CLEAN-UP DECISION DOCUMENT

DRURY GULCH
KODIAK ISLAND, ALASKA

FINAL
JULY 2003

Prepared for:
U.S. Army Corps of Engineers
P.O. Box 6898
Anchorage, Alaska 99506-6898

Prepared by:
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

Total Environmental Restoration Contract
Contract No. DACA 85-95-D-0018
Task Order No. 02

DECLARATION OF THE DRURY GULCH CLEAN-UP DECISION

Site Name and Location

Drury Gulch
Located within the United States Coast Guard Integrated Support Command
Kodiak Island, Alaska

Statement of Basis and Purpose

This decision document presents the selected final remedial action for Drury Gulch on Kodiak Island, Alaska, which was chosen in accordance with the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This decision is based on the information contained in the Administrative Record for this site. The Administrative Record can be found in the Information Repository located at the Kodiak Library, 319 Lower Mill Bay Road, Kodiak, Alaska. The remedy was selected by the United States Army Engineer District, Alaska (USAED) with concurrence from the State of Alaska Department of Environmental Conservation (ADEC), the United States Environmental Protection Agency (EPA), and the United States Coast Guard (USCG).

Assessment of Site

Elevated levels of polychlorinated biphenyls (PCB) have been identified in surface and subsurface soils, sediments, and groundwater at this site. PCB concentrations in soil and sediment were above ADEC 18 AAC 75 clean-up standards; groundwater PCB concentrations were significantly below ADEC clean-up standards. No PCBs have been detected in surface water samples. The remedial action selected in this Decision Document is necessary to protect human health and the environment from releases of contaminants from this site.

Description of Selected Remedy

The selected remedy for Drury Gulch addresses surface soil, subsurface soil, and sediment. The purpose of the remedial action is to reduce the risks associated with exposure to PCBs in these media. To accomplish this goal, the selected remedy includes the following actions. The areas of Upper and Lower Drury Gulch where there is soil with PCB concentrations above 10 milligrams per kilogram (mg/kg) will be excavated. The excavated soil will be transported to and disposed of at a Toxic Substances Control Act (TSCA)-permitted facility. After excavation of the contaminated soil, the remaining areas of the Drury Gulch site that have been disturbed and/or reworked and contain PCBs will be covered with a minimum of 2-feet of clean fill. Topcover will then be placed over the clean fill material and revegetated. In addition to the cover, the segments of the Drury Gulch channel, beginning in Upper Gulch and extending to the point where the channel goes beneath the Rezanof Highway, will be lined with permeable geotextile fabric and riprap. Beginning just north of the Rezanof Highway and ending where the channel goes beneath the airport runway, a new drainage channel will be installed adjacent to the existing channel. Excess soil from installation of the new channel will be used to backfill the existing channel. By covering the old channel with 2 feet of clean soil, contaminated sediments will be inaccessible for transport via surface water.

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 long-term remedies to the maximum extent practicable. Onsite treatment of the contaminated soil and sediment was found to be impractical due to significantly higher costs; therefore, the selected remedy does not satisfy the statutory preference for treatment as a principal element.

LEAD AND SUPPORT AGENCY ACCEPTANCE OF THE CLEAN-UP DECISION
DRURY GULCH
KODIAK ISLAND, ALASKA

Signature sheet for the foregoing Clean-up Decision for Drury Gulch at Kodiak Island, Alaska, between the United States Army Engineer District, Alaska and the State of Alaska Department of Environmental Conservation, with concurrence from the United States Environmental Protection Agency and the United States Coast Guard.

