 feet above mean sea level. The island is uninhabited and has no residential or commercial facilities. Portions of Long Island are environmentally sensitive areas, such as wetlands and the intertidal zone. The island provides habitat for several species of birds, small mammals, and feral cattle, as well as two inland lakes containing land-locked rainbow trout.

U.S. Army structures inhabited during the period of activity at the site include a tower, gun emplacements and turrets, ammunition bunkers, garages, warehouses, barracks, Quonset huts, mess halls, and bathhouses. In 1995, USAED determined that Fort Tidball was eligible for inclusion in the National Register of Historic Places.

## 4.3 SAMPLING STRATEGY

Sampling has taken place during each of the investigation/restoration activities at Long Island. Specifically, soil, groundwater, sediment, and surface water were analyzed for the full suite of chemicals that could be present as a result of known historical site activities.




| EXPOSURE MEDIA | EXPOSURE ROUTE | HUMAN RECEPTORS: RECREATIONAL | HUMAN RECEPTORS: SITE WORKER | HUMAN RECEPTORS: RESIDENTIAL* | ECOLOGICAL RECEPTORS: FRESHWATER AQUATIC | ECOLOGICAL RECEPTORS: MARINE AQUATIC | ECOLOGICAL RECEPTORS: TERRESTRIAL |
|---|---|---|---|---|---|---|---|
| SURFACE SOIL | INGESTION | √ | √ | √ | √ | √ | √ |
| | DERMAL CONTACT | √ | √ | √ | | | √ |
| | INHALATION | | | | | | |
| SUBSURFACE SOIL | INGESTION | √ | √ | √ | | | √ |
| | DERMAL CONTACT | √ | √ | √ | | | √ |
| | INHALATION | | | | | | |
| SEDIMENT | INGESTION | √ | √ | √ | √ | √ | √ |
| | DERMAL CONTACT | √ | √ | √ | √ | √ | √ |
| | INHALATION | | | | | | |
| DUST (X) | INGESTION | | | | | | |
| | DERMAL CONTACT | | | | | | |
| | INHALATION | | | | | | |
| BIOTA | BIOACCUMULATION | √ | | √ | √ | √ | √ |
| GROUNDWATER | INGESTION | √ | √ | √ | √ | √ | √ |
| | DERMAL CONTACT | √ | √ | √ | √ | √ | √ |
| | INHALATION | | | | | | |
| SURFACE WATER | INGESTION | √ | √ | √ | √ | √ | √ |
| | DERMAL CONTACT | √ | √ | √ | √ | √ | √ |
| | INHALATION | | | | √ | √ | |

NOTES:

√ = Potential Exposure Pathway

**X** = Pathway Not Complete

* = There are no current residential or commercial establishments on-site. Residential receptors are therefore presented as a future human receptor group.

| **HUMAN HEALTH CONCEPTUAL SITE MODEL** LONG ISLAND, ALASKA | | |
|---|---|---|
| J. DeGeorge | FILE NAME: Fig. 4-1 CSM.vsd | FIGURE NO. 4-1 |
| DRAWN BY: | PROJ. NO: 05M30535 | DATE: Aug. 5, 05 |

The following investigation/restoration activities were conducted:

- Test pit excavation
- Soil screening
- Surface soil and test pit sampling
- Surface water and sediment sampling
- Borehole advancement and subsurface soil sampling
- Monitoring well installation and development
- Groundwater sampling
- Asbestos sampling
- Land surveying

Test pits were excavated at areas of suspected or known contamination to determine the lateral and vertical extent of contamination. Test pit locations were based primarily on field observations and soil screening. When contamination was encountered, step-out test pits were excavated. This step-out process was repeated until only clean soil was encountered.

Surface water and sediment samples were collected at locations where standing water was present; for example, the drainage located at the Headquarters Complex and the areas of pooled water at Castle Bluff Garrison. Surface water samples were collected in a manner that minimized disturbance to the underlying sediments. Any surface water and sediment samples collected within a drainage, were sampled downstream to upstream.

Soil borings were advanced where contamination was too deep for test pits. Wells were placed to define the extent of groundwater contamination, and then developed and sampled using either a bailer or a low-flow sampling method. All wells have been decommissioned following the completion of quarterly groundwater monitoring events.

Samples for asbestos analysis were collected from construction materials, such as floor tile, ceiling material, and pipe insulation, in order to identify potential ACM. Field methods used included visual inspection and bulk sampling.

## 4.4 SOURCES OF CONTAMINATION

U.S. Army structures that were in use while Fort Tidball was active included a tower, gun emplacements and turrets, ammunition bunkers, garages, warehouses, barracks, Quonset huts, mess halls, and bathhouses. Potential sources of residual contamination at the site include constituents in soil, water, and sediment associated with historical spills and leaks from former ASTs and USTs and associated product distribution lines, as well as former drums, transformers, and miscellaneous debris.

## 4.5 TYPES OF CONTAMINATION AND THE AFFECTED MEDIA

The COCs at the Long Island site are gasoline-range organics (GRO), diesel-range organics (DRO), residual-range organics (RRO), PCBs (specifically Aroclor 1260), and five polynuclear aromatic hydrocarbons (PAH). GRO, DRO, and RRO are refined products from crude oil; the five PAHs are minor components of crude oil that remain with DRO during fuel production.

GRO includes the low-boiling-range petroleum products typically found in gasoline, with boiling range between approximately 70 and 170 degrees Celsius (°C), corresponding to an alkane range beginning with n-hexane ($C_6$) to n-decane ($C_{10}$). GRO compounds are soluble in water, are quite volatile, and vaporize rapidly from water and soil to enter the atmosphere, where they are dispersed and eventually biologically degrade to carbon dioxide and water. By definition, GRO, DRO, and RRO are classes of chemical compounds and are not carcinogens; however, individual components of these classes when evaluated individually may be carcinogenic. Also, large doses of GRO, DRO, and RRO have adverse reactions on the kidney, liver, and blood.

DRO includes mid-range petroleum products such as diesel fuel, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of $C_{10}$ to the beginning of $C_{25}$ (n-pentacosane) and a boiling point range between approximately 170 and 400°C. DRO is more volatile than RRO, and the lighter fraction will tend to evaporate from the soil or water to enter the atmosphere, where it will degrade. The heavier DRO components will act similar to RRO, as described below.

RRO includes heavy-range petroleum products such as lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of $C_{25}$ to the beginning of $C_{36}$ (n-hexatriacontane) and a boiling point range between approximately 400 and 500°C. The higher-molecular-weight RRO components have very low water solubility and will not volatilize from soils or surface waters. Consequently, RRO will remain on the soil or in the water column where it may be adsorbed to particulate organic matter in water or soil. It will eventually be biodegraded by microorganisms in the soils and sediments.

PCBs are a family of man-made chemicals that contain over 200 individual compounds. They were manufactured under the trade name Aroclor until 1977. Aroclor 1260 is a type of PCB that contains 60 percent chlorine by weight. PCBs were once widely used industrial chemicals whose high stability contributed to both their commercial usefulness and their long-term deleterious environmental and health effects. The transport of PCBs differs from that of petroleum products due to their relatively low solubility in water. They do not tend to mix with water but can be adsorbed by sediments or organic matter in soils. PCBs are carcinogenic.

PAHs are minor DRO components. These compounds are present in crude oil and are concentrated in the same boiling range with other DRO components, mostly saturated hydrocarbons. PAHs are slightly soluble in water and have low volatility; therefore, they degrade more slowly than the other DRO components, and their relative concentrations increase with time. PAHs more readily form free radicals and are fat soluble; therefore, they bioaccumulate and tend to be more biologically harmful than the saturated hydrocarbon components of DRO. Some PAHs are considered carcinogenic.

## 4.6 RELEASE MECHANISMS

Constituents at the Long Island site may have been released by surface spills during storage tank filling operations, spills, and leaks from associated piping, tanks, transformers, and drums. The primary sources of contamination were originally located at the ground surface, and the majority of past releases likely occurred to surface soils.

## 4.7 FATE AND TRANSPORT

Depending on the nature of the source and the release mechanism, several transport pathways are possible. These transport pathways, and the media within which they occur, are illustrated on Figure 4-1. Exposure media are identified as a secondary source or a contact medium on this figure. Exposure media are so named because they are media that potential receptors may come into contact with, completing the exposure pathway. In general, the potential exposure media include surface soil, subsurface soil, groundwater, surface water, sediment, air, and biota (e.g., berries, fish, and/or shellfish). Biota that have been contaminated can serve as transportation pathways if consumed by human or other organisms. The CSM was generalized for all applicable sites on Long Island; not all exposure media are applicable to each source area.

Any contamination historically released to surface soils could have then been transported to other surface soils (via infiltration, percolation or overland flow), surface water (via overland flow), or sediment by erosion or runoff (via overland flow). Constituents could also have been carried to the subsurface by infiltration and percolation. Once in the subsurface, contaminants can partition onto soil particles or infiltrate and percolate to groundwater. Once in groundwater, contaminants may then be transported though the subsurface and discharge to the fresh water or marine environments.

## 4.8 CONTAMINANT CONCENTRATIONS AND EXTENT OF CONTAMINATION

The following subsections summarize the samples collected at each Long Island AOC and discuss potential human health or ecological risks associated with these results. All sample locations were surveyed and survey data is available in Appendix E of the Phase II IRA Report (USAED 1999) and Appendix B of the 2002 Long Island Interim Removal Action Report (USAED 2003). Figure 4-2 provides an overview of Long Island and all seven AOCs. Table 4-1 lists the cleanup level and closure delineation associated with each site.

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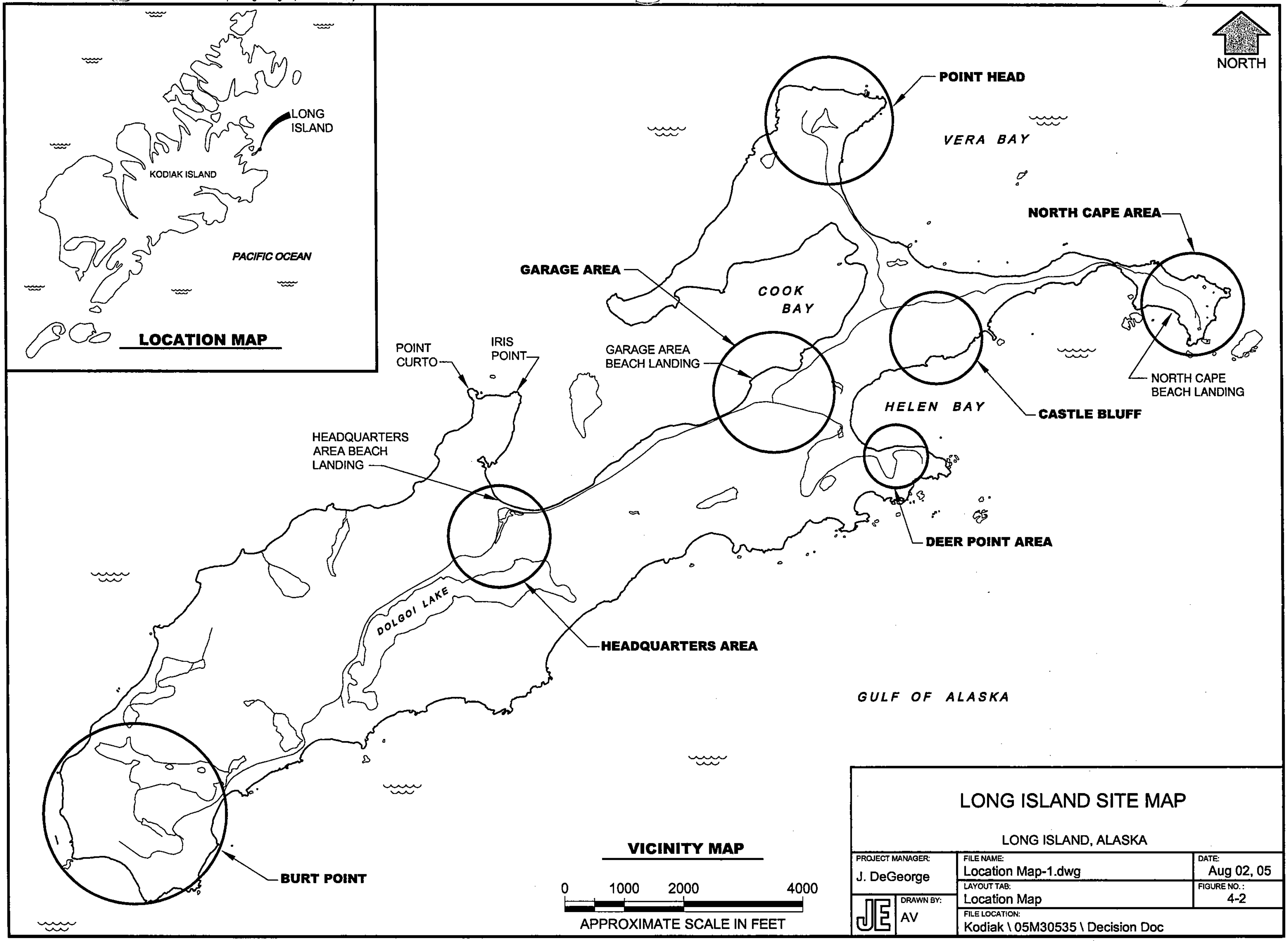


LONG ISLAND SITE MAP

LONG ISLAND, ALASKA

| PROJECT MANAGER: | FILE NAME: | DATE: |
|---|---|---|
| J. DeGeorge | Location Map-1.dwg | Aug 02, 05 |
| JE / DRAWN BY: AV | LAYOUT TAB: Location Map | FIGURE NO.: 4-2 |
| | FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc | |

**Table 4-1**
**Site Closure Delineation**

| Site Name | Cleanup Level | Closure Delineation |
|---|---|---|
| Burt Point<br>North Cape | Method Two | Site closed under Method Two cleanup levels, no further action required. NFRAP and NDAI status will be applied. |
| Castle Bluff<br>Deer Point<br>Garage Area<br>Headquarters Area<br>Point Head | Method Three<br>Alternative Cleanup Levels:<br>1,200 mg/kg DRO | Informational institutional controls in the form of deed notices will be attached to the property for locations where Method Three cleanup levels were applied. NFRAP and NDAI status will be applied. |

**Note**: For definitions, see the Acronyms and Abbreviations section.

### 4.8.1 Burt Point

Burt Point is located at the western end of Long Island (Figure 4-3). During the 1997 Phase I IRA, one UST located southwest of and adjacent to former generator shed S-55 was removed along with the associated fuel-contaminated soil (site BP-A). As part of the 1998 Phase II RI/IRA, an AST located adjacent to a Quonset hut was removed along with the associated fuel-contaminated soil (site BP-C), and several soil samples were also collected from a suspected area of contamination on the northeast side of former generator shed S-55 (site BP-B). Approximately 41 tons of fuel-contaminated soil was removed during these cleanup actions. Following the removal of fuel-storage tanks and contaminated soil in the Burt Point area, samples of the soil remaining at the AOC were collected and submitted to a laboratory for analysis of DRO, total recoverable petroleum hydrocarbons (TRPH), RRO, GRO, semivolatile organic compounds (SVOC), volatile organic compounds (VOC), PCBs, and metals. All of the soil samples met the Method Two cleanup levels or were below Kodiak background concentrations for metals.

Surface water at a small, unnamed lake located north of the main cluster of buildings at Burt Point was also sampled for DRO, SVOCs, VOCs, pesticides, and metals during the 1994 RI. All results were below the Freshwater Criteria [Alaska Administrative Code (AAC), Title 18, Part 70]. Table 4-2 summarizes the COCs and maximum concentrations remaining onsite.