8 Aug '03
Date

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

8/22/2003
Date

John Halverson
Section Manger
Contaminated Sites Section
South Central Regional Office

9/16/03
Date

Captain R. L. Lachowsky
Commanding Officer
Integrated Support Command Kodiak
United States Coast Guard

U.S. Department of Homeland Security

United States Coast Guard

Commanding Officer
United States Coast Guard
Integrated Support Command

P.O. Box 195025
Kodiak, Alaska 99619-5025
Staff Symbol: ee
Phone: (907) 487-5320 x252
Fax: (907) 487-5494

5090
RCRA/D/03-2153
17 Sept 2003

MEMORANDUM

From: S. E. Raney
CG ISC KODIAK (ee)

Reply to Attn of: ee
D. H. Guenthner
907-487-5320 x249

To: C. KING (CEPOA-PM-C)
U.S. ARMY CORPS OF ENGINEERS, ALASKA DISTRICT

Subj: Site 18, Drury Gulch, RCRA Permit No. AK9690330742

1. Attached are two originals of the Drury Gulch Decision Document (DD) signature page. One page is provided for your records and the second is provided for you to deliver to ADEC per your e-mail. I have retained the copy of the entire DD provided to me on 27 August 2003 for my records. Additionally, I have included a copy of the signed Memorandum of Understanding per your e-mail request.

2. If you have any questions regarding this matter, please contact Mr. Dan Guenthner, Supervisory Environmental Protection Specialist, at (907) 487-5320 Ext. 249.

#

Enclosures: (1) Site 18-Drury Gulch Decision Document Signature Page
(2) Site 18-Drury Gulch Memorandum of Understanding

Copy: CG FDCC Pacific (Tim Stott)

Drury Gulch
Kodiak Island, Alaska
Environmental Restoration
Inspection and Corrective Action
Memorandum of Agreement

Whereas, the United States Army Corps of Engineers and the United States Coast Guard desire to cooperatively plan for environmental restoration of the Drury Gulch site, on Kodiak Island, it is hereby stipulated and agreed as follows:

Parties to the Agreement and Jurisdiction:

1. The United States Coast Guard, an agency of the Department of Homeland Security, enters into this Agreement pursuant to its authority under 14 United States Code Section 141, authorizing cooperation between Federal agencies.

2. The United States Army Corps of Engineers (USAED) Alaska District, an agency of the Department of Defense, enters into this Agreement pursuant to its program for remediation of Formerly Utilized Defense Sites (FUDS) under the Defense Environmental Restoration Program.

Purpose and Scope:

3. The Parties enter into this agreement to facilitate coordination and communication regarding the inspection, monitoring, maintenance, and if necessary, corrective action, of the Remedial Action Cover and Engineering Controls at Drury Gulch (the "Cover").

4. The common goals of the Parties include:

   - Protection of human health and the environment.
   - Compliance with State of Alaska and Federal environmental laws and regulations.
   - Provision of long-term monitoring and inspection of the Cover and other Engineering Controls.
   - Provision of long-term maintenance, corrective action, and other engineering controls required to preserve the integrity and operation of the Cover.
   - Establish procedures by which responsibility for maintaining the integrity of the Cover and engineering controls are transferred from the USAED, Alaska to the USCG, ISC Kodiak.
   - Establish a schedule for the USAED, Alaska to relinquish the post-remedial action responsibilities to the USCG, ISC Kodiak.
   - Establish procedures for identifying responsibility for conducting additional activities, if required.
   - Provide dispute resolution procedures.

Provisions

5. The Parties agree that the FUDS program will be responsible for monitoring and maintenance of the Drury Gulch remedial action cover for 5 years following the signing of a notification of completion of construction memorandum.

6. Monitoring and maintenance under the FUDS program will be conducted in accordance with the Monitoring and Maintenance Plan of the Final Drury Gulch Remedial Action Work Plan.

7. Monitoring and Maintenance beyond the 5 year FUDS execution period identified in item 5 above will be the responsibility of the landowner, USCG.

8. The FUDS program will reevaluate the site if the remedy selected in the decision document and implemented in the field fails to protect human health and the environment, or if a previously unknown issue at the site becomes FUDS eligible.

9. Natural disasters, such as fire, earthquake, or flooding that occur after the 5 year FUDS monitoring and maintenance period and that exceed the remedial action design criteria are specifically excluded from item 8 above. Any repairs to the cover required as a result of such events are the responsibility of the landowner. This paragraph does not apply if such an event makes evident a previously unknown issue at the site that is FUDS eligible.

10. The USAED, Alaska will provide the landowner with a letter notifying the end of 5 year monitoring and maintenance. The notification will be made six months prior to completion of the FUDS monitoring and maintenance period described in paragraph 6. Notification is to be made to the individual parties at the addresses provided in item 20 of this agreement, or to their successors.

11. The USAED, Alaska will host a joint site inspection prior to the termination of the 5-year monitoring and maintenance period. Any corrective actions associated with the final inspection are the responsibility of the FUDS program. The timing of the final inspection is to correspond with the last scheduled monitoring/maintenance event. A notification of final FUDs action will be provided to the landowner after the final inspection.

Dispute Resolution:

12. The project managers shall be the primary points of contact to coordinate all activities under this Agreement, including the resolution of disputes. It is the intention of the parties that all disputes shall be resolved at the lowest possible level or authority as expeditiously as possible within the following framework.

All timeframes indicated below for resolving disputes may be lengthened by mutual consent.

13. Should the project managers be unable to agree, the matter shall be referred in writing as soon as practicable, but in no event to exceed thirty (30) working days after the failure to agree, to the Commander, United States Army Corps of Engineers, Alaska District and the Commanding Officer, United States Coast Guard Integrated Support Command (ISC) Kodiak or their mutually agreed upon representatives designated in writing.

14. Should the Commander, Alaska District and Commanding Officer, ISC Kodiak or their mutually agreed upon representatives designated in writing be unable to agree within thirty (30) working days, the matter shall be elevated to the Commander, Pacific Ocean Division and the Commander, Maintenance and Logistics Command, Pacific or their mutually agreed upon representatives designated in writing.

15. It is the intention of the parties that all disputes shall be resolved in this manner. Alternative dispute resolution methods may be used. In the event that the parties are unable to resolve a dispute, the parties retain any rights they may otherwise have to seek resolution of this issue under applicable law

Miscellaneous Provisions:

16. Effective Date – Amendment and Termination: This Agreement shall be effective when executed by all Parties listed in paragraphs 1 and 2 above. The Agreement may not be amended except by written agreement of the Parties. The Agreement shall continue in effect until termination by agreement of those Parties.

17. Reservation of Rights: It is recognized that each party to this Agreement has reserved all rights, powers and remedies for or hereafter existing at law or in equity, or by statute or otherwise, and that nothing in this Agreement waives or forecloses the exercise of all such rights, powers or remedies

18. Nothing in this agreement shall be construed as altering, or in any way limiting, either party's ability or responsibility to act in accordance with all applicable federal, state, and local laws and regulations.

19. Implementation of any part or all of this agreement is subject to availability of funds. All requirements of this agreement requiring the expenditure of Corps funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by the Corps under the terms of this agreement will require or be interpreted to require a commitment to expend funds not obligated for a particular purpose. If the Corps cannot perform the obligations set forth in this agreement

due to the unavailability of funds, the Corps agrees to apply its best efforts to renegotiate the provision and may require the parties initiate consultation to develop an amendment to this agreement when appropriate.

20. Notice to Parties: Unless otherwise provided, notice to the individual Parties shall be provided under this Agreement to the following addresses:

A. U.S. Army Corps of Engineers Alaska District
CEPOA-PM-C
P.O. Box 6898
Elmendorf AFB, AK 99506-6898
(907) 753-5665

Incumbent: Curtis King

B. Commanding Officer
U.S. Coast Guard ISC Kodiak (ee)
P.O. Box 195025
Kodiak, AK 99615-5025
(907) 487-5320 Ext. 252

Incumbent: LCDR Steve Raney

APPROVED BY:

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

20 JUNE 03
(Date signed)

Captain R. L. Lachowsky
Commanding Officer
USCG Integrated Support Command
Kodiak, Alaska