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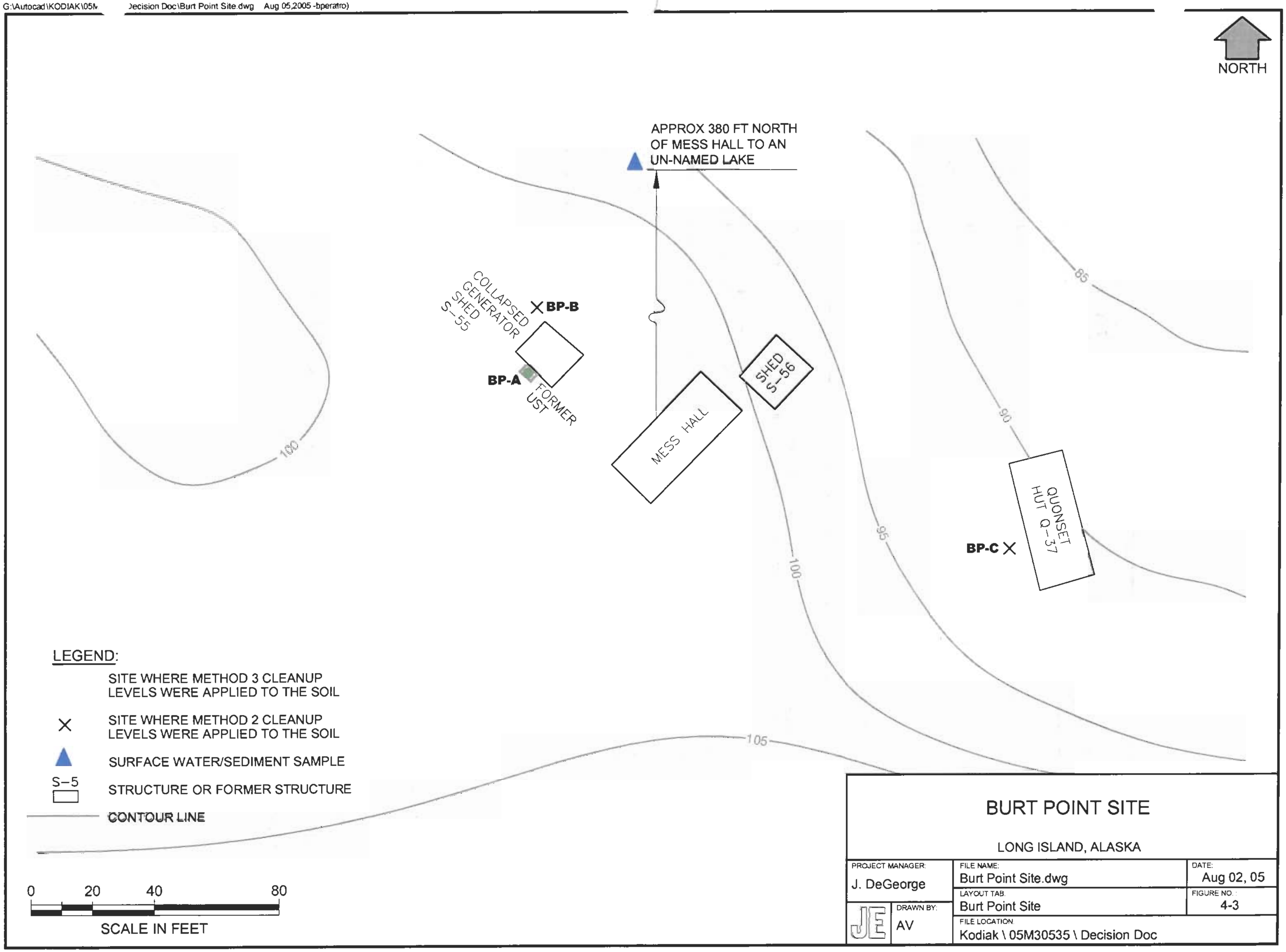


**Table 4-2**
**Burt Point**

| Media | COC[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[3] | 16.56[5] | 5[6] | BP-B | 94LIBP371SL (1994) |
| | Lead | 400[3] | NA | 45.2 | BP-B | BPUSTSBK-01SO (1998) |
| | GRO | 1,400[4] | NA | 2 | BP-A | BPUSTSBF-01SO (1998) |
| | DRO | 8,300[4] | NA | 88 | BP-A | BPUSTSBH-01SO (1998) |
| Surface Water (mg/L) | None[2] | NA | NA | NA | NA | Unnamed Lake (1994) |

**Notes:**

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, PCBs, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] Surface water from an unnamed lake north of BP-A and BP-B was analyzed for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), PCBs, pesticides, VOCs, SVOCs, and TRPH; all results were less than EPA Ambient Water Quality Criteria, adopted by reference from ADEC 18 AAC 70, 2002. ARAR.

[3] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). ARAR.

[4] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three alternative cleanup level determinations can be found in Appendix D. ARAR.

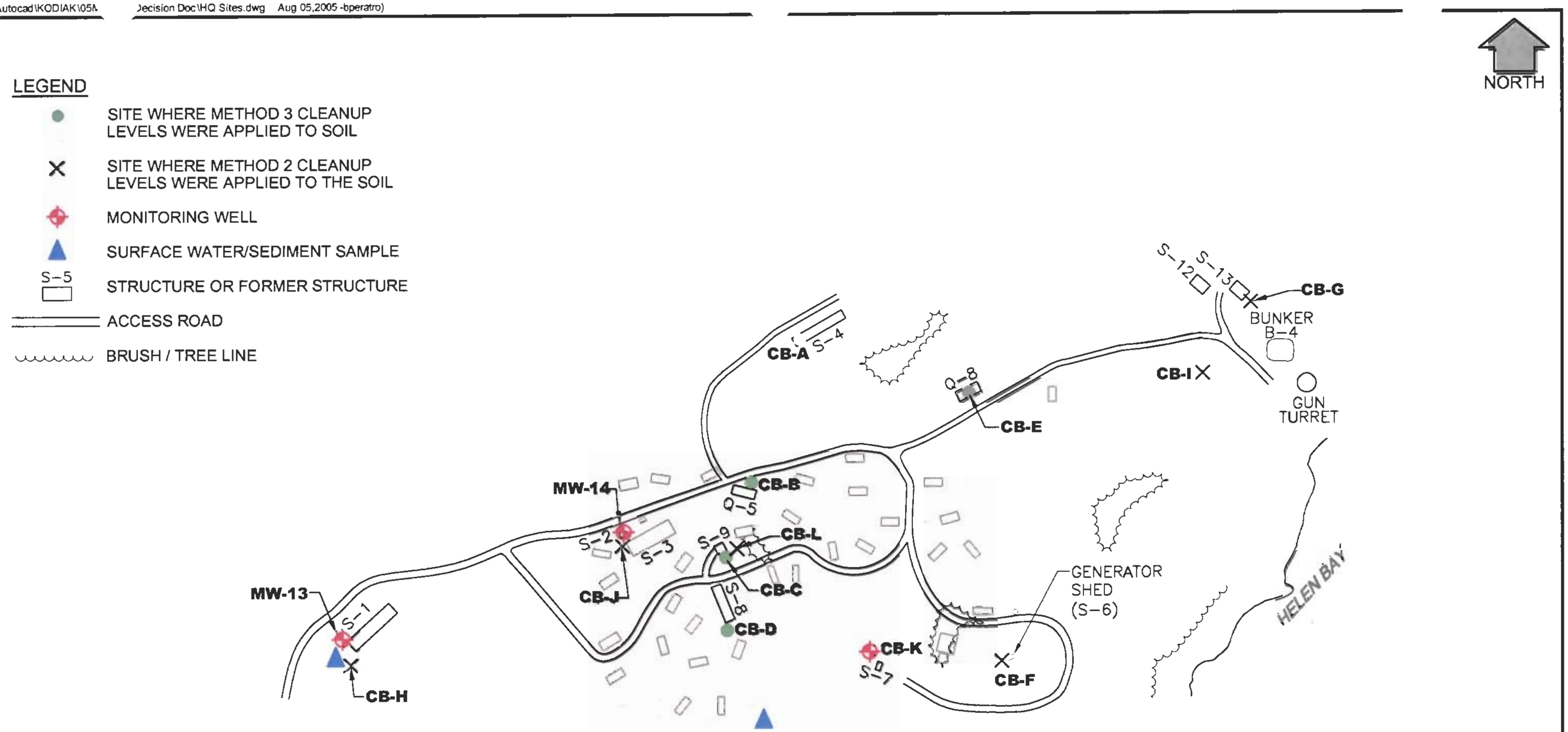
[5] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report, Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* TBC criteria.

[6] Concentration of arsenic in the soil was below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

For definitions, see the Acronyms and Abbreviations section.

### 4.8.2 Castle Bluff

Castle Bluff is located on the south side of Long Island, overlooking Helen Bay (Figure 4-4). During the IRA, four USTs and 52 tons of fuel-contaminated soil were removed along with nine transformers and 33 tons of PCB-contaminated soil. USTs were removed from the south end of building S-8 (site CB-D), adjacent to generator shed S-6 (site CB-F), from a concrete vault near building S-13 (site CB-G), and near building S-7 (site CB-K).




CASTLE BLUFF SITE

LONG ISLAND, ALASKA

| | | |
|---|---|---|
| PROJECT MANAGER: J. DeGeorge | FILE NAME: HQ Sites.dwg | DATE: Aug 02, 05 |
| | LAYOUT TAB: Castle Bluff Site | FIGURE NO.: 4-4 |
| JE — DRAWN BY: AV | FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc | |

Following these cleanup actions, samples of the soil remaining at Castle Bluff were collected and submitted to a laboratory for analysis of DRO, TRPH, RRO, GRO, PAHs, SVOCs, VOCs, metals, pesticides, and PCBs. All of the soil samples were below the Method Two or Method Three cleanup levels, with the exception of two sites (CB-H and CB-J) where elevated levels of arsenic and chromium were detected. However, the arsenic concentrations of 9.4 and 6.7 mg/kg at sites CB-H and CB-J, respectively, were below the Kodiak background soil concentration of 16.56 mg/kg; thus, arsenic is not considered a site-related COC. Chromium was detected at levels above the most stringent Method Two cleanup level (based on migration to groundwater) with concentrations of 58 and 40 mg/kg at sites CB-H and CB-J, respectively. However, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. The cleanup level for trivalent chromium is 120,000 mg/kg (ingestion); the chromium concentrations in the samples collected at CB-H and CB-J are well below this cleanup level. The groundwater at CB-H and CB-J was sampled, and chromium was not detected.

One sediment sample was collected in a surface drainage at site CB-H and sampled for DRO, TRPH, VOCs, SVOCs, PCBs, pesticides, and metals. This sample exceeded the sediment screening level for arsenic, with a concentration of 9.7 mg/kg, compared to the EcoTox threshold of 8.2 mg/kg. However, this sample concentration is below the 23.2 mg/kg Kodiak background sediment concentration for arsenic; therefore, arsenic is not considered a site-related contaminant. Arsenic was also detected in the soil sample collected at CB-H.

Soil samples collected from the Headquarters AOC were analyzed for total organic carbon (TOC), and the results were used to modify the default fraction of organic carbon ($F_{OC}$) value during calculation of the Method Three ACLs. The resulting DRO and RRO Method Three ACLs were calculated to be 1,200 and 22,000 mg/kg, respectively, for the Headquarters Area. During development of the Method Three cleanup levels, USAED and ADEC decided that the lower, more conservative site-cleanup levels calculated for the coastal beach areas should be applied to the upland areas at Castle Bluff, Deer Point, the Garage Area, and North Cape AOCs. Table 4-1 summarizes these ACLs.

Freshwater samples were collected from two surface drainages in the Castle Bluff area (site CB-H and downgradient of Buildings S-7 and S-8) and analyzed for DRO, TRPH, VOCs, SVOCs, PCBs, pesticides, and metals. Although lead was detected in these freshwater samples, both samples were below the drinking water criteria for lead of 0.015 milligrams per liter (mg/L); therefore, there is no unacceptable risk to human health via the ingestion pathway.

Groundwater samples were collected from three monitoring wells at sites CB-H (MW-13), CB-J (MW-14), and CB-K. Due to its poor condition, the monitoring well at CB-K was replaced in 2003 with a new well, which was then sampled. While CB-H and CB-J groundwater samples have been below cleanup levels, CB-K samples have repeatedly exceeded the groundwater cleanup level for lead. However, CB-K is not considered an area where a viable monitoring well can be developed and sampled due to the high groundwater turbidity. Filtered (representing dissolved lead) and unfiltered (representing total lead) groundwater samples were collected at CB-K and analyzed for lead. The filtered sample had a result of 0.0003 mg/L, compared to 0.242 mg/L in the unfiltered sample. These results indicate that the lead is suspended in the sediment at the site; however, the concentration of the dissolved lead fraction is below the groundwater criterion of 0.015 mg/L. Lead was not detected in freshwater samples collected downgradient of CB-K.

Table 4-3 summarizes the COCs and maximum concentrations remaining at Castle Bluff.

### 4.8.3 Deer Point

Deer Point is located on the south side of Long Island, overlooking Helen Bay (Figure 4-5). During the 1997 IRA, one UST adjacent to generator shed S-26 (site DP-C) was removed along with approximately 4 tons of the associated contaminated soil. In 2000, additional soil samples were collected adjacent to Quonset hut 43 (site DP-B) and adjacent to Quonset hut 42 (site DP-D) to further characterize the extent of contamination at these sites where there was evidence of former ASTs. Sites DP-B and DP-D were revisited during the 2002 IRA, and 18 tons of fuel-contaminated soil was removed and treated.

## Table 4-3
## Castle Bluff

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[3] | 16.56[7] | 9.4[8] | CB-H | 94LICB277SL (1994) |
| | Chromium | 120,000[3] | 17.84[7] | 58[9] | CB-H | 94LICB277SL (1994) |
| | Selenium | 3[3] | N/E | 4.1[10] | CB-H | 94LICB277SL (1994) |
| | PCBs | 1[3] | NA | 0.128 | CB-I | 157SO (1997) |
| | DRO | 1,200[4] | NA | 871 | CB-E | CBS912-001 (2002) |
| Groundwater (mg/L)[2] | Arsenic | 0.05[5] | 0.0377[13] | 0.016 | CB-H | 94LICB362WA (1994) |
| | Chromium | 0.1[5] | 0.178[7] | ND [0.02] | CB-H | 94LICB362WA (1994) |
| | Lead | 0.015[5] | 0.0670[7] | 0.0003[11] | CB-K | CBMWK2-01 (2003) |
| | Selenium | 0.05[5] | N/E | ND [0.005] | CB-H | 94LICB362WA (1994) |
| | PCBs | 0.0005[5] | NA | ND [0.0005] | CB-K | CBK-01GW (1998) |
| | DRO | 1.5[5] | NA | 0.57 | CB-K | CBK-01GW (1998) |
| Sediments (mg/kg) | Arsenic | 8.2[6] | 23.2[7] | 9.7[12] | CB-H | 94LICB365SL (1994) |
| Surface Water (mg/L) | Lead | 0.015[5] | 0.005[7] | 0.008 | CB-H | 94LICB364WA (1994) |

**Notes:**

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] Remaining site concentration for groundwater is reflected by the most current sampling event.

[3] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). Chromium III cleanup value (ingestion pathway) listed. Based on samples collected from Kodiak area soil, chromium III is the predominant species. ARAR.

[4] ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR

[5] ADEC, 2003, 18 AAC 75, Table C, groundwater cleanup levels. ARAR.

[6] Most stringent value listed in the EcoTox thresholds (EPA 1996). TBC criteria.

[7] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium (tri- and hexavalent). TBC criteria.

[8] Concentration of arsenic in the soil is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

[9] Reported result is total chromium; however, based on samples collected from the Kodiak area, chromium III is the predominant species.

[10] The selenium concentration found in this sample is likely due to the naturally occurring volcanic rock found in the soil. Selenium has been detected above the cleanup level in Kodiak area soils.

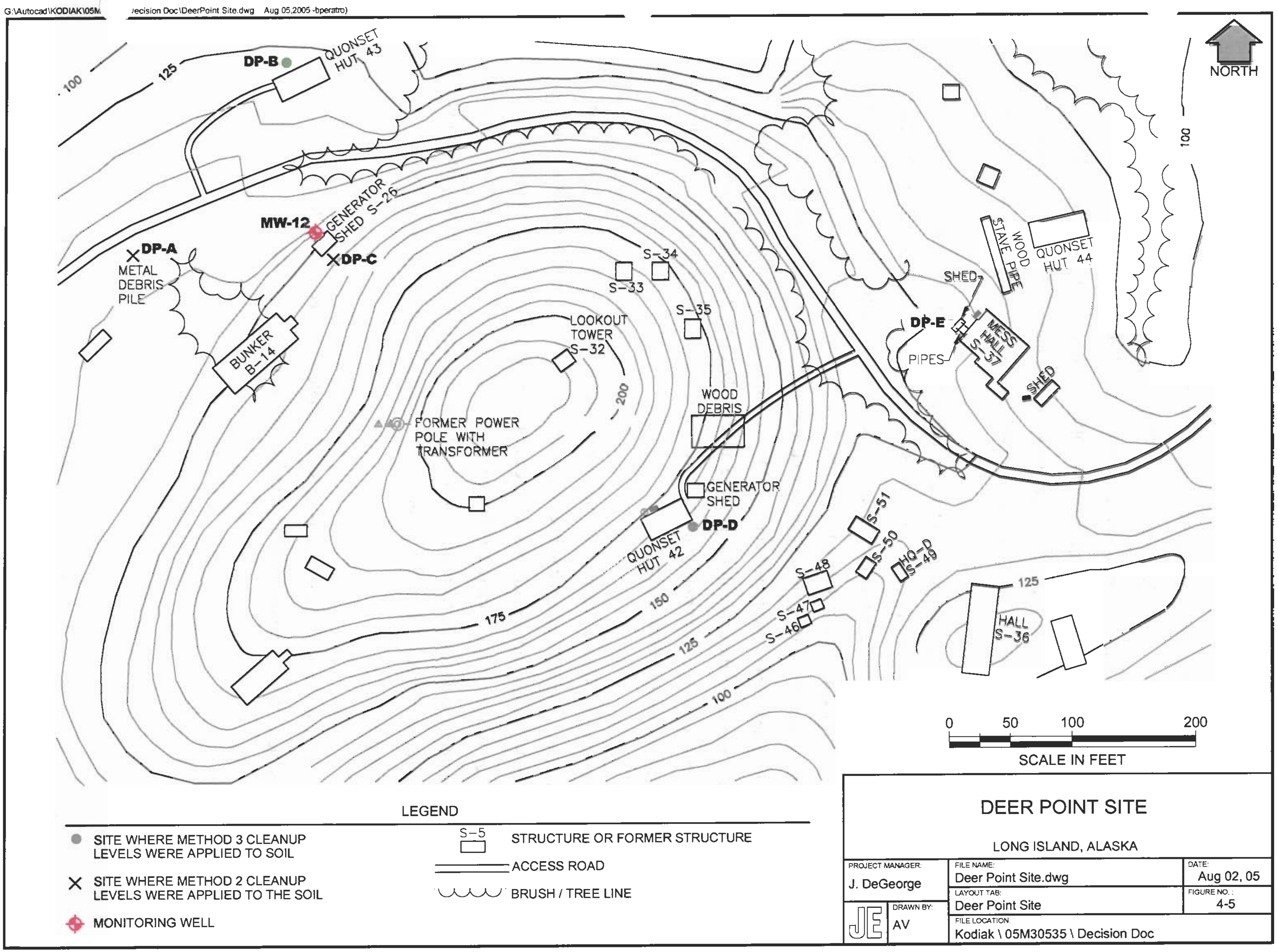
[11] This result reflects dissolved analyte only. Total lead result for this sample (including suspended solids) is 0.242 mg/L. CB-K is not considered an area where a viable monitoring well can be developed and sampled due to high turbidity of the groundwater.