05 Aug 03
(Date signed)

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

TABLE

FIGURES

APPENDIX

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMS	Corrective Measures Study
COC	contaminant of concern
COPC	contaminant of potential concern
CSM	conceptual site model
DERA	Defense Environmental Restoration Account
DERP-FUDS	Defense Environmental Restoration Program for Formerly Used Defense Sites
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
ER-L	effects range – low
ER-M	effects range – median
FS	feasibility study
FUDS	Formerly Used Defense Sites
ICP	institutional control plan
IRA	interim remedial action
ISC	Integrated Support Command
ISL	interim screening levels
LOAEL	lowest-observable-adverse effect level
mg/kg	milligram per kilogram
mg/L	milligram per liter
MMP	monitoring and maintenance plan
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no-observable-adverse effect level
NPL	National Priorities List
PAH	polynuclear aromatic hydrocarbon

ACRONYMS AND ABBREVIATIONS
(continued)

PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
ppm	parts per million
PQL	practical quantitation limit
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	remedial investigation
ROD	Record of Decision
RRO	residual-range organics
SACM	Superfund Accelerated Clean-up Model
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SSL	soil screening levels
SWMU	solid waste management unit
TERC	Total Environmental Restoration Contract
TOC	total organic carbon
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, or disposal facility
USAED	U.S. Army Engineer District, Alaska
USC	United States Code
USCG	United States Coast Guard
UST	underground storage tank
µg/L	microgram per liter

1.0 INTRODUCTION

This Decision Document presents the selected action and supporting rationale for cleanup at the Drury Gulch site within the U.S. Coast Guard (USCG) Integrated Support Command (ISC) on Kodiak Island, Alaska (Figure 1-1).

This Decision Document was developed in accordance with State of Alaska regulations governing the protection of human health and the environment from hazardous substances (18 Alaska Administrative Code [AAC], Part 75, Article 3), Alaska Water Quality Standards (18 AAC, Part 70, Article 1), Federal Toxic Substances Control Act (TSCA), and Resource Conservation and Recovery Act (RCRA) (based on the findings of the Final RCRA Facility Assessment Report [EPA 1991]). This document is generally consistent with procedures set forth by the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

This decision document is based on the information contained in the Administrative Record for this site. The Administrative Record can be found in the Information Repository located at the Kodiak Library, 319 Lower Mill Bay Road, Kodiak, Alaska.

The Alaska Department of Environmental Conservation (ADEC) and the United States Army Engineer District, Alaska (USAED) have agreed to the decisions outlined in this document. Concurring federal agencies include the U.S. Environmental Protection Agency (EPA) and the USCG.

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SITE LOCATION - DRURY GULCH
KODIAK, ALASKA

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P. Hannon	Site Vicinity.cdr	1-1
DRAWN BY:	FILE LOCATION:	DATE:
MC/JL	Kodiak\05M30512\2003DecisionDoc	July 2003

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2.0 SITE INFORMATION AND BACKGROUND

A detailed description of the site is provided in the 2000 Remedial Investigation/Feasibility Study Report (USAED 2002). 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.

2.1 SITE DESCRIPTION

Drury Gulch is located near the main entrance to the USCG ISC complex (Figure 2-1). The Drury Gulch site is approximately 3,600 feet long and 6 acres in size. It is comprised of four areas: Upper Gulch area, Lower Gulch area, area north of Rezanof Highway, and the Storm Drain area (Figure 2-2). Drury Gulch is a natural drainage on Kodiak Island. In the early 1940s, the drainage north of the Rezanof Highway was controlled by routing it through a man-made storm drain that eventually discharges to Womens Bay. Drury Gulch and the surrounding area were used by the U.S. Navy from 1939 to 1975 as part of the Kodiak Naval Station reservation. The Navy stored or disposed of a variety of metal and wood debris in Drury Gulch for an unknown period of time. During the rerouting of the Rezanof Highway in the mid-1970s and the mid-1980s, the majority of metal and debris was removed from the site or buried onsite and the surface re-graded. Site investigations in 1993, 1999, and 2000 showed that elevated levels of polychlorinated biphenyls (PCB) remain in the gulch from the military activities. The presence of PCBs in the area is believed to result from dumping metal debris such as electrical components containing PCBs or using soil cover/backfill material containing PCBs.