[12] Concentration of arsenic in the sediment is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant. Arsenic was also detected in the soil at CB-H.

[13] Twice the average concentration found at Long Island was used as a screening value for arsenic in groundwater. Sample results during the most recent sampling event in 2003 indicated arsenic concentrations were below the Table C cleanup criteria.

ND = not detected at [X] concentration

For additional definitions, see the Acronyms and Abbreviations section.



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NORTH
DP-B
QUONSET HUT 43
MW-12
GENERATOR SHED S-26
DP-A
METAL DEBRIS PILE
DP-C
BUNKER B-14
S-34
S-33
S-35
LOOKOUT TOWER S-32
FORMER POWER POLE WITH TRANSFORMER
WOOD DEBRIS
GENERATOR SHED
DP-D
QUONSET HUT 42
WOOD STAVE PIPE
QUONSET HUT 44
SHED
DP-E
MESS HALL S-37
PIPES
SHED
S-51
S-50
HQ-D S-49
S-48
S-47
S-46
HALL S-36
100
125
150
175
200
0 50 100 200
SCALE IN FEET
LEGEND
SITE WHERE METHOD 3 CLEANUP LEVELS WERE APPLIED TO SOIL
SITE WHERE METHOD 2 CLEANUP LEVELS WERE APPLIED TO THE SOIL
MONITORING WELL
S-5 STRUCTURE OR FORMER STRUCTURE
ACCESS ROAD
BRUSH / TREE LINE
DEER POINT SITE
LONG ISLAND, ALASKA
PROJECT MANAGER: J. DeGeorge
FILE NAME: Deer Point Site.dwg
DATE: Aug 02, 05
LAYOUT TAB: Deer Point Site
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FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc

Following these cleanup actions, samples of the soil remaining at Deer Point were collected and submitted to a laboratory for analysis of DRO, TRPH, RRO, GRO, PAHs, SVOCs, VOCs, pesticides, PCBs, and metals. Chemical concentrations in all of the soil samples were below the Method Two or Method Three cleanup levels for DRO and RRO or the Kodiak background concentrations for metals. Cleanup actions were not required at sites DP-A and DP-E because the soil characterization samples collected met the Method Two or Method Three cleanup levels.

At site DP-A, the location of a metal debris pile, one sample did indicate a total chromium concentration of 25 mg/kg, which exceeds the Method Two cleanup level of 23 mg/kg. However, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. The cleanup level for trivalent chromium is 120,000 mg/kg (ingestion); the chromium concentrations in the sample collected at site DP-A are well below this cleanup level. In this same sample, arsenic exceeded the Method Two cleanup level with a concentration of 12 mg/kg. However, the concentration of arsenic in the Deer Point soil (Table 4-4) is below the Kodiak background concentration and is, therefore, considered a naturally occurring level rather than a site-related contaminant.

Groundwater samples were collected from monitoring well MW-12 at site DP-C, where a fuel-storage tank and contaminated soil had been removed. When the groundwater was sampled at this site in 1994, arsenic and chromium were detected below the groundwater cleanup level, and lead was slightly above the groundwater cleanup level. In 2003, the groundwater was sampled for both the total and dissolved fractions of arsenic, lead, and chromium; all of the metals were detected at concentrations below the groundwater cleanup levels in both the filtered and unfiltered samples.

Figure 4-5 shows the location of the discrete sites and samples collected at Deer Point. Table 4-4 summarizes the COCs and maximum concentrations remaining at Deer Point.

**Table 4-4**
**Deer Point**

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[4] | 16.56[7] | 12[9] | DP-A | 94LIDP266SL (1994) |
| | Chromium | 120,000[4] | 17.84[7] | 25[10] | DP-A | 94LIDP266SL (1994) |
| | DRO | 1,200[5] | NA | 640 | DP-B | DPBTP1-02 (2002) |
| | RRO | 22,000[5] | NA | 790 | DP-B | DPBTP1-03 (2002) |
| Groundwater (mg/L)[2] | Arsenic | 0.05[6] | 0.0377[8] | ND [0.005] | DP-C | DPMW12-01F (2003) |
| | Chromium | 0.1[6] | 0.178[7] | 0.0039 | DP-C | DPMW12-01F (2003) |
| | DRO | 1.5[6] | NA | ND [0.1] | DP-C | 94LIDP361WA (1994) |
| | TRPH[3] | N/E | NA | ND [1.0] | DP-C | 94LIDP361WA (1994) |

<u>Notes</u>:

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] Remaining site concentration for groundwater is reflected by the most current sampling event.

[3] RRO was not reported in 1994; this range of compounds is represented by TRPH by EPA Method 418.1.

[4] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). Chromium III cleanup value (ingestion pathway) listed. Based on samples collected from Kodiak area soil, chromium III is the predominant species. ARAR.

[5] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR.

[6] ADEC, 2003, 18 AAC 75, Table C, Groundwater and Surface Water Cleanup Levels. ARAR.

[7] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium (tri- and hexavalent). TBC criteria.

[8] Twice the average concentration found at Long Island was used as a screening value for arsenic in groundwater. Sample results during the most recent sampling event in 2003 indicated arsenic concentrations were below the Table C cleanup criteria.

[9] Concentration of arsenic in the soil is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

[10] Reported result is total chromium; however, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. Chromium III is the predominant species.

For definitions, see the Acronyms and Abbreviations section.

### 4.8.4 Garage Area

The Garage Area is on the north side of Long Island, overlooking Cook Bay (Figure 4-6). During the 1997 IRA, several assumed fuel-contaminated areas near the former garage building S-15 or near the loading docks were investigated, and a water-storage tank and two transformers were removed at the Garage Area. The soil at these sites was sampled and submitted for laboratory analysis of DRO, TRPH, RRO, GRO, PAHs, SVOCs, VOCs, metals, PCBs, and pesticides. Chemical concentrations in all of the soil samples were below the Method Two or Method

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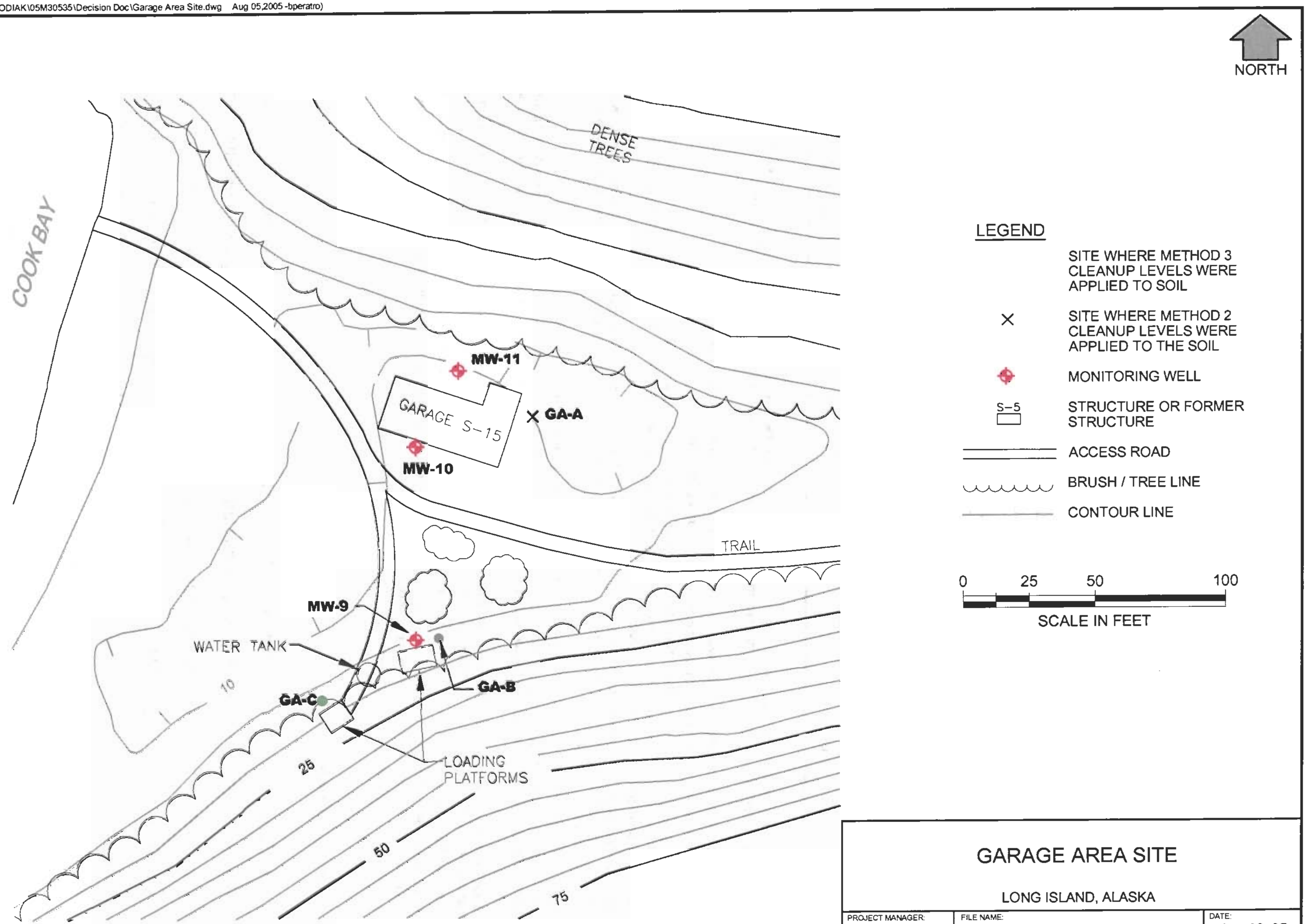



GARAGE AREA SITE

LONG ISLAND, ALASKA

| | | |
|---|---|---|
| PROJECT MANAGER: J. DeGeorge | FILE NAME: Garage Area Site.dwg | DATE: Aug 02, 05 |
| DRAWN BY: AV | LAYOUT TAB: Garage Area Site | FIGURE NO.: 4-6 |
| | FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc | |

Three cleanup levels for DRO and RRO or below Kodiak background concentrations; therefore, no soil removal was required.

Groundwater samples were collected from three monitoring wells at sites GA-A (MW-10, MW-11) and GA-B and GA-C (MW-9) in the Garage Area. When the groundwater was sampled at these sites in 1994, only GA-C exceeded the cleanup level for GRO. In 2003, the groundwater at GA-C was sampled for GRO, which was detected below the cleanup level.

Table 4-5 summarizes the COCs and maximum concentrations remaining at the Garage Area.

### 4.8.5 Headquarters Area

Headquarters is located on the north side of Long Island, west of the Garage Area (Figures 4-7 and 4-8). Six USTs and nine transformers were removed from the Headquarters Area during the 1997 IRA. Approximately 71 tons of fuel-contaminated soil associated with the USTs was removed and treated. In addition, 958 tons of PCB-contaminated soil associated with the transformers was removed and packaged for disposal at a landfill in Grandview, Idaho. In 2000, additional soil characterization samples were collected at sites HQ-M and HQ-N, where DRO was detected previously near a fallen power pole. Groundwater samples were also collected at the Headquarters Area in 2000; results confirmed that DRO continued to exceed groundwater cleanup levels at HQ-E, which is the site of former powerhouse structure S-25. Based on the findings of the 2000 investigation, contaminated soil removals at HQ-E were recommended. As part of the 2002 IRA, 187 tons of fuel-contaminated soil was removed from sites HQ-M, HQ-N, and HQ-E. Following the cleanup actions in 1997 and 2002, the soil at these sites was sampled and submitted for laboratory analysis of fuel-related compounds and PCBs. All of the samples were below the Method Two cleanup levels for GRO, PAHs, SVOCs, VOCs, and PCBs or Method Three cleanup levels for DRO and RRO, or the Kodiak background concentrations for metals.

## Table 4-5
## Garage Area

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[4] | 16.56[7] | 4.9[9] | GA-A | 94LIGA251SL (1994) |
| | Chromium | 120,000[4] | 17.84[7] | 37[10] | GA-A | 94LIGA258SL (1994) |
| | DRO | 1,200[5] | NA | 1,160[11] | GA-C | 94LIGA202SL (1994) |
| | TRPH[3] | N/E | NA | 2,800 | GA-C | 94LIGA204SL (1994) |
| Groundwater (mg/L)[2] | Arsenic | 0.05[6] | 0.0377[8] | 0.022 | GA-B | 94LIGA357WA (1994) |
| | Chromium | 0.1[6] | 0.178[7] | 0.08 | GA-B | 94LIGA357WA (1994) |
| | DRO | 1.5[6] | NA | 0.81 | GA-B | 94LIGA357WA (1994) |
| | TRPH[3] | N/E | NA | 2.7 | GA-B | 94LIGA356WA (1994) |

**Notes:**

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] Remaining site concentration for groundwater is reflected by the most current sampling event.

[3] RRO was not reported in 1994; this range of compounds is represented by TRPH by EPA Method 418.1.

[4] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). Chromium III cleanup value (ingestion pathway) listed. Based on samples collected from Kodiak-area soil, chromium III is the predominant species. ARAR.

[5] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341 (c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR.

[6] ADEC, 2003, 18 AAC 75, Table C, Groundwater and Surface Water Cleanup Levels. ARAR.

[7] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium (tri- and hexavalent). TBC criteria.

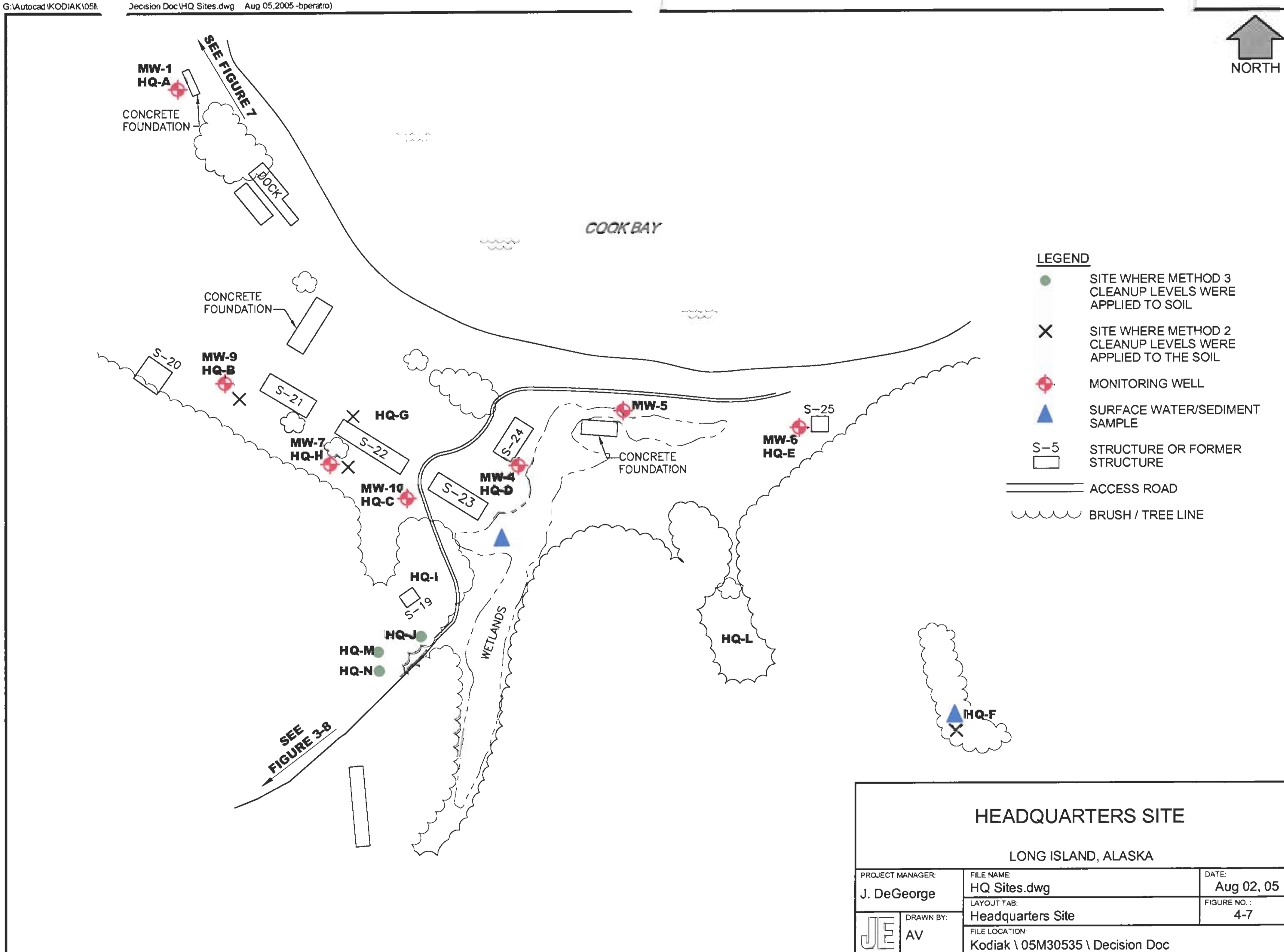
[8] Twice the average concentration found at Long Island was used as a screening value for arsenic in groundwater. Sample results during the most recent sampling event in 2003 indicated all arsenic concentrations were below the Table C cleanup criteria.

[9] Concentration of arsenic in the soil is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

[10] Reported result is total chromium; however, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. Chromium III is the predominant species.

[11] Data show a sample duplicate of 1,390 mg/kg and a QA sample result of 2,960 mg/kg. However, primary result of 1,160 mg/kg is represented in all subsequent data tables. During the 1997 IRA, six field-screening samples were collected at GA-C in an effort to further characterize/locate the 1994 sample with the DRO detection; none of these samples was above background readings, and visual evidence of contamination was not present.

For definitions, see the Acronyms and Abbreviations section.