Drury Gulch is generally oriented from the southwest to the northeast. The gulch is composed of a primary drainage sloping down to the northeast and a secondary side drainage sloping toward the east. Drainage water flows along the gulch toward the north/northeast. The Drury Gulch drainages are bounded by hills of shallow bedrock on both sides of the primary drainage pathways.

The slope of the western hillside boundary of the gulch is between 45 degrees and 60 degrees, while the eastern hillside boundary slope is less steep at approximately 30 degrees.

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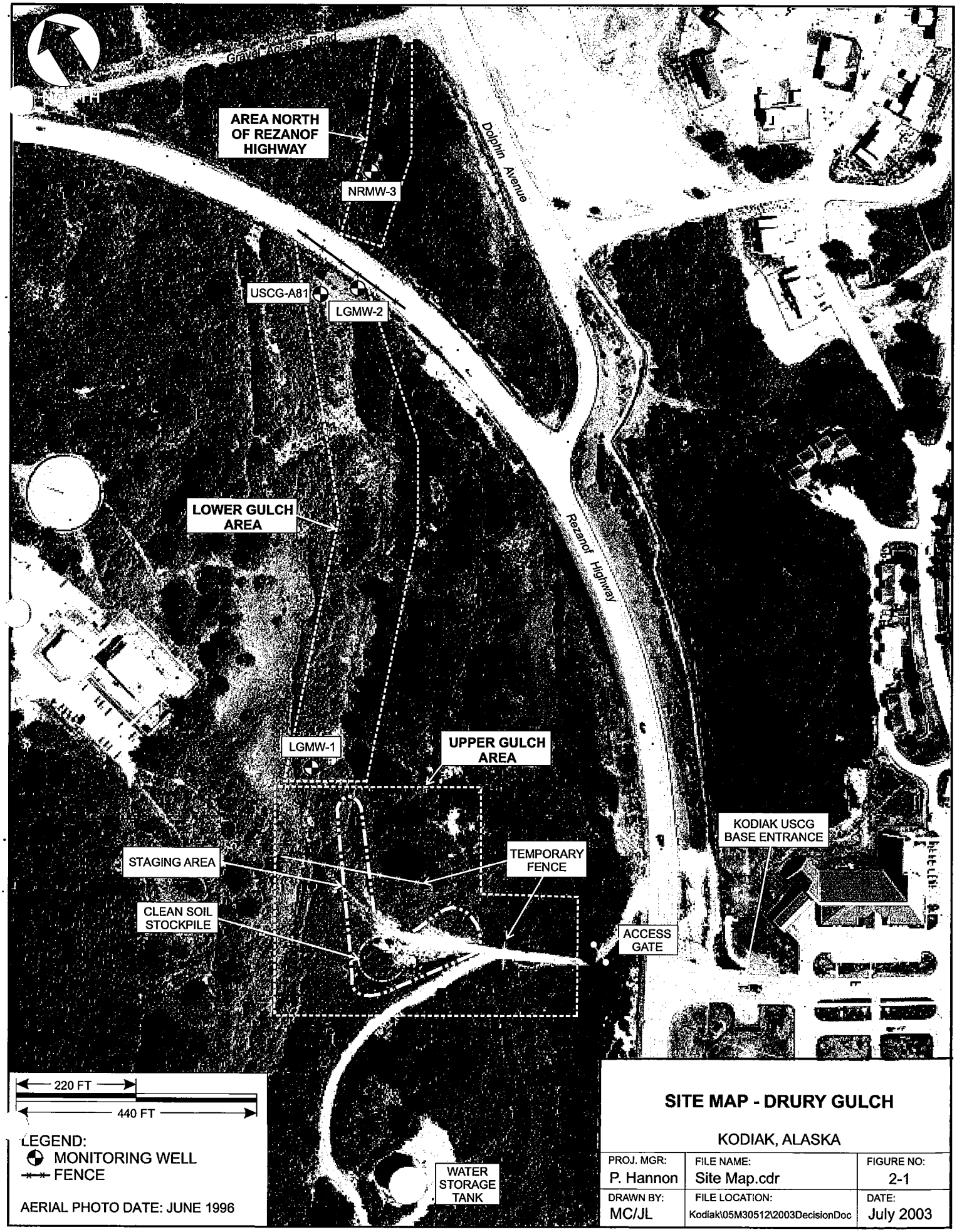