NORTH
COOK BAY
SEE FIGURE 7
SEE FIGURE 3-8
MW-1
HQ-A
CONCRETE FOUNDATION
DOCK
CONCRETE FOUNDATION
S-20
MW-9
HQ-B
S-21
HQ-G
S-22
MW-7
HQ-H
MW-10
HQ-C
S-23
S-24
MW-4
HQ-D
MW-5
CONCRETE FOUNDATION
S-25
MW-6
HQ-E
HQ-I
S-19
HQ-J
HQ-M
HQ-N
WETLANDS
HQ-L
HQ-F
LEGEND
SITE WHERE METHOD 3 CLEANUP LEVELS WERE APPLIED TO SOIL
SITE WHERE METHOD 2 CLEANUP LEVELS WERE APPLIED TO THE SOIL
MONITORING WELL
SURFACE WATER/SEDIMENT SAMPLE
S-5
STRUCTURE OR FORMER STRUCTURE
ACCESS ROAD
BRUSH / TREE LINE
HEADQUARTERS SITE
LONG ISLAND, ALASKA
PROJECT MANAGER: J. DeGeorge
DRAWN BY: AV
FILE NAME: HQ Sites.dwg
LAYOUT TAB: Headquarters Site
FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc
DATE: Aug 02, 05
FIGURE NO.: 4-7

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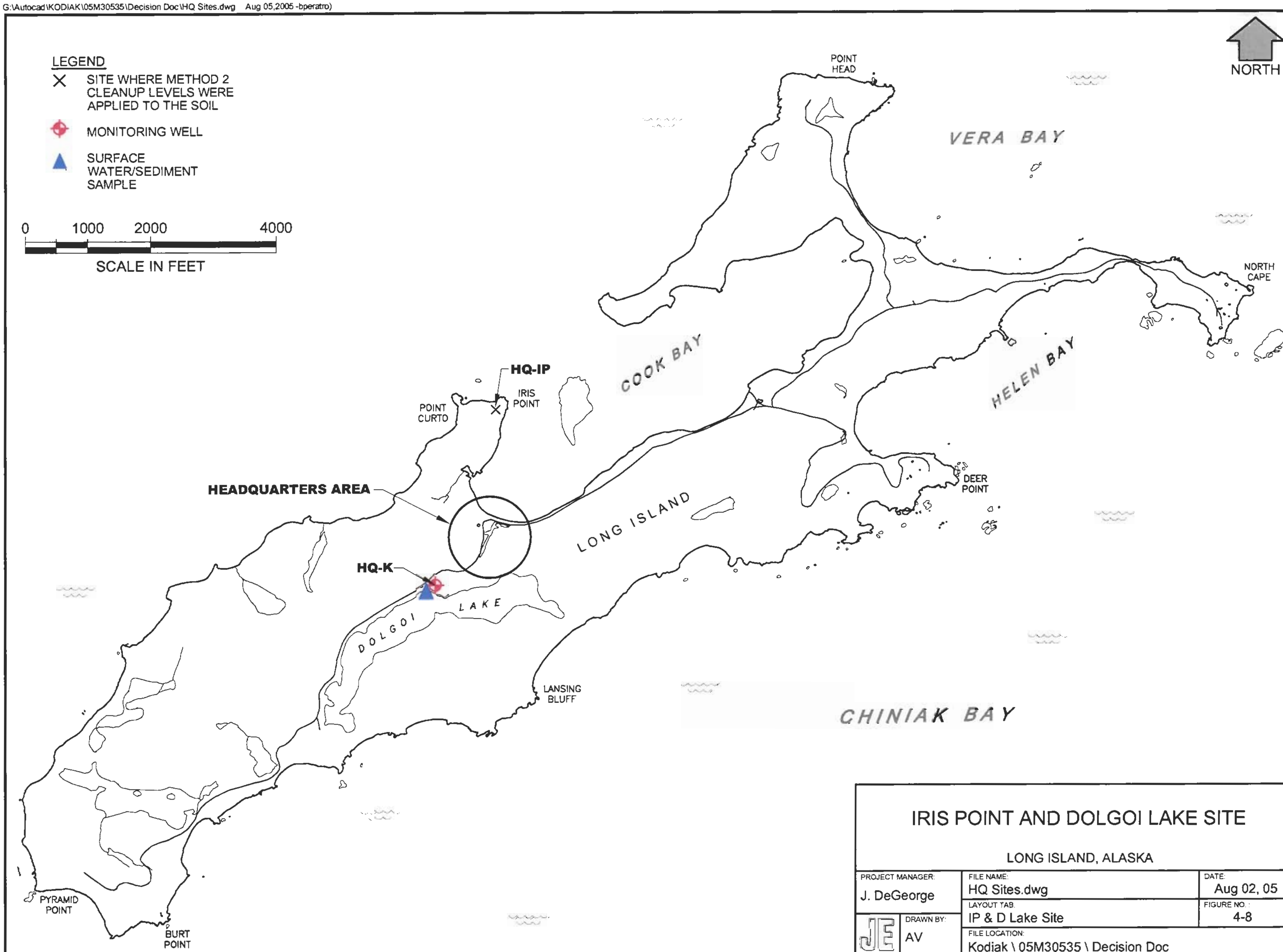

Sediment samples were collected at Dolgoi Lake and the wetland area within the main Headquarters Complex beach area and submitted for laboratory analysis of DRO, TRPH, VOCs, SVOCs, PCBs, pesticides, and metals. All of the sediment samples collected from Dolgoi Lake met applicable EcoTox thresholds (EPA 1996). One sample collected in 1994 from the wetland area in the main Headquarters Complex exceeded the sediment screening level for lead, with a concentration of 83 mg/kg, compared to the EcoTox threshold of 47 mg/kg. However, the concentration of lead detected in this sediment sample is well below the Method Two soil cleanup level of 400 mg/kg for lead.

Freshwater samples were collected from Dolgoi Lake and the wetland area within the main Headquarters Complex beach area and submitted for laboratory analysis of DRO, TRPH, VOCs, SVOCs, PCBs, pesticides, and metals. All of the samples met the applicable Freshwater Criteria.

Groundwater samples were collected from eight monitoring wells at sites HQ-A (MW-1), HQ-B (MW-9), HQ-C (MW-10), HQ-D (MW-4), HQ-E (MW-6), HQ-G and HQ-H (MW-7), HQ-K, and MW-5 in 1994, 1998, 2000, and 2003. When the groundwater was sampled at these sites previously, HQ-E did not meet the groundwater cleanup level for DRO and HQ-K exceeded the groundwater cleanup level for lead. During the 2002 IRA, contaminated soil (the contributing source of contamination in the groundwater) was removed from site HQ-E. In 2003, the groundwater at HQ-E and HQ-K was sampled. The monitoring well at HQ-K was also replaced because of the possibility that the lead contamination may have been introduced during well installation in 1998. Results from the 2003 sample event indicated that the groundwater at HQ-E and HQ-K now meets the groundwater cleanup levels for DRO and lead.

Figures 4-7 and 4-8 present the locations of the discrete sites and samples collected at the Headquarters Area. Table 4-6 also summarizes the COCs and maximum concentrations remaining at the Headquarters Area.

## Table 4-6
## Headquarters Area

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[4] | 16.56[8] | 15[10] | HQ-D | 94LIHQ83SL (1994) |
| | Chromium | 120,000[4] | 17.84[8] | 35[11] | HQ-H | 94LIHQ102SL (1994) |
| | PCBs | 1 (surface)/10 (subsurface)[4] | NA | 7.04[12] | HQ-H | KOD096SO (1997) |
| | DRO | 1,200[5] | NA | 1,100 | HQ-M | HQM-2.0-001A (2002) |
| Groundwater (mg/L)[2] | Arsenic | 0.05[6] | 0.0377[9] | 0.014 | HQ-D | 94LIHQ227WA (1994) |
| | Chromium | 0.1[6] | 0.178[8] | 0.04 | HQ-C | 94LIHQ226WA (1994) |
| | PCBs | 0.0005[6] | NA | ND [0.0005] | HQ-H | HQH-01GW (1998) |
| | DRO | 1.5[6] | NA | 1.3 | HQ-E | HQMW61-01 (2003) |
| Sediments (mg/kg) | Lead | 47[7] | 9[8] | 83[13] | HQ-D | 94LIHQ248SL (1994) |
| Surface Water (mg/L) | None[3] | All results below criteria | NA | NA | NA | Dolgoi Lake (1994) |

**Notes:**

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] Remaining site concentration for groundwater is reflected by the most current sampling event.

[3] Surface water from Dolgoi Lake, near the site, was analyzed for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), PCBs, pesticides, VOCs, and DRO. All results were less than the EPA Ambient Water Quality Criteria, adopted by reference (ADEC 2002). ARAR.

[4] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). Chromium III cleanup value (ingestion pathway) listed. Based on samples collected from Kodiak area soil, chromium III is the predominant species. ARAR.

[5] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR.

[6] ADEC, 2003, 18 AAC 75, Table C, groundwater and surface water cleanup levels. ARAR.

[7] Most stringent value listed in the EcoTox thresholds (EPA 1996). TBC criteria.

[8] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium (tri- and hexavalent). TBC criteria.

[9] Twice the average concentration found at Long Island was used as a screening value for arsenic in groundwater. Sample results during the most recent sampling event in 2003 indicated all arsenic concentrations were below the Table C cleanup criteria.

[10] Concentration of arsenic in the soil is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

[11] Reported result is total chromium; however, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. Chromium III is the predominant species.

[12] Result is from stockpiled soil that was used as backfill at a depth greater than 2 feet below ground surface during the 1997 IRA. The subsurface soil criteria for PCBs is 10 mg/kg.

[13] The concentration of lead in this sediment sample is well below the Method Two soil cleanup level of 400 mg/kg for lead that is protective of human health and based on the most common exposure pathways.

For definitions, see the Acronyms and Abbreviations section.

### 4.8.6 North Cape

North Cape is located at the eastern end of Long Island (Figure 4-9). The soil surrounding two collapsed buildings at North Cape was sampled in 1998 for evidence of DRO, RRO, VOCs, PCBs, and metals. Chemical concentrations in all of the soil samples were below the Method Three cleanup levels for DRO and RRO or the Kodiak background concentrations for metals. In addition, a leaking 55-gallon drum that contained oily liquid was removed from site NC-A in 2000, and the soil beneath the drum was sampled for DRO and RRO. During the 2002 IRA, one-half ton of contaminated soil was removed from the former drum location, based on the results of the samples collected in 2000. The soil remaining at this drum site was sampled for DRO, and RRO; concentrations of these compounds, in all of the samples, were below the Method Three cleanup levels.

Table 4-7 summarizes the COCs and maximum concentrations remaining in the soil at North Cape.

**Table 4-7**
**North Cape**

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | Arsenic | 1.8[2] | 16.56[4] | 2.75[5] | NC-A | NCAPEFSLA-01SO (1998) |
| | Chromium | 120,000[2] | 17.84[4] | 30.2[6] | NC-A | NCAPEFSLA-01SO (1998) |
| | DRO | 1,200[3] | NA | 61 | NC-A | NC-SOUTH (2002) |
| | RRO | 22,000[3] | NA | 6,000 | NC-A | NC-SOUTH (2002) |

Note:

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels (most conservative of ingestion, inhalation, and migration-to-groundwater pathways). Chromium III cleanup value (ingestion pathway) listed. Based on samples collected from Kodiak area soil, chromium III is the predominant species. ARAR.

[3] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR.

[4] SAIC, 1995, *Final RCRA Facility Investigation/Corrective MEASURES Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium.

[5] Concentration of arsenic in the soil is below the Kodiak background level; therefore, arsenic is not considered a site-related contaminant.

[6] Reported result is total chromium; however, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. Chromium III is the predominant species.

For definitions, see the Acronyms and Abbreviations section.

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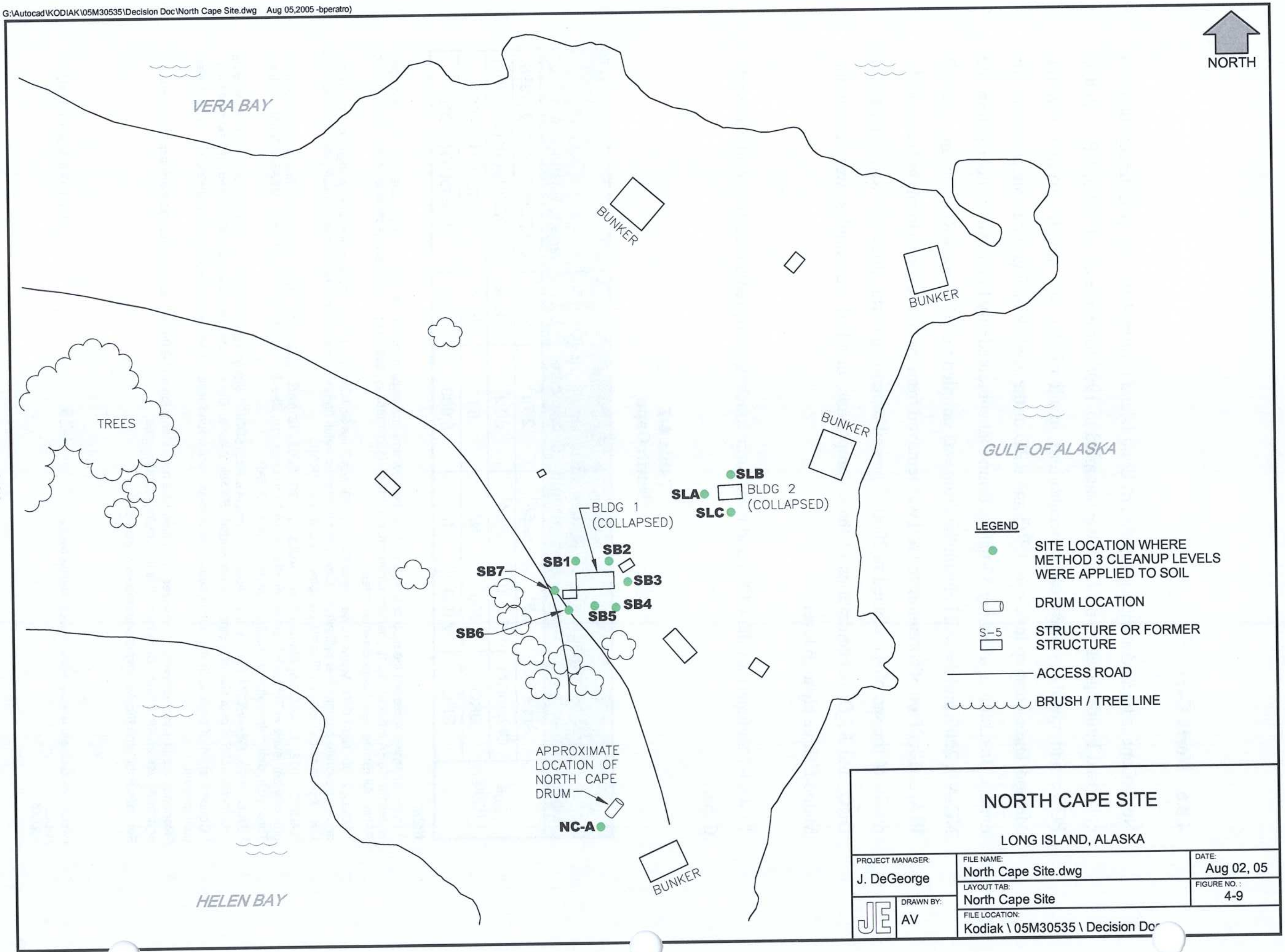


### 4.8.7 Point Head

Point Head overlooks Vera Bay and is the northernmost AOC on Long Island. In 1998, the soil surrounding a collapsed building in the Point Head area (site PH-A) was sampled for DRO, RRO, PAHs, SVOCs, VOCs, and lead (Figure 4-10). Concentrations of fuel-related compounds and lead in these samples were below the Method Three cleanup levels established for the fuel-related contaminants and the Method Two cleanup criteria for lead, based on residential land use.

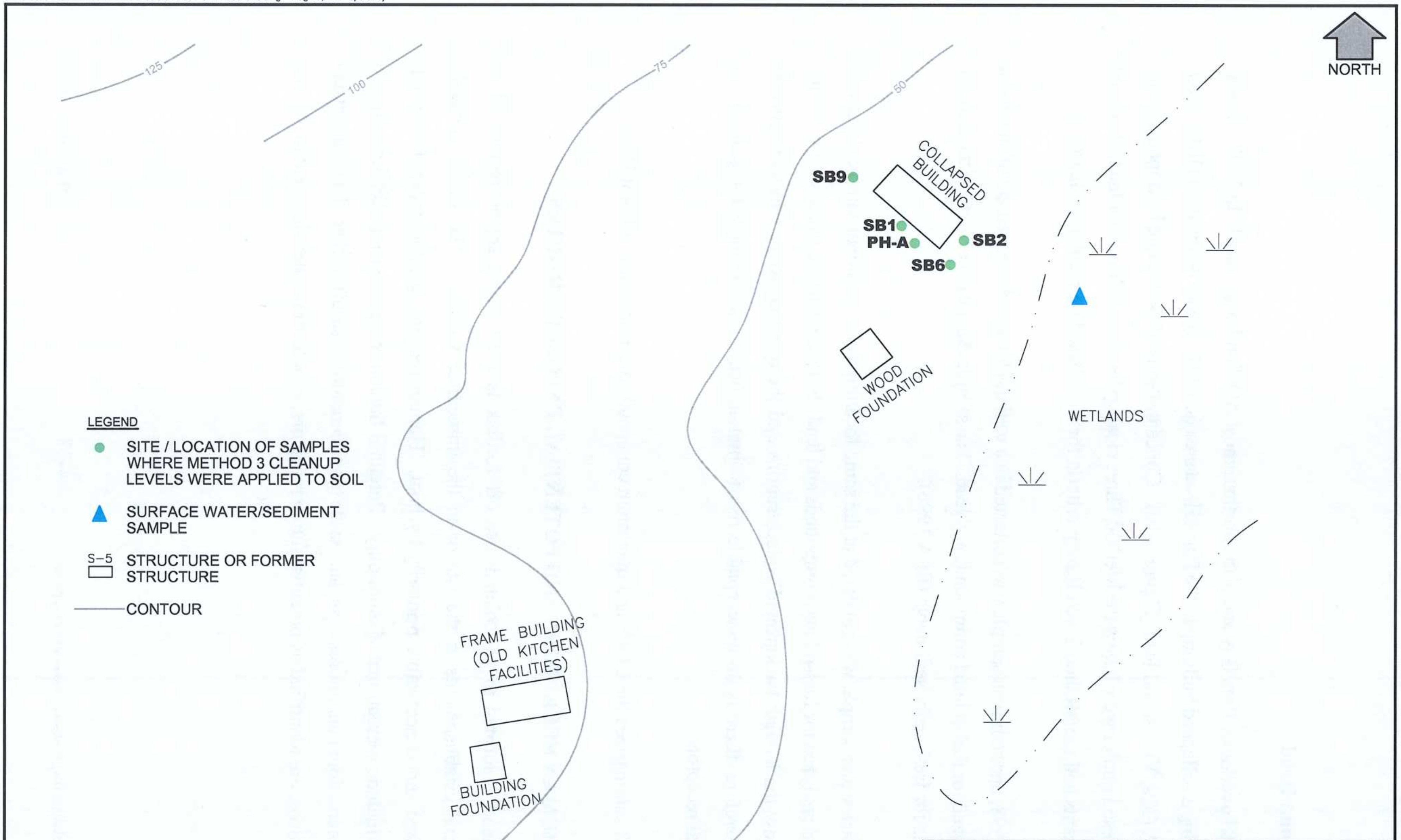
Also in 1998, one sediment sample was collected in a wetland located downgradient of site PH-A and analyzed for fuel-related compounds and lead. The sample did not exceed any of the EcoTox thresholds for freshwater sediments (EPA 1996).

One surface water sample was collected at the same location as the sediment sample described above and analyzed for fuel-related compounds and lead. For lead, surface water sample results were below the Kodiak background concentrations and the drinking water criteria in surface water; therefore, there is no unacceptable risk to human health via the ingestion pathway or ecological receptors.

Table 4-8 summarizes the COCs and maximum concentrations remaining at Point Head.

## 4.9 HUMAN RECEPTORS AND POTENTIAL EXPOSURE ROUTES

Long Island is located in an isolated area off Kodiak Island. There are no residential or commercial establishments at the site or in the immediate vicinity. The site is currently uninhabited and is accessible primarily by boat. Human receptor groups under the current scenario include recreational visitors only. Potential human receptor groups for Long Island include recreational visitor, resident, and onsite (commercial/industrial) worker. The resident and onsite worker are identified as potential future receptors, should future development of the site occur.

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|---|---|---|
| POINT HEAD SITE<br>LONG ISLAND. ALASKA | | |
| PROJECT MANAGER: J. DeGeorge | FILE NAME: Point Head Site.dwg | DATE: Aug 02, 05 |
| JE / DRAWN BY: AV | LAYOUT TAB: Point Head Site | FIGURE NO.: 4-10 |
| | FILE LOCATION: Kodiak \ 05M30535 \ Decision Doc | |

**Table 4-8**
**Point Head**

| Media | Contaminant of Concern[1] | Cleanup Criteria | Kodiak Background | Maximum Remaining Site Concentration | Discrete Site | Sample Location ID (Year) |
|---|---|---|---|---|---|---|
| Soil (mg/kg) | DRO | 12,500[2] | NA | 579 | PH-A | 94LIPH400SL (1994) |
| Sediment (mg/kg) | DRO | N/E | NA | 116 | PH-A | PTHDSED-01SO (1998) |
| Surface Water (mg/L) | DRO | N/E | NA | ND [0.22] | PH-A | PTHEAD-01SW (1998) |
| | Lead | 0.015[3] | 0.005[4] | 0.0046 | PH-A | PTHEAD-01SW (1998) |

**Notes:**

[1] These analytes exceeded cleanup criteria prior to soil excavation and were identified as COCs. Soil at this AOC has also been tested for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), pesticides, VOCs, SVOCs, and PAHs. All results were below cleanup criteria.

[2] ADEC, 2002, 18 AAC 75, Method Three ACLs. ADEC, 2002, 18 AAC 75, Method Three ACLs, modified the migration-to-groundwater levels in Tables B1 and B2 of 18 AAC 75.341(c) and (d). See 2002 Long Island IRA Report (USAED 2003). Method Three ACL determinations can be found in Appendix D. ARAR.

[3] ADEC, 2003, 18 AAC 75, Table C, groundwater and surface water cleanup levels. ARAR.

[4] SAIC, 1995, *Final RCRA Facility Investigation/Corrective Measures Study Report Volume 1, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Kodiak, Alaska.* Background soil value was determined for total chromium (tri- and hexavalent). TBC criteria.

For definitions, see the Acronyms and Abbreviations section.

The following potential routes of exposure have been identified for receptors at the Long Island site as presented in Figure 4-1:

- Inadvertent ingestion of soil or sediment
- Dermal contact with groundwater, soil, sediment, or surface water
- Ingestion of groundwater and surface water
- Consumption of impacted biota such as fish or shellfish

For purposes of the CSM, it is assumed that constituents in subsurface soil may be brought to the surface during future construction activities. A current or future recreational visitor and a future resident or onsite worker may have direct contact with contaminated soils and be exposed to site contaminants from inadvertent ingestion or dermal contact. Exposure to surface or subsurface soil is not considered a significant pathway as contaminated soil was removed through a series of remedial actions, and the concentrations of the residual contaminants are below cleanup levels protective of human health. Dusts are not considered a viable pathway due to the wet climate and the dense growth of vegetation on the island.

The recreational visitor may also be exposed to contaminated freshwater or marine sediments. Exposure to fresh surface water and sediments may occur for the recreational visitor at the inland Headquarters Area. Exposure to beach sediments may occur for the recreational visitor walking along the shoreline at all other areas. Freshwater sediment samples have been collected from the major lakes, wetlands, and several small drainages throughout the island. Laboratory analytical results have indicated that the contaminants of potential concern (COPC) and COCs in sediments were either not detected or, for metals, were at concentrations within naturally occurring background levels. A complete exposure scenario was assumed for surface water since fresh surface water (i.e., Lake Dolgoi) may be used as a drinking water source at the site; however, surface water sample results from previous investigations have indicated that the COPCs or COCs were either not detected or were at concentrations below cleanup levels.

Groundwater ingestion is not currently considered a complete human exposure pathway, as it has not been developed as a drinking water source; however, a complete exposure pathway was assumed to address potential future development of the groundwater as a drinking water source. It is also assumed that contaminated groundwater may impact the adjacent marine environment. Exposure to impacted fish or shellfish assumes contamination associated with the site could discharge or migrate to the freshwater or marine environment and adversely affect associated aquatic biota. These fish and/or shellfish might then be harvested and ingested by a recreational visitor or a future resident. Based on the most current groundwater samples collected in 2003, there is no contamination remaining above cleanup levels for any COPC or COC. Therefore, while there is a complete pathway, exposure is not considered a risk to human health or the environment.

## 4.10 ECOLOGICAL RECEPTORS AND POTENTIAL EXPOSURE ROUTES

Ecological receptor groups identified for the Long Island site include aquatic and terrestrial organisms. Mammalian species include Sitka black-tailed deer, snowshoe hare, and possibly arctic ground squirrel, short-tailed weasel, and red fox. Approximately 20 to 30 feral cattle inhabit the island and forage mainly along the edge of the beach of Cook Bay and on the road system where clover and grasses are most abundant. The northwest tip of the island serves as a pupping and hauling out grounds for harbor seals and Steller sea lions. Long Island also supports a number of breeding sea birds, including tufted and horned puffins, pelagic and red-faced cormorants, glaucous-winged gulls, and black-legged kittiwakes. Bald eagles also use the island for roosting and nesting (USAED 2002a).

The only inland fishery resource known on the island is rainbow trout, which have been stocked in Dolgoi Lake and in an unnamed lake near the southern tip of the island. Clams, shrimp, king, tanner, and Dungeness crab can be found in the intertidal and near-shore habitats off Long Island.

Potential routes of exposure include inadvertent ingestion of soil or sediment, exposure to constituents in groundwater discharging to off-island marine or fresh surface waters and sediments, exposure to constituents in fresh surface water and sediments, uptake of contaminants by flora, and ingestion of contaminants in food resources (i.e., prey or flora) by consumers. The concentration of residual contaminants left in the soil, sediment, groundwater, and surface water on Long Island are below the risk-based screening levels and cleanup levels protective of ecological receptors or within background concentrations of naturally deposited metals. There are no unacceptable risks to ecological receptors.

## 4.11 GROUNDWATER

Depth to groundwater at Long Island varies depending on proximity to the coastline, the presence of perched, low-permeability sedimentary deposits; bedrock topography; and bedrock characteristics (permeability, number and size of fractures, etc). Groundwater is found in soils overlying bedrock and within fractures of the bedrock itself. The nature of the groundwater is constrained by the influence of the surrounding saltwater, the relatively small size of the island (approximately 0.75 mile by 4 miles), and the fact that the island has a maximum of 100 feet of relief between ground elevation and mean sea level. Elevated electrical conductivity readings measured in monitoring wells from the Headquarters Area indicate that saltwater intrusion is present in groundwater near the coastline.

The exact nature of the fracture system at Long Island has not been characterized. Groundwater within fractured bedrock would likely occur along bedding planes, joints, and dissolution fractures. The size, extent, and degree of interconnection between these openings would determine the water-producing capacity of the bedrock system. The connections of fractures within the bedrock at Long Island are unknown.

The direction of groundwater flow has not been characterized, but is believed to closely follow the land surface topography. During periods of increased rainfall, some shallow groundwater likely flows along the topsoil-ash and/or silty glacial till and interfaces downslope, towards discharge areas where it intersects the ground surface or a surface water body. The ash and dense glacial till can act as a water perch, impeding water infiltration and increasing runoff.

## PART 5: CURRENT AND POTENTIAL FUTURE LAND AND WATER USES

The Long Island site is currently owned by Leisnoi Inc., with subsurface rights belonging to Koniag Inc. The island had been used for several years for cattle grazing. Currently, there are approximately 20 to 30 head of feral cattle on the island. Development plans for the island include potential recreational activities. Future development may include cabins and access to fishing at two inland lakes that contain stocked rainbow trout.

Currently, no producing drinking water wells exist on Long Island. Since the site is an island, with a maximum of 100 feet of relief between ground elevations and mean sea level, the possibility would exist for saltwater intrusion with prolonged pumping of groundwater from a fractured bedrock system. Using groundwater as a drinking water source on Long Island is not likely, due to the high expense and unpredictability of developing a well in a fractured bedrock system. Although freshwater may be available in the short term, the connections of fractures within the bedrock are unknown and the long-term productivity of a well would be difficult to determine. Dolgoi Lake is a large freshwater lake located approximately 800 feet south of the Headquarters Area that encompasses approximately 46.6 acres. The surface water of Dolgoi Lake was the source of drinking water for the Fort Tidball Headquarters Complex Facility during military activities at the site. Since a surface water source (Dolgoi Lake) is readily accessible, reliable, and less expensive to develop, this resource would be the most logical to develop both economically and hydrogeologically.

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# PART 6: SUMMARY OF SITE RISKS

Chemical concentrations in previous soil, sediment, groundwater, and surface water samples collected on Long Island were compared to federal- and state-established criteria or ACLs developed specifically for Long Island to evaluate risks to human health and the environment.

In addition, for metals, surface water and sediment sample results were also compared to background concentrations calculated for other Kodiak project areas. Several metals (such as arsenic and chromium) are found to be naturally occurring in the soil; the concentrations of these naturally deposited metals are referred to as background concentrations. A study of background metals was conducted at various locations on Kodiak Island in close proximity to the U.S. Coast Guard Base. This study was part of a Resource Conservation and Recovery Act (RCRA) Facility Investigation/Corrective Measures Study (Science Applications International Corporation 1995). Samples were collected from locations within the upper Buskin River Valley (located on Kodiak Island) that had not been influenced by human activity. Background concentrations of metals were determined for soil, groundwater, surface water, and sediment sample media. The surface water and sediments found on Long Island have similar characteristics and surrounding terrain as the freshwater bodies and sediments selected for background sampling during the RCRA Facility Investigation/Corrective Measures Study. The soil in the uplands (inland areas at elevations above the beach line) of Long Island also has similar characteristics to the soil found in the upper Buskin River Valley. Concentrations of metals at or below these background concentrations are considered to be naturally occurring levels, rather than site-related contaminants. The Section 5 summary tables present cleanup levels, background concentrations, and remaining site concentrations for all Long Island sites.

## 6.1 IDENTIFICATION OF CHEMICALS OF CONCERN

The response action selected in this Decision Document is necessary to protect public health and welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment.

COCs for soil at Long Island are the POL constituents DRO, RRO, GRO, PCBs, and five PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. The COCs in sediment are lead and arsenic. COCs for groundwater are DRO and RCRA metals. The COC for surface water is lead.

For soils, samples collected at Burt Point, the Garage Area, and the Headquarters Area were below the ADEC Method Two or Method Three cleanup levels for DRO and RRO and were also below the Kodiak Island background concentrations for metals.

For soils at the North Cape, the samples were below the ADEC Method Three cleanup levels. At Point Head, concentrations of fuel-related compounds and lead were below the ADEC Method Three cleanup levels established for the fuel-related contaminants and the ADEC Method Two cleanup criteria for lead, based on residential land use.

At Castle Bluff, all of the soil samples analyzed were below the ADEC Method Two and Method Three cleanup levels and were also below the Kodiak Island background concentrations for metals, with two exceptions: Chromium levels at Sites CB-H and CB-J (58 and 40 mg/kg, respectively) exceeded the ADEC Method Two cleanup level for total chromium (23 mg/kg). However, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island therefore trivalent chromium is the predominant species at Kodiak. The cleanup level for trivalent chromium is 120,000 mg/kg (ingestion); the chromium concentrations in the samples collected at CB-H and CB-J are well below this cleanup level.

At Deer Point, all of the soil samples analyzed were below the ADEC Method Two and Method Three cleanup levels and were also below the Kodiak Island background concentrations for metals, with one exception: Total chromium levels at DP-A (25 mg/kg) exceeded the ADEC Method Two cleanup level for total chromium. However, chromium +6 is not a stable ion and is unlikely to be present as there is no known source or historic use on the island. The cleanup level for trivalent chromium is 120,000 mg/kg (ingestion); the chromium concentrations in the sample collected at site DP-A are well below this cleanup level.

For sediments, two out of the 11 samples collected exceeded the EcoTox threshold for arsenic, and one of these samples exceeded the Kodiak background concentration for lead. For groundwater, the most current sample results show that there is no contamination remaining above cleanup levels. For surface water, two out of the 13 surface water samples exceeded the 18 AAC 70 Freshwater Criteria for lead; however, these concentrations were below the 18 AAC 75 groundwater cleanup level for lead.

The quality assurance (QA) and quality control (QC) program utilized throughout the site investigations, RIs, and IRAs was in accordance with the USAED-approved QA/QC program, and compliance was achieved for the work conducted at the site. All data quality objectives were achieved, and the quality of the data supports the decisions made for the site.

## 6.2 EXPOSURE ASSESSMENT/RISK EVALUATION

The objective of the exposure assessment was to identify potential exposure scenarios by which COCs in site media could contact humans and to quantify the intensity and extent of that exposure. The assessment considers the current and potential future uses of the site, characterizes the potentially exposed populations, identifies the important exposure pathways, and quantifies the intake of each COC from each medium for each population at risk. The CSM depicting potential receptors and exposure pathways is presented on Figure 4-1. The exposure pathways quantitatively evaluated in the human health risk evaluation are the following:

- Current and future recreational visitors, i.e., onsite campers (adults and children), were evaluated for potential exposures to COCs via incidental ingestion, dermal contact, consumption of impacted biota. This category also includes occasional trespassers.
- Potential future onsite residents (adults and children) were evaluated for potential exposures to COCs via incidental ingestion, dermal contact, and consumption of impacted biota. Although the probability of this occurring is small, it was included as a benchmark.
- Potential future onsite campers, i.e., recreational visitors (adults and children), were evaluated for potential exposures to COCs via incidental ingestion, dermal contact, consumption of impacted biota. This category also includes occasional trespassers.

The pathways of contaminants in the soil migrating to surface water and groundwater were evaluated as complete. However, as there is no contamination remaining above cleanup levels for all COPCs or COCs, the pathway is not considered significant.

The parameters and equations used to calculate exposure were obtained from state guidance (ADEC 1999). These ADEC parameters and equations are similar to those used by the EPA. The exposure frequency for the residential exposure was adjusted by the ADEC guidance document to account for local climatic conditions, which reduced residential exposure frequency from the default value of 350 days per year to 330 days per year, consistent with spending less time outdoors due to rainfall, snowfall, temperature, and daylight extremes. The exposure frequency for the current recreational visitor scenario used 20 days per year. (Other minor changes between the EPA defaults and the ADEC defaults include the $F_{OC}$ in the soil and the dilution attenuation factor.)

## 6.3 TOXICITY ASSESSMENT

The human health toxicity assessment quantified the relationship between estimated exposure (dose) to a COC and the increased likelihood of adverse effects. Risks of developing cancer due to site exposure are evaluated based on toxicity factors (cancer slope factors [CSF]) published by EPA in the Integrated Risk Information System. Quantification of noncancer injuries relies on EPA-published reference doses (RfD).