SITE MAP - DRURY GULCH

KODIAK, ALASKA

PROJ. MGR:	FILE NAME:	FIGURE NO:
P. Hannon	Site Map.cdr	2-1
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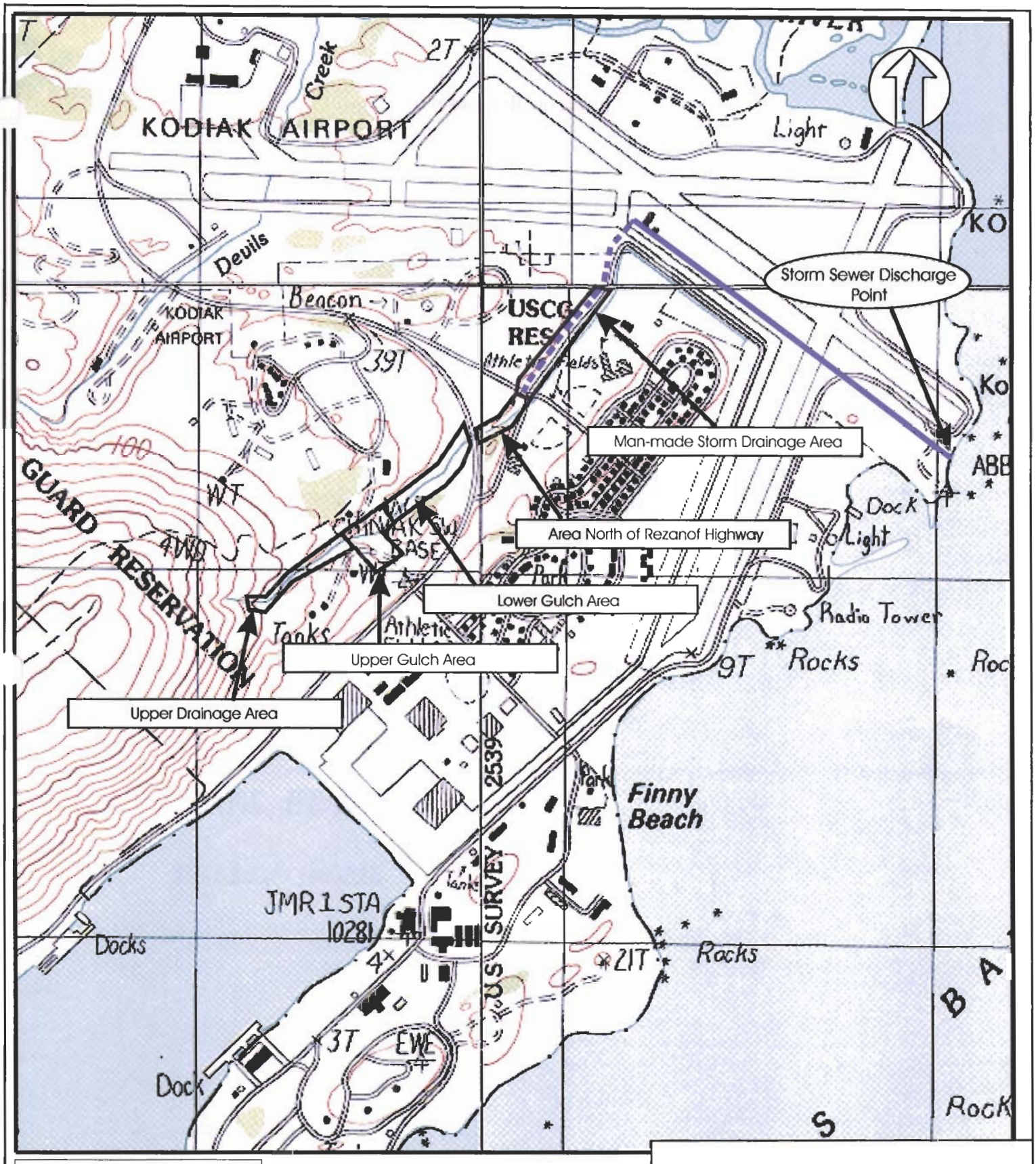