CSFs are used to estimate the probability that a person *may* develop cancer given exposure to site-specific contaminants. This site-specific risk is in addition to the risk of developing cancer due to other causes over a lifetime. Consequently, the risk estimates generated in risk assessments are frequently referred to as "incremental" or "excess lifetime" cancer risks.

RfDs represent a daily contaminant intake below which no adverse human health effects are expected to occur to the most sensitive subpopulations (children, elderly, pregnant women). To evaluate noncarcinogenic health effects, the human health impact of contaminants is approximated using a hazard quotient, calculated by comparing the estimates of site-specific human exposure doses with RfDs. (Values of less than 1 indicate that noncancer effects are unlikely to result from exposure to a site contaminant.)

Of the site-related COCs in soil that potentially impact human health, some PAHs are considered carcinogenic.

## 6.4 SOIL RISK EVALUATION

The cleanup requirements in ADEC 18 AAC 75 are relevant and appropriate to cleanup work on Long Island. Under these regulations, there are four methods of establishing soil cleanup levels; however, at Long Island, only Methods Two and Three cleanup levels were applied. Soil samples were collected from all eight AOCs and analyzed for DRO, GRO, RRO, VOCs, SVOCs, pesticides, PCBs, and metals.

Contaminated soil from 38 discrete sites within the seven AOCs on Long Island has been removed, POL-contaminated soil has been thermally treated in Kodiak, and PCB-contaminated soil has been disposed of in a TSCA-permitted landfill (Grandview, Idaho). Method Two cleanup levels were applied to 16 of the 38 sites on Long Island. The COCs at these sites were DRO or PCBs. Method Three cleanup levels were applied to the remaining 22 sites; COCs were DRO and RRO. At two discrete sites, GRO and PAHs were also COCs. Figures 4-2 through 4-10 show the approximate location of these sites and the pertinent cleanup levels.

### 6.4.1 Method Three Alternative Cleanup Levels

Under the criteria established in 18 AAC 75.340(e)(1), Method Three ACLs that modified the migration-to-groundwater levels in Table B1 of 18 AAC 75.341(c) and Table B2 of 18 AAC 75.341(d) were developed for Long Island. ADEC's Web-Based Method Three Calculator (ADEC 2002) was used to derive the Long Island ACLs. Copies of the calculated Method Three ACLs produced from the Website and supporting data are included in the 2002 Long Island IRA Report (USAED 2003).

The geology of Long Island has been characterized as upland areas or coastal beach areas. Because the soil characteristics are different between the upland and coastal beach areas, separate Method Three site cleanup levels were established for both areas. In 1998, soil samples were collected from the upland and coastal beach areas and analyzed for their TOC content. Soil samples were collected from the Burt Point, Headquarters, and Point Head AOCs and analyzed for TOC. The results were used to modify the default $F_{OC}$ value during calculation of the Method Three ACLs.

The average $F_{OC}$ value for Burt Point and Point Head (0.072753 grams per gram and 0.112288 grams per gram, respectively) was significantly higher than that of the Headquarters Area. The upland soils found at Point Head and Burt Point AOCs have higher Method Three cleanup levels (due to higher TOC content) than compared to the coastal beach soils at the Headquarters AOC. Method Three cleanup levels were established for several fuel-related compounds, including DRO, RRO, GRO, and a number of PAH compounds.

The resulting DRO and RRO Method Three ACLs were calculated to be 12,500 and 22,000 mg/kg, respectively for both Point Head and Burt Point. DRO and RRO Method Three ACLs for the Headquarters Area were calculated to be 1,200 and 22,000 mg/kg, respectively. The GRO ACL was 1,400 mg/kg and was applied to one subarea at Burt Point (BP-A). ACLs for three PAH compounds were also calculated in order to address the one subarea (HQ-L) where PAHs are COCs. Method Three ACLs could not be applied for two of the PAH compounds at HQ-L; however, the excavation proceeded to bedrock, and the site was cleaned to the extent practicable. During development of the Method Three cleanup levels, USAED and ADEC decided that the lower, more conservative site-cleanup levels calculated for the coastal beach areas should be applied to the upland areas at Castle Bluff, Deer Point, the Garage Area, and North Cape AOCs. Table 6-1 summarizes these ACLs.

**Table 6-1**
**Comparison of Soil Cleanup Levels for Contamination at Long Island**

| AOCs | Contaminant | Method Three ACLs, Migration to Groundwater (mg/kg) | Method Two Migration to Groundwater (mg/kg)[1] |
|---|---|---|---|
| Headquarters, Castle Bluff, Deer Point, Garage and North Cape | DRO | 1,200 | 230 |
| | RRO | 22,000 | 9,700 |
| | Benzo(a)anthracene | 25.4 | 5.5 |
| | Benzo(a)pyrene | N/A | 0.9[2] |
| | Benzo(b)fluoranthene | 78.5 | 9 |
| | Dibenzo(a,h)anthracene | N/A | 0.9[2] |
| | Indeno(1,2,3-c,d)pyrene | 221 | 9 |
| Burt Point | DRO | 12,500 | 230 |
| | RRO | 22,000 | 9,700 |
| | GRO | 1,400 | 260 |
| Point Head | DRO | 12,500 | 230 |
| | RRO | 22,000 | 9,700 |

__Notes:__
[1]ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup. This regulation is an ARAR for the project site.
[2]ADEC, 2003, 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels. Ingestion cleanup level was used as it was the most conservative.
For definitions, see the Acronyms and Abbreviations section.

### 6.4.2 Cumulative Risk Soil

The cumulative carcinogenic and noncarcinogenic risk for Long Island was calculated using the maximum concentrations of the COPCs remaining onsite. Additionally, metals were compared to background concentrations and were eliminated as COPCs if background concentrations exceeded onsite sample concentrations. ADEC's Web-Based Method Three Calculator (ADEC 2002) was used to derive the Long Island cumulative risk values. The cumulative carcinogenic risk and hazard index were also calculated to include background metals such as arsenic; the resulting risk values were below the regulatory thresholds. Based on the CSM developed for Long Island, ingestion is the primary route of exposure.

The resultant Long Island cumulative carcinogenic risk is $2.7 \times 10^{-6}$, which meets the regulatory requirement of 18 AAC 75.325(g) that cumulative carcinogenic risk must not exceed $1.0 \times 10^{-5}$.

The resultant Long Island cumulative hazard index is 0.13, which meets the regulatory requirement of 18 AAC 75.325(g) that cumulative noncarcinogenic risk must not exceed a hazard index of 1.0.

## 6.5 SEDIMENT RISK EVALUATION

Sediment data were collected and compared to the most stringent screening levels in the EPA EcoTox thresholds (EPA 1996) and the Kodiak background concentrations for metals. The freshwater sediment EcoTox threshold represents levels of contaminants above which adverse or toxic effects may occur in aquatic organisms. If chemical concentrations were above the EcoTox thresholds, they were further evaluated to determine if they posed a risk to the environment.

A total of 11 sediment samples was collected from five sites within the Headquarters, Castle Bluff, and Point Head AOCs and analyzed for DRO, TRPH, VOCs, SVOCs, pesticides, PCBs, and metals. The COCs in the sediment at these sites were lead and arsenic. Two out of the 11 samples collected exceeded the EcoTox thresholds for arsenic or lead; however, only one sample (from the wetland at the Headquarters Complex) exceeded the Kodiak background concentration for lead.

## 6.6 GROUNDWATER RISK EVALUATION

Groundwater cleanup levels established in 18 AAC 75.345, Table C, were applied to all of the Long Island AOCs.

Groundwater samples collected from 15 discrete sites within the Headquarters, Castle Bluff, Garage, and Deer Point AOCs were analyzed for DRO, GRO, RRO, VOCs, SVOCs, pesticides, PCBs, and metals. The COCs in the groundwater at these sites included DRO and metals. Based on the results of the most current groundwater samples collected in 2003, there is no contamination remaining above cleanup levels.

### 6.6.1 Cumulative Risk Groundwater

The cumulative carcinogenic and noncarcinogenic risk for Long Island was calculated using the maximum concentrations of the COPCs remaining onsite. Additionally, metals were compared to background concentrations and were eliminated as COPCs if background concentrations exceeded onsite sample concentrations. ADEC's Web-Based Method Three Calculator (ADEC 2002) was used to derive the Long Island cumulative risk values. As with the soil data, the cumulative carcinogenic risk and hazard index were also calculated to include background metals such as arsenic and chromium; the resulting risk values were below the regulatory thresholds. Supporting data used for calculation of cumulative risks in groundwater are included in Appendix C. Based on the CSM developed for Long Island, ingestion is the primary route of exposure.

The resultant Long Island cumulative carcinogenic risk is $2.7 \times 10^{-6}$, which meets the regulatory requirement of 18 AAC 75.325(g) that cumulative carcinogenic risk must not exceed $1.0 \times 10^{-5}$.

The resultant Long Island cumulative hazard index is 0.21, which meets the regulatory requirement of 18 AAC 75.325(g) that cumulative noncarcinogenic risk must not exceed a hazard index of 1.0.

## 6.7 SURFACE WATER RISK EVALUATION

Surface water data was compared to Alaska water quality standards defined in ADEC 18 AAC 70 Water Quality Standards (Freshwater Criteria) or the groundwater cleanup levels listed in 18 AAC 75, Table C. The Freshwater Criteria referenced in the regulations represent levels of contaminants above which adverse or toxic effects may occur in aquatic organisms. The groundwater cleanup levels are concentrations that are protective of human health and are based on the assumption that someone may live onsite and ingest the surface water.

A total of 13 surface water samples was collected in the Headquarters, Burt Point, Castle Bluff, and Point Head AOCs and analyzed for DRO, TRPH, VOCs, SVOCs, pesticides, PCBs, and metals. The only COC in the surface water was lead. Two out of the 13 surface water samples exceeded the 18 AAC 70 Freshwater Criteria for lead (0.0032 mg/L, based on the EPA 1985 Ambient Water Quality Criteria for lead); however, these concentrations were below the 18 AAC 75 groundwater cleanup level for lead (0.015 mg/L). It was determined these isolated low levels of lead do not pose an unacceptable risk to human health or the environment.

## 6.8 ECOLOGICAL RISK EVALUATION

An evaluation of ecological risks indicated that the potential for significant ecological impacts to occur was small. Based upon the relatively small size of the contaminated source areas in comparison to the home ranges of the target ecological receptor habitats, there was little potential for significant exposure of wildlife to the contaminants.

## 6.9 BASIS FOR RESPONSE ACTION

The response actions selected in this Decision Document are necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site; any or all of which could present an imminent and substantial endangerment to public health or welfare.

# PART 7: REMEDIAL ACTION OBJECTIVES

The remedial action objectives (RAO) for the Long Island sites are:

- Prevent ingestion, inhalation, or migration to groundwater of contaminants in soil containing DRO, GRO, RRO, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene.
- Prevent ingestion of groundwater or negative ecological impacts to marine surface water caused by the discharge of groundwater containing DRO, arsenic, chromium, and lead.

See Part 6 for cleanup levels for each contaminant present onsite.

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# PART 8: DESCRIPTION OF ALTERNATIVES

## 8.1 REMEDY COMPONENTS

Three alternatives were evaluated based on information presented in the Long Island Phase I RI (USAED 1994). This section presents the remedial action alternatives and a description of each alternative analyzed.

### 8.1.1 Alternative 1 – No Action

The National Oil and Hazardous Substances Pollution Contingency Plan requires that a no-action alternative be considered for all media. The no-action alternative (Alternative 1) establishes a baseline for alternative comparison. A no-action alternative can include limited environmental monitoring to assess the impacts associated with no remedial response action, but cannot include actions to minimize risk by reducing either contaminant exposure pathway or contamination through treatment.

### 8.1.2 Alternative 2 – Apply ADEC Method Three Cleanup Levels and Informational Institutional Controls

Alternative 2 would include:

- Applying ADEC Method Three ACLs established using site-specific soil data
- Applying informational institutional controls in the form of a deed notice to all sites where Method Three ACLs are applied

## 8.2 COMMON ELEMENTS AND DISTINGUISHING FEATURES OF EACH ALTERNATIVE

### 8.2.1 Key Applicable or Relevant and Appropriate Requirements

Key applicable or relevant and appropriate requirements (ARAR) for this Decision Document may be found in Appendix B.

### 8.2.2 Long-Term Reliability of Remedy

Alternative 2 has adequate long-term reliability of remedy. The no-action alternative would not have any long-term reliability.

### 8.2.3 Quantity of Untreated Waste and Treatment Residuals to Be Disposed of Offsite or Managed Onsite

The no-action alternative would leave all waste onsite, untreated and unmanaged. Alternative 2 would restore the site to associated cleanup levels.

### 8.2.4 Estimated Time for Design and Construction

Implementation timeframe for the no-action alternative (Alternative 1) and Alternative 2 would not apply because there would be no design or construction.

### 8.2.5 Estimated Time to Reach Remediation Goals

Remediation goals would not be reached for the no-action alternative (Alternative 1). Alternative 2 would reach the remediation goals immediately.

### 8.2.6 Estimated Costs

The no-action alternative (Alternative 1) would have no costs. Alternative 2 is expected to cost approximately $18,000 to implement.

## 8.3 EXPECTED OUTCOME OF EACH ALTERNATIVE

The no-action alternative (Alternative 1) would leave 22 of the 38 sites with contaminant concentrations that could possibly lead to exposure routes in the future. Alternative 2 would leave all the sites available for residential use with the application of informational institutional controls to manage the remaining contaminated soil. No operations and management costs were associated with either of the alternatives. The use of innovative technologies was not a practicable option.

# PART 9: COMPARATIVE ANALYSIS OF ALTERNATIVES

As shown in Table 9-1, Alternative 1 (no-action) fails to comply with the threshold criteria. Because this alternative lacks institutional controls or active treatment, there is a possibility that humans could be exposed to site contaminants at concentrations above regulatory (health-based) limits. Alternative 2 protects human health and the environment and could be implemented in a manner that complies with all chemical-, location-, and action-specific ARARs.

**Table 9-1**
**Comparison of Alternatives**

| Evaluation Criteria | Alt 1 | Alt 2 |
|---|---|---|
| Overall protection of human health and the environment | ◗ | ● |
| Compliance with ARARs | ○ | ● |
| Long-term effectiveness and permanence | ○ | ● |
| Reduction in toxicity, mobility, and volume through treatment | ○ | ◗ |
| Short-term effectiveness | ◗ | ● |
| Implementability | ◗ | ● |
| Cost (in thousands) | $0 | $18 |
| State acceptance | ○ | ● |
| Community acceptance | ○ | ● |
| ● = meets or exceeds criteria | ◗ = partially meets criteria | ○ = does not meet criteria |

**Note:** For definitions, see the Acronyms and Abbreviations section.

Because all onsite contamination is below the appropriate ADEC Method Three cleanup levels, Alternative 2 would protect human health and the environment using informational institutional controls, while Alternative 1 fails to meet threshold criteria. Alternative 2 would be just as easy to implement, would involve little disruption to the site; however, it would cost more than Alternative 1.

Alternative 2 would minimize ecological impacts and safety concerns adequately. Finally, the long-term effectiveness and permanence of Alternative 2 is greater than that of Alternative 1.

Because Alternative 2 would be protective of human health and the environment and would meet the RAOs, Alternative 2 is the selected remedy for the site.

## PART 10: PRIMARY CONSTITUENTS OF CONCERN

Principal threat wastes, as defined by CERCLA, exclude petroleum and any fraction thereof. Because of this, no principal threat waste is associated with the Long Island sites. The primary constituents of concern at the sites are fuel-contaminated material. Soil contamination associated with historical fuel spills and releases has affected the soil and groundwater. The ability of each alternative to address the primary constituents of concern is summarized in Table 10-1.

**Table 10-1**
**Primary Constituents of Concern**

| Alternative | Primary Constituents of Concern Addressed | How Addressed? |
|---|---|---|
| 1: No action. | None | Not addressed |
| 2: Apply Method Three ACLs, institutional controls, and NFRAP and NDAI status. | Fuel-contaminated soils | Application of cleanup levels and informational institutional controls to document residual contamination and waste management requirements. |

**Note:** For definitions, see the Acronyms and Abbreviations section.

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# PART 11: SELECTED REMEDY

Based on the information generated during previous investigations, the comparative analysis of alternatives, and the interim cleanup actions performed, USAED has selected Alternative 2 for the Long Island site. Alternative 2 includes application of ADEC Method Three ACLs and NFRAP and NDAI status recommendation. Recorded deed notices are also required under the ADEC regulations when using Method Three cleanup levels for soil in order to provide additional protection of human health and the environment.

Alternative 2 meets the threshold criteria of overall protection of human health and the environment and compliance with ARARs and is also the most cost-effective remedial action, considering both long-term impact and total cost.

## 11.1 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

The RAO for soil and sediments is the prevention of ingestion of soil containing POL compounds in excess of Method Three ACLs.

The main cleanup alternative components are described in detail below.

### 11.1.1 Application of ADEC Method Three Alternative Cleanup Levels

POL-contamination sources such as USTs, ASTs, and drums were removed and disposed of at the Long Island site. Following the source removals, a limited excavation and treatment of POL-contaminated soil above the Method Two cleanup levels was conducted. POL-contaminated soil was transported to a soil treatment unit located on Kodiak Island. All excavations were backfilled with clean, imported material and graded to original contours. All affected areas, including access roads, were reseeded. The Phase I RI estimated that approximately 1,258 tons of POL-contaminated soil above Method Two cleanup levels was present at the seven AOCs on Long Island (USAED 1994).

Following the initial removal action, for all sites with POL contamination remaining in the soil above the Method Two cleanup levels, a risk screening was performed and Method Three ACLs were developed. Soil with POL contamination in excess of the Method Three ACLs was removed and transported for treatment at a soil treatment unit located on Kodiak Island. Restoration of all excavations was performed as described previously. A total of 687 tons of POL-contaminated soil was removed from Long Island during these IRAs.

### 11.1.2 Recorded Deed Notices

Informational institutional controls in the form of a "Notice of Environmental Conditions" will be attached to the property records. The deed notice will inform current and future land owners of the prior cleanup activities, approved cleanup levels, and remaining contaminants, and the need to notify ADEC prior to the movement of any soil from the sites where the Method Three cleanup levels were applied and to comply with regulations applicable at such times. Leisnoi Inc. is the current landowner of Long Island and has agreed to the deed notices. There are 22 discrete sites within the seven AOCs on Long Island where Method Three cleanup levels and deed notices are being applied. These 22 discrete sites are identified on Figures 4-2 through 4-10 and have been surveyed in order to identify the respective site boundaries. Survey data is available in Appendix E of the Phase II Interim Removal Action Report (USAED 1999) and Appendix B of the 2002 Long Island Interim Removal Action Report (USAED 2003). All survey data were provided to the landowner. This information will be used to update land records.

## 11.2 COST ESTIMATE FOR THE SELECTED REMEDY

The selected remedy would have present worth costs of approximately $18,000 associated with completing the legal documentation and coordination necessary for site closure under Method Three. Future changes in the cost elements are a possibility, as a result of new information. Major changes may be documented in the form of a memorandum in the Administrative Record file, an explanation of significant differences, or a Decision Document amendment.

## 11.3 EXPECTED OUTCOMES OF THE SELECTED REMEDY

Upon applying cleanup levels and recording the deed notices, the Long Island sites will be available for a wide range of uses, including commercial, industrial, and residential application. Method Two and Method Three cleanup levels are protective of residential use. The time estimate for attaining cleanup goals is immediate.

The selected remedy will allow the development of the land as a commercial or residential property which could increase jobs and tax revenue, enhance human use of the resources, and provide other benefits to the community.

## 11.4 REOPEN CLAUSE

Under 18 AAC 75.380(d)(1), ADEC may require additional cleanup action if new information is discovered which leads ADEC to make a determination that the cleanup described in this Decision Document is not protective of human health, safety, welfare, or the environment.

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# PART 12: STATUTORY DETERMINATIONS

Under CERCLA Section 121, selected remedy must:

- Be protective of human health and the environment
- Comply with ARARs (unless a waiver is justified)
- Be cost effective
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable

In addition, CERCLA includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of contaminants as a principal element. The following sections discuss how the selected remedies meet these statutory requirements.

## 12.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy protects human health from site contaminants.

The selected remedies incorporate risk-based cleanup goals. The soil and groundwater cleanup goals to be used in these removal actions were established under 18 AAC 75 and are designed to reduce cancer risks to below $1 \times 10^{-5}$ and noncancer risks to below a hazard index of 1.0. Cumulative risks (i.e., risks associated with exposure through more than one exposure media) were also considered in the development of cleanup goals. Thus, at the completion of remedial action, site cancer risks will be below $1 \times 10^{-5}$, and noncancer risks will be below a hazard index of 1.0.

Implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

## 12.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy for Long Island complies with all ARARs and does not require waivers for any ARARs. ARARs for the selected remedy are presented in Appendix B.

## 12.3 COST EFFECTIVENESS

In the judgment of USAED, the selected remedy is cost effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost effective if its costs are proportional to its overall effectiveness" (EPA 2004). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). The relationship of the overall effectiveness of the selected remedies was determined to be proportional to their costs and, hence, represents a reasonable value for the money to be spent.

## 12.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

Additional treatment was determined unnecessary to ensure protection of human heath and the environment. USAED has determined that the selected remedy results in a permanent cleanup of the sites on Long Island and represents the maximum extent to which treatment technologies can be used in a practicable manner to address contamination at Long Island. The selected remedy relies on treatment already conducted, and treatment is not a practicable response to the level of contamination present onsite.

## 12.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedies address primary constituents of concern at the facility without using treatment technologies because treatment was not a practicable response to the level of contamination present at the site. However, treatment technologies have been utilized during previous restoration activities at the site.

## 12.6 FIVE-YEAR REVIEW REQUIREMENTS

Because the remedy will not result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, five-year reviews will not be required to ensure that the remedy is protective of human health and the environment.

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## PART 13: DOCUMENTATION OF SIGNIFICANT CHANGES

The *Proposed Plan for Long Island (Fort Tidball) Military Cleanup Project Long Island, Alaska* (USAED 2004) was released for public comment 9 February 2004. An open house to address any questions from the public on this Proposed Plan was held in Kodiak on 25 February 2004. The public was given 30 days to provide comments pertaining to the selected remedial alternative. The meeting minutes from this open house are provided in the Responsiveness Summary. No public comments were submitted during the public comment period.

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# PART 14: RESPONSIVENESS SUMMARY

A Proposed Plan for this project was distributed to the residents of Kodiak for review on 9 February 2004. In addition, an open house was held on 20 February 2004 at the Safeway lobby in Kodiak to answer any questions on the Proposed Plan. No substantive verbal comments were received. Written comments were received from Leisnoi Inc. and are addressed in Appendix A.

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## PART 15: REFERENCES


ADEC (Alaska Department of Environmental Conservation). 2003. *Oil and Hazardous Substances Pollution Control.* 18 AAC 75, Method Two, Table B2, Over 40-Inch Zone Soil Cleanup Levels.

ADEC. 2002 (1 October). *Contaminated Sites Remediation Program, Spill Prevention and Response, Method Three Calculator.* WWW.DEC.STATE.AK.US/SPAV/CS/WEBCALC/

ADEC. 1999. *Oil and Hazardous Substances Pollution Control Regulations, Discharge Reporting, Clean-up, and Disposal of Oil and Other Hazardous Substances.* 18 AAC 75, Article 3.

EPA (U.S. Environmental Protection Agency). 2004 (1 July). Code of Federal Regulations, Title 40, Section 300.430(f)(1)(ii)(D).

EPA. 1996 (29 August). "EcoTox Thresholds." *Eco Update.* Vol. 3, No. 2, EPA 540/F-95/038. Office of Solid Waste and Emergency Response.

Science Applications International Corporation. 1995 (February). *Final RCRA Facility Investigation/Corrective Measures Study Report, Volume I, Introduction and Facility-Wide Information, U.S. Coast Guard Support Center Kodiak, Alaska.*

USAED (U.S. Army Engineer District, Alaska). 2004. *Proposed Plan for Long Island (Fort Tidball) Military Cleanup Project, Long Island, Alaska.*

USAED. 2003 (June). *2002 Long Island Interim Removal Action Report, Kodiak, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2002a (July). *2002 Long Island Interim Removal Action Work Plan, Long Island, Kodiak, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2002b (May). *2000 Remedial Investigation/Interim Removal Action Report, Long Island, Kodiak, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.

USAED. 1999 (December). *Phase II Interim Removal Action Report, Long Island, Kodiak, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.

USAED. 1994 (November). *Final Remedial Investigation, Long Island (Fort Tidball), Kodiak Island, Alaska.* Prepared by Montgomery Watson.

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# APPENDIX A

## Draft Decision Document Responses to Comments

**REVIE COMMENTS** **PROJECT: Long Island**
**DOCUMENT: Decision Document-Draft** **LOCATION: Kodiak, Alaska**

| | | |
|---|---|---|
| **U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE** | **DATE:** 6/30/2004<br>**REVIEWER: Jeff Brownlee (ADEC)**<br>**PHONE: 269-3053** | **Action taken on comment by:** |

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | Statement of Basis and Purpose Introduction: 3rd Paragraph | Please include an Administrative Record location in Anchorage. | | Administrative Record location in Anchorage will be added to the text. | |
| 2 | Page 2-2, last ¶ | Please mention that the historic structure demolition was coordinated with the State Historic Preservation Office. | | Added the following paragraph to the text:" Demolition of historic structures was coordinated with the State Historic Preservation Officer (SHPO) and complied with a Memorandum of Agreement (MOA). The MOA was signed by the U.S. Army Engineer District Alaska, the SHPO, Leisnoi Corporation, and Alaska State Parks in July 2002. Concurring parties include the Kodiak Military History Museum, the Baranov Museum, and the National Archives and Records Administration." | |
| 3 | Section 4.2 | Please delete the sentence that mentions overland flow could have impacted the fresh surface water and sediment in Dolgoi Lake. This section is a general description of release mechanisms so it seems out of place to include a specific location example.<br>Please delete the last sentence. Please add "or surface water environments" after "marine in the last sentence and delete "thereby impacting marine sediment and surface water". | | All changes will be made as suggested. | |

**REVIEW COMMENTS** **PROJECT: Long Island**
**DOCUMENT: Decision Document-Draft** **LOCATION: Kodiak, Alaska**

| U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE | DATE: 6/30/2004<br>REVIEWER: Jeff Brownlee (ADEC)<br>PHONE: 269-3053 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE) |
|---|---|---|---|---|---|
| 4 | CSM | USTs and buried piping are the only point sources that may not contribute to overland flow. It seems if ASTs were moved to the lower Source box and an arrow was completed to infiltration/percolation that the release possibilities would fit better.<br>Please put the groundwater pathway as complete. Although there has not been any historic use of groundwater I suspect that the island is large enough to support a viable fresh water aquifer to serve a number of potential future users. As there are no groundwater results of concern completing the pathway for a future user shouldn't present a problem.<br>Uptake by plants and animals are mentioned in the transportation pathways and biota is listed as an exposure media, but there is no column heading for ecological receptors. Please structure the receptors so that freshwater aquatic, marine aquatic and terrestrial receptors are captured. | | | |
| 5 | Page 4-4, last paragraph | Please delete the sentence that starts, "Future development is likely limited.... The island is more than large enough combined with a high precipitation rate to support a viable freshwater aquifer. | | Change will be made. | |
| 6 | Section 4.5 | Please add "or fresh" after "marine" in the second sentence. | | Change will be made. | |
| 7 | Section 5.1.2 | Please add "Soil" after "Cumulative Risk" in the heading. | | Change will be made. | |
| 8 | Section 5.3.1 | Please add "Groundwater" after "Cumulative Risk" in the heading. | | Change will be made. | |
| 9 | Section 5.4 | Last ¶: Please reference where the Freshwater Criteria for lead is found. | | Added 18 AAC 70 as the reference for lead in freshwater. | |

**REVIEW COMMENTS** **PROJECT: Long Island**
**DOCUMENT: Decision Document-Draft** **LOCATION: Kodiak, Alaska**

| U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE | DATE: 6/30/2004<br>REVIEWER: Jeff Brownlee (ADEC)<br>PHONE: 269-3053 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE) |
|---|---|---|---|---|---|
| 10 | Section 6.0 | It would be nice to see an overview map again at this point. If the Headquarters area could start it off then the map used as Figure 6 could be combined with figure 2 to show all the sites, or Figure 2 could just be reproduced here. | | Will reproduce Figure 1-1 with more detail. | |
| 11 | Data tables | We had discussed during the proposed plan that a background in groundwater for arsenic of 0.128 mg/kg was unreasonably high. That concentration even if a true background would pose an unacceptable toxicity risk to human or ecological receptors. Perhaps we can use twice the average value found on the island. The SAIC report sampling must have had suspended solids to get a concentration that high. | | Twice the average value for found on Long Island was calculated to be 0.038 mg/L. The SAIC background level for arsenic in groundwater will be substituted with the twice-average value. The most recent sampling event indicated that all arsenic levels were below the Table C groundwater cleanup level. | |
| 12 | 8.2.4 | Second to last sentence: Please delete the first part of the sentence. The IC's for a method 3 ACL don't prevent the potential development of groundwater as a drinking water source. | | Change will be made. | |
| 13 | General | Please note that the next version (draft/final) will need to be briefed and reviewed my Contaminated Sites management, so will probably need a 30 day review. | | A 30-day review will be requested for the pre-final version. | |
| 14 | Comments summary | Please change the title to "Responsiveness Summary" to be consistent with guidance terminology. | | Change will be made. | |
| 15 | Appendix B | Please delete. These worksheets should be part of the Remedial Investigation work rather than the decision document. | | Change will be made. | |

**REVIEW COMMENTS** **PROJECT: Long Island**
**DOCUMENT: Decision Document Draft** **LOCATION: Kodiak, Alaska**

| U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE | DATE: 6/30/04<br>REVIEWER: Wayne Crayton<br>PHONE: | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE<br>A - comment accepted<br>W - comment withdrawn<br>(if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE<br>(A-AGREE)<br>(D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | | In Table of Contents, table 6-1 is listed twice; once on page ii and once on page iii | | Error will be corrected. | |
| 2 | | Section 3.0, last paragraph - doesn't read correctly - reevaluate verbiage used. | | Last paragraph was rewritten as follows: "The applicable or relevant and appropriate requirements (ARARs) developed for the Long Island project includes State of Alaska regulations, Federal Regulations and screening criteria." | |
| 3 | | Section 4.5. This section is written too general and should reflect the site-specificity of the area studied for years. Therefore, provide some names of the aquatic and terrestrial organisms composing the ecological receptor groups and prey/flora on the island | | Text will be re-written to include specific ecological receptor groups (will use information contained in the EA for Long Island). | |
| 4 | | Document well prepared! | | | |

**REVIEW COMMENTS** **PROJECT: Long Island** 
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| U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE | DATE: REVIEWER: Scott McKean, PE PHONE: (907) 753-5722 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE) |
|---|---|---|---|---|---|
| 1 | Declar | 'Sites' is misspelled. | | Correction will be made. | |
| 2 | Declar. | Change the phrase 'operation sites'. Makes is sound like medical procedures were done there. | | Will change text to "operational areas". | |
| 3 | Declar. | Is it more correct to refer to Leisnoi as a Native Corporation than simply Native-owned. | | Agreed, text will be clarified. | |
| 4 | Declar. | Did we really find levels below background? | | Kodiak background metal concentrations in soil and sediment were used as a screening criterion (arsenic for example is typically above the Method Two cleanup level). Sample results that were below these background concentrations were considered not related to site activities/contaminants. | |
| 5 | Sec. 2.1 | Mention the feral cattle that live on the island as well. | | Text will be added. | |
| 6 | Sec. 3.2.1 | Change 'the TSCA' to simply 'TSCA'. | | Change will be made. | |
| 7 | Pg. 5-2 | Top of page: What about the other analytes? Were they not also COC's. | | The remaining analytes (PCBs, VOCs, pesticides, PAHs) were eliminated as COCs; metals and a few PAHs were COCs at certain discrete sites. This will be clarified and further explained in the text. | |
| 8 | Table 5-1 | Clarify if the 'alternate cleanup level' means method 3 or not. | | Will add "Method Three" to the header column of the table. | |
| 9 | Sec. 6.1 | Change 41 tons of fuel contamination 'was removed' to 'were removed'. | | Change will be made. | |
| 10 | Pg. 6-9 | Top of page refers to results below background. Were they really 'below' background. | | Please see response to comment 4. | |

**REVIEW COMMENTS** **PROJECT: Long Island**
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| U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE | DATE:<br>REVIEWER: Scott McKean, PE<br>PHONE: (907) 753-5722 | Action taken on comment by: |
|---|---|---|

| Item No. | Drawing Sht. No., Spec. Para. | COMMENTS | REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain) | JACOBS RESPONSE | USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE) |
|---|---|---|---|---|---|
| 11 | Pg. 6-12 | Fig. 6-6 is mentioned in the text before fig. 6-5. Figures should always appear on the next page after mentioning (unless the next page is taken up by a table that was mentioned first, etc.) | | Change will be made. | |
| 12 | Pg. 6.6 | Should the mention of 1988 for North Cape actually be '1998'. | | Yes, the correct date should be 1998. Change will be made. | |
| 13 | Fig 6-8 | Dots are hard to read on the figure. | | Lack of clarity is probably a result of conversion to a PDF file. The final document reproduction should not be affected. | |

# APPENDIX B

## Applicable or Relevant and Appropriate Requirements

## APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Under the Defense Environmental Restoration Program Formerly Used Defense Sites (DERP-FUDS), compliance with CERCLA Section 120 (42 United States Code [USC] 9620) is required for all projects addressing hazardous substances, pollutants, and contaminants [10 USC 2701(a)(2)].

Using the CERCLA framework, DERP-FUDS employs a risk management approach to taking necessary and appropriate response action to protect human health and the environment from unacceptable risks resulting from past contamination. Remedial actions are to be defined and their basis described in a Decision Document consistent with CERCLA and its implementing regulation, the National Oil and Hazardous Substances Pollution Contingency Plan.

The applicable or relevant and appropriate requirements (ARARs) developed for the Long Island project include State of Alaska regulations, Federal Regulations, and screening criteria.

## ADEC REQUIREMENTS

ADEC Oil and Other Hazardous Substances Pollution Control Regulation (18 AAC 75) apply as a relevant and appropriate regulation to the cleanup at Long Island.

ADEC Water Quality Standards (18 AAC 70) apply as a relevant and appropriate regulation to the cleanup at Long Island.

## FEDERAL REGULATIONS AND SCREENING CRITERIA

### Toxic Substances Control Act Requirements

PCB-contaminated soil and transformers were identified at the Long Island project site; therefore, TSCA is an ARAR for this action. The section of TSCA that is applicable to this action is 40 Code of Federal Regulations (CFR) Section 761, Disposal of Polychlorinated Biphenyls. This section applies to all persons who manufacture, process, distribute in commerce, use, or dispose of PCBs or PCB items.

The subsections of this rule that apply to this action are the following:

- 40 CFR 761.61, which regulates PCB remediation waste
- 40 CFR 761.260-274, which regulates cleanup site characterization sampling for PCB remediation waste
- 40 CFR 761.280-298, which regulates sampling to verify completion of self-implementing cleanup and onsite disposal of bulk PCB remediation waste and porous surfaces

**Screening Criteria**

U.S. Environmental Protection Agency (EPA) EcoTox thresholds, 29 August 1996, were used as screening criteria for freshwater sediments. These EcoTox thresholds are "to be considered" criteria for the Long Island site. The freshwater sediment EcoTox thresholds represent levels of contaminants above which adverse or toxic effects may occur in aquatic organisms.