USGS Kodiak
Approximate Scale 1:14000

AREA MAP - DRURY GULCH
KODIAK, ALASKA

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P. Hannon	Area Map.cdr	2-2
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Two distinctly different land areas (with respect to soil saturation and organic content) are present within Drury Gulch. The first area, the Upper Gulch, is characteristic of many areas of Kodiak Island and is comprised of rocky, unconsolidated soil deposits resting upon shallow, decaying bedrock. The materials overlaying the bedrock are described as dark brown, well-graded silty sand, silt, and gravels. In addition, the ash layer from the 1912 eruption of the Novarupta volcano is very distinct in the undisturbed areas of the gulch. The fractured, decaying, underlying bedrock is dark gray basalt and metasedimentary rock. The second area is located farther downgradient in the Lower Gulch, where the drainage begins to meander along an undefined path due to the lessening gradient. The lowlands adjacent to the drainage in this area are saturated with approximately 4 to 6 inches of standing water during storm conditions. Surface water within the lower reaches of the gulch recharges rapidly in response to short periods of rainfall. This area is bounded by steep hillsides on both sides of the gulch, confining flows to drainage cross-sections that vary from approximately 3 to 20 feet in width depending on precipitation events. The area of the actual intermittent drainage consists of sediment of high organic content, which remains moist or wet during the fall and winter seasons or during storm events.

Stream flow rates within Drury Gulch also vary depending on precipitation events but typically average from approximately 1 to 10 gallons per minute during moderately rainy periods. The stream exits Drury Gulch through a culvert under the Rezanof Highway, then follows an open man-made storm drainage ditch to the Kodiak Airport, where it enters a culvert and flows beneath the runways at the southeastern boundary of the airport. The outfall of the culvert is into Womens Bay, which is part of the U.S. Fish and Wildlife Service Alaska Maritime National Wildlife Refuge.

Kodiak residents recreationally use Drury Gulch as a foot access route to hunting and hiking areas. It is also used as an access by USCG contractors to the firewater storage tank, electrical utilities, and fiber optic cable vaults. A USCG residential housing area is located west of the site on Aviation Hill, positioned approximately 100 vertical feet above Drury Gulch and approximately 330 feet west of the drainage. The firewater storage tank in the upper reaches of Drury Gulch is a 300,000-gallon tank available as a contingency source

of water for hangar fire or other emergencies on the Base. The storage tank is currently accessed via a short, improved dirt access road from the gulch's eastern sub-drainage. The Upper Gulch also has a road that was constructed to access the upper drainage area, apparently to aid in the completion of a power line extension. Imported gravel fill has been placed in depths up to 2 feet where the road parallels the primary Drury Gulch drainage pathway.