# APPENDIX C

## Cumulative Risk Calculation Documentation


## STEP 5:

The following are cumulative cancer risks and hazard quotients by chemical. Note that petroleum ranges (GRO, DRO, and RRO) are not included in cumulative risks. Also, if PCBs or dioxins are present at the site, the cumulative risks associated with these chemicals may also need to be considered; please contact contact the ADEC project manager for your site for information on how to address these chemicals.

| Chemical Name | Concentration (mg/kg) | Cancer Risk | Hazard Quotient |
|---|---|---|---|
| Benzo(a) anthracene | 0.129 | 1.4e-7 | 0 |
| Benzo(a)pyrene | 0.16 | 0.0000017 | 0 |
| Benzo(b) fluoranthene | 0.243 | 2.6e-7 | 0 |
| Benzo(k) fluoranthene | 0.0629 | 6.8e-9 | 0 |
| Chloroform | 0.0552 | 1.6e-7 | 0.000067 |
| Chromium (total) | 30.2 | 0 | 0.12 |
| Chrysene | 0.108 | 1.2e-9 | 0 |
| Dibenzo(a,h) anthracene | 0.0261 | 2.8e-7 | 0 |
| Fluorene | 0.00827 | 0 | 0.0000025 |
| Indeno(1,2,3-c,d)pyrene | 0.146 | 1.6e-7 | 0 |
| Mercury | 0.132 | 0 | 0.01 |
| Toluene | 2.16 | 0 | 0.0012 |
| Xylenes | 41.3 | 0 | 0.00025 |

Overall totals are as follows:

**Hazard Index: 0.13**
**Cancer Risk: 0.0000027**

These cumulative risk levels should be printed. To print, please select the print function on your web browser. This page may also be saved and emailed for documentation of the calculated cumulative risks. For best results, save the page as a "Web Archive for email" file (.mht) if your browser supports this; in Internet Explorer 5 choose "Save as..." from the file menu and change the "Save as type" to "Web Archive for email". Other browsers should have a similar choice.

To revise concentrations and recalculate cumulative risks, click here. Alternatively, to return to the first step to rerun the calculator or change parameters, click here.

Contaminated Sites Remediation Program

## STEP 5:

The following are cumulative cancer risks and hazard quotients by chemical. Note that petroleum ranges (GRO, DRO, and RRO) are not included in cumulative risks. Also, if PCBs or dioxins are present at the site, the cumulative risks associated with these chemicals may also need to be considered; please contact contact the ADEC project manager for your site for information on how to address these chemicals.

| Chemical Name | Concentration (mg/kg) | Cancer Risk | Hazard Quotient |
|---|---|---|---|
| Arsenic | 2.75 | 0.0000061 | 0.11 |
| Benzo(a) anthracene | 0.129 | 1.4e-7 | 0 |
| Benzo(a)pyrene | 0.16 | 0.0000017 | 0 |
| Benzo(b) fluoranthene | 0.243 | 2.6e-7 | 0 |
| Benzo(k) fluoranthene | 0.0629 | 6.8e-9 | 0 |
| Chloroform | 0.0552 | 1.6e-7 | 0.000067 |
| Chromium (total) | 30.2 | 0 | 0.12 |
| Chrysene | 0.108 | 1.2e-9 | 0 |
| Dibenzo(a,h) anthracene | 0.0261 | 2.8e-7 | 0 |
| Fluorene | 0.00827 | 0 | 0.0000025 |
| Indeno(1,2,3-c,d)pyrene | 0.146 | 1.6e-7 | 0 |
| Mercury | 0.132 | 0 | 0.01 |
| Toluene | 2.16 | 0 | 0.0012 |
| Xylenes | 41.3 | 0 | 0.00025 |

Overall totals are as follows:

**Hazard Index: 0.24**
**Cancer Risk: 0.0000088**

These cumulative risk levels should be printed. To print, please select the print function on your web browser. This page may also be saved and emailed for documentation of the calculated cumulative risks. For best results, save the page as a "Web Archive for email" file (.mht) if your browser supports this; in Internet Explorer 5 choose "Save as..." from the file menu and change the "Save as type" to "Web Archive for email". Other browsers should have a similar choice.

To revise concentrations and recalculate cumulative risks, click here. Alternatively, to return to the first step to rerun the calculator or change parameters, click here.

**Long Island Groundwater Cumulative Risk Calculations**

| analyte | units | result | sys_sampid | labsampid | Notes | Table G | Over? | RfD | THQ | Sfo | CancRisk x10^-5 | Site | Reason for Dropping |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | mg/L | 0.056 | 94LIDP361WA | | xd | 0.05 | Yes | 0.0003 | | 1.5 | | DP MW12 | **addnl work conducted; 2003 event was ND** |
| Arsenic | mg/L | 0.022 | 94LIGA357WA | | x | 0.05 | No | 0.0003 | 2.01 | 1.5 | 38.75 | GA MW9 | |
| Barium | mg/L | 0.54 | 94LIDP361WA | | x | 2 | No | 0.07 | 0.21 | | | DP MW12 | **addnl work conducted; not smpld in 2003** |
| Benzene | mg/L | 0.0025 | 94LIGA357WA | | x | 0.005 | No | | | 0.055 | 0.16 | GA MW9 | |
| Benzo(a)pyrene | mg/L | 0.00007 | KO-A018301 | 9809210-06A | xd | 0.0002 | No | | | 7.3 | | HQH MW8 | **MB contamination** |
| Benzo(b)fluoranthene | mg/L | 0.00011 | KO-A018005 | 9809210-03E | x | 0.001 | No | | | 0.73 | 0.09 | CBK Micro | |
| Bis(2-ethylhexyl) Phthalate | mg/L | 0.094 | 94LIHQ232WA | | xd | 0.006 | Yes | 0.02 | | 0.014 | | HQ MW5 | **NO QA/QC Confirmation** |
| Bis(2-ethylhexyl) Phthalate | mg/L | 0.042 | 94LIHQ224WA | | xd | 0.006 | Yes | 0.02 | | 0.014 | | HQ MW1 | **Resample did not confirm presence of contaminant** |
| Chloroform | mg/L | 0.052 | 94LIDP361WA | | xd | 0.1 | No | 0.01 | | 0.0061 | | DP MW12 | **all hits attributed to lab contamination** |
| Chromium | mg/L | 0.13 | 94LIDP361WA | | xd | 0.1 | Yes | 0.003 | | | | DP MW12 | **addnl work conducted; see 2003 event** |
| Chromium | mg/L | 0.08 | 94LIGA357WA | | x | 0.1 | No | 0.003 | 0.73 | | | GA-B MW9 | |
| Dibenzo(a,h)anthracene | mg/L | 0.0001 | KO-A018301 | 9809210-06A | xd | 0.0001 | No | | | 7.3 | | HQH MW8 | **MB contamination (no other hits)** |
| Indeno(1,2,3-cd)pyrene | mg/L | 0.00012 | KO-A018301 | 9809210-06A | xd | 0.001 | No | | | 0.73 | | HQH MW8 | **MB contamination (no other hits)** |
| | | | | | | | | **Sum** | **2.95** | | **39.01** | | |
| | | | | | | | | **Sum w/o Arsenic** | **0.94** | | **0.26** | | |
| | | | | | | | | **Sum w/o Chromium** | **0.21** | | | | |

Note:

xd = Result excluded from the calculation. See explanation in last column.

x = Result included in the calculation

# APPENDIX D

## Method Three Calculation Documentation

Alaska Department of Environmental Conservation • Spill Prevention and Response

*Contaminated Sites Remediation Program*

## STEP 4:

The following are the calculated cleanup levels for each chemical and pathway. Where values are provided for more than one pathway, the lowest of the values should be used as the soil cleanup level. All cleanup levels are in units of mg/kg. Any other chemical-specific requirements that must be considered follow the table of cleanup levels.

| Chemical Name | Chemical Type | Ingestion | Inhalation | Migration to GW |
|---|---|---|---|---|
| DRO (Total) | Petroleum | 8300 | 12500 | 12500 |
| GRO (Total) | Petroleum | 1400 | 1400 | 1400 |
| RRO (Total) | Petroleum | 8300 | 22000 | 22000 |

| Chemical | Notes |
|---|---|
| DRO (Total) | The Maximum Allowable DRO concentration is 12500 mg/kg. |
| GRO (Total) | The Maximum Allowable GRO concentration is 1400 mg/kg. |
| RRO (Total) | The Maximum Allowable RRO concentration is 22000 mg/kg. |

These cleanup levels should be printed. To print, please select the print function on your web browser. This page may also be saved and emailed for documentation of the calculated cleanup levels. For best results, save the page as a "Web Archive for email" file (.mht) if your browser supports this; in Internet Explorer 5 choose "Save as..." from the file menu and change the "Save as type" to "Web Archive for email". Other browsers should have a similar choice.

For reference, the parameters used to calculate these levels are as follows (with defaults that have been changed listed in parentheses):

**Volatilization Pathway:**

| | | |
|---|---|---|
| $\rho_b$: Dry soil bulk density ($g/cm^3$): | 1.5 | (Default: 1.5 ) |
| n: Total soil porosity ($L_{pore}/L_{soil}$): | 0.434 | (Default: 0.434 ) |
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.15 | (Default: 0.15 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.284 | (Default: 0.284 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.1 | (Default: 0.1 ) |
| $f_{oc}$: organic carbon content of soil (g/g): | 0.112288 | (Default: 0.001 ) |

**Groundwater Pathway:**

| | | |
|---|---|---|
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.3 | (Default: 0.3 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.13 | (Default: 0.13 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.2 | (Default: 0.2 ) |
| K: aquifer hydraulic conductivity (m/yr): | 876 | (Default: 876 ) |
| i: hydraulic gradient (m/m): | 0.002 | (Default: 0.002 ) |
| L: source length parallel to groundwater flow (m): | 32 | (Default: 32 ) |
| I: infiltration rate (m/yr): | 0.6 | (Default: 0.6 ) |
| $d_a$: aquifer thickness (m): | 10 | (Default: 10 ) |

The exposure scenario and zone for this project: Over 40-inch Zone - Residential Exposures
Today's date: 9/26/02
Enter site name to view on printout: Burt Point

If you wish to calculate cumulative risks based on concentrations that have been entered for the site, select the "continue" button below. If you do not wish to complete this step, please note that you must demonstrate that the calculated cleanup levels will not produce unacceptable cumulative risks before they will be accepted. If cumulative risks are above the benchmarks, the cleanup levels should be modified downwards. See the Guidance on Cleanup Standards Equations and Input Parameters for details.

Continue

Alternatively, to return to the first step to rerun the calculator or change parameters, click here.


STEP 4:

The following are the calculated cleanup levels for each chemical and pathway. Where values are provided for more than one pathway, the lowest of the values should be used as the soil cleanup level. All cleanup levels are in units of mg/kg. Any other chemical-specific requirements that must be considered follow the table of cleanup levels.

| Chemical Name | Chemical Type | Ingestion | Inhalation | Migration to GW |
|---|---|---|---|---|
| Benzo(a) anthracene | Organic | 9.3 | | 25.4 |
| Benzo(a)pyrene | Organic | 0.93 | | 13 |
| Benzo(b) fluoranthene | Organic | 9.3 | | 78.5 |
| Dibenzo(a,h) anthracene | Organic | 0.93 | | 24.2 |
| DRO (Total) | Petroleum | 8300 | 12500 | 1200 |
| GRO (Total) | Petroleum | 1400 | 1400 | 1290 |
| Indeno(1,2,3-c,d) pyrene | Organic | 9.3 | | 221 |
| RRO (Total) | Petroleum | 8300 | 22000 | 22000 |

| Chemical | Notes |
|---|---|
| DRO (Total) | The Maximum Allowable DRO concentration is 12500 mg/kg. |
| GRO (Total) | The Maximum Allowable GRO concentration is 1400 mg/kg. |
| RRO (Total) | The Maximum Allowable RRO concentration is 22000 mg/kg. |

These cleanup levels should be printed. To print, please select the print function on your web browser. This page may also be saved and emailed for documentation of the calculated cleanup levels. For best results, save the page as a "Web Archive for email" file (.mht) if your browser supports this; in Internet Explorer 5 choose "Save as..." from the file menu and change the "Save as type" to "Web Archive for email". Other browsers should have a similar choice.

For reference, the parameters used to calculate these levels are as follows (with defaults that have been changed listed in parentheses):

**Volatilization Pathway:**

| | | |
|---|---|---|
| $\rho_b$: Dry soil bulk density ($g/cm^3$): | 1.5 | (Default: 1.5 ) |
| n: Total soil porosity ($L_{pore}/L_{soil}$): | 0.434 | (Default: 0.434 ) |
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.15 | (Default: 0.15 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.284 | (Default: 0.284 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.1 | (Default: 0.1 ) |
| $f_{oc}$: organic carbon content of soil (g/g): | 0.005355 | (Default: 0.001 ) |

**Groundwater Pathway:**

| | | |
|---|---|---|
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.3 | (Default: 0.3 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.13 | (Default: 0.13 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.2 | (Default: 0.2 ) |
| K: aquifer hydraulic conductivity (m/yr): | 876 | (Default: 876 ) |
| i: hydraulic gradient (m/m): | 0.002 | (Default: 0.002 ) |
| L: source length parallel to groundwater flow (m): | 32 | (Default: 32 ) |
| I: infiltration rate (m/yr): | 0.6 | (Default: 0.6 ) |
| $d_a$: aquifer thickness (m): | 10 | (Default: 10 ) |

The exposure scenario and zone for this project: Over 40-inch Zone - Residential Exposures
Today's date: 3/14/02
Enter site name to view on printout: Headquarters Area

*Also to be applied to Castle Bluff, Deer Pt + Garage Area and North Cape*

If you wish to calculate cumulative risks based on concentrations that have been entered for the site, select the "continue" button below. If you do not wish to complete this step, please note that you must demonstrate that the calculated cleanup levels will not produce unacceptable cumulative risks before they will be accepted. If cumulative risks are above the benchmarks, the cleanup levels should be modified downwards. See the Guidance on Cleanup Standards Equations and Input Parameters for details.

Continue

Alternatively, to return to the first step to rerun the calculator or change parameters, click here.

*Contaminated Sites Remediation Program*

## STEP 4:

The following are the calculated cleanup levels for each chemical and pathway. Where values are provided for more than one pathway, the lowest of the values should be used as the soil cleanup level. All cleanup levels are in units of mg/kg. Any other chemical-specific requirements that must be considered follow the table of cleanup levels.

| Chemical Name | Chemical Type | Ingestion | Inhalation | Migration to GW |
|---|---|---|---|---|
| DRO (Total) | Petroleum | 8300 | 12500 | 12500 |
| GRO (Total) | Petroleum | 1400 | 1400 | 1400 |
| RRO (Total) | Petroleum | 8300 | 22000 | 22000 |

| Chemical | Notes |
|---|---|
| DRO (Total) | The Maximum Allowable DRO concentration is 12500 mg/kg. |
| GRO (Total) | The Maximum Allowable GRO concentration is 1400 mg/kg. |
| RRO (Total) | The Maximum Allowable RRO concentration is 22000 mg/kg. |

These cleanup levels should be printed. To print, please select the print function on your web browser. This page may also be saved and emailed for documentation of the calculated cleanup levels. For best results, save the page as a "Web Archive for email" file (.mht) if your browser supports this; in Internet Explorer 5 choose "Save as..." from the file menu and change the "Save as type" to "Web Archive for email". Other browsers should have a similar choice.

For reference, the parameters used to calculate these levels are as follows (with defaults that have been changed listed in parentheses):

**Volatilization Pathway:**

| | | |
|---|---|---|
| $\rho_b$: Dry soil bulk density ($g/cm^3$): | 1.5 | (Default: 1.5 ) |
| n: Total soil porosity ($L_{pore}/L_{soil}$): | 0.434 | (Default: 0.434 ) |
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.15 | (Default: 0.15 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.284 | (Default: 0.284 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.1 | (Default: 0.1 ) |
| $f_{oc}$: organic carbon content of soil (g/g): | 0.07275 | (Default: 0.001 ) |

**Groundwater Pathway:**

| | | |
|---|---|---|
| $\Theta_w$: Water-filled soil porosity ($L_{water}/L_{soil}$): | 0.3 | (Default: 0.3 ) |
| $\Theta_a$: Air-filled soil porosity ($L_{air}/L_{soil}$): | 0.13 | (Default: 0.13 ) |
| w: average soil moisture content ($g_{water}/g_{soil}$): | 0.2 | (Default: 0.2 ) |
| K: aquifer hydraulic conductivity (m/yr): | 876 | (Default: 876 ) |
| i: hydraulic gradient (m/m): | 0.002 | (Default: 0.002 ) |
| L: source length parallel to groundwater flow (m): | 32 | (Default: 32 ) |
| I: infiltration rate (m/yr): | 0.6 | (Default: 0.6 ) |
| $d_a$: aquifer thickness (m): | 10 | (Default: 10 ) |

The exposure scenario and zone for this project: Over 40-inch Zone - Residential Exposures
Today's date: 2/13/02

Enter site name to view on printout: Point Head

If you wish to calculate cumulative risks based on concentrations that have been entered for the site, select the "continue" button below. If you do not wish to complete this step, please note that you must demonstrate that the calculated cleanup levels will not produce unacceptable cumulative risks before they will be accepted. If cumulative risks are above the benchmarks, the cleanup levels should be modified downwards. See the Guidance on Cleanup Standards Equations and Input Parameters for details.

Continue

Alternatively, to return to the first step to rerun the calculator or change parameters, click here.