2.2 APPLICABLE 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 U.S.C. 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. When remedial action is taken, it must be documented in a Record of Decision (ROD) as required by CERCLA and its implementing regulation, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

For non-National Priorities List (NPL) project locations that meet Defense Environmental Restoration Account (DERA) eligibility requirements, it may be possible that other applicable regulatory processes can be used instead of, or in lieu of, the NCP process for accelerating site clean-up. Examples include the approach known as Superfund Accelerated Clean-up Model (SACM); Regulations under Subtitle I of the RCRA, as amended, for underground storage tank (UST) releases; regulations under Subtitle C of RCRA for corrective actions associated with solid waste management units (SWMU); voluntary corrective actions under RCRA; regulations under TSCA, as amended, for PCBs; and state regulations for petroleum or other releases.

Since Drury Gulch is listed as a RCRA SWMU under the USCG Treatment, Storage or Disposal Facility (TSDF) Permit, the FUDS program has the flexibility of performing

clean-up activity under Subtitle C of RCRA. Thus, applicable or relevant and appropriate requirements (ARAR) from RCRA must be evaluated and addressed as part of the Drury Gulch clean-up action.

The ARARs were developed for this project as follows:

ADEC Requirements

State of Alaska Oil and Hazardous Substances Pollution Control Regulations 18 AAC 75 apply as an Applicable Regulation to the cleanup at Drury Gulch. 18 AAC 75.341 Table B1 footnote 9 explains the clean-up levels for PCBs in soil. In summary, the regulation states that the clean-up level for PCBs in soil is 1 milligram per kilogram (mg/kg) or less but may be cleaned up to between 1 and 10 mg/kg if the responsible party caps the area containing PCBs and establishes institutional controls documenting that the contamination is present, has been capped, and outlines the legal obligations of any subsequent interest holders.

TSCA Requirements

Because there are PCBs at this site, the 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 clean-up site characterization sampling for PCB remediation waste.
- 40 CFR 761.280-298, which regulates sampling to verify completion of self-implementing clean-up and on-site disposal of bulk PCB remediation waste and porous surfaces.

RCRA Requirements

The RCRA Statute, Section 3004(u), states that "permits issued after November 8, 1984, shall require corrective action for all releases of hazardous waste or constituents from any solid waste management unit at a treatment, storage, or disposal facility seeking a permit under RCRA, regardless of the time at which waste was placed in such unit...." The key elements in this statutory language that are applicable at Drury Gulch are the following:

- **Treatment, storage, or disposal facility** – The USCG ISC on Kodiak Island is a permitted treatment, storage, and disposal facility subject to the requirements of RCRA 3004 (see EPA Administrative Record).
- **Solid waste management unit**—Drury Gulch is a solid waste management unit (EPA 1991) (see March 8, 1991 RCRA Facility Assessment).
- **Release** —There has been a release of PCBs to the environment at the Drury Gulch site.
- **Hazardous constituents**—PCBs are listed as hazardous constituents in 40 CFR 261, Appendix VIII, the list of hazardous constituents under RCRA.

Therefore, in the specific case of Drury Gulch, RCRA 3004(u) is applicable, due to a release of a hazardous waste or hazardous constituent from a SWMU that is located within the contiguous property boundary of a permitted TSDF. This would be true for any other SWMU located on the USCG Kodiak Island property from which there has been a release of hazardous waste or constituents.

Additionally, the generation of any solid waste during remediation activities may require compliance with other RCRA regulations applicable to any generator of hazardous waste.

3.0 CONCEPTUAL SITE MODEL, CLEAN-UP LEVELS AND RISK ANALYSIS RESULTS

The following sections present the conceptual site model (CSM) for the Drury Gulch site, the results of the risk analysis, and the clean-up levels applicable for each media. The risk analysis approach used in support of the Drury Gulch project was developed to meet the requirements of ADEC regulations in 18 AAC 75, Article 3, *Oil and Hazardous Substances Pollution Control Regulations, Discharge Reporting, Clean-up, and Disposal of Oil and Other Hazardous Substances* (ADEC 1999a). The risk analysis was performed following the procedures specified in ADEC Method 2. Results of the analysis are presented in the Final 2000 Remedial Investigation (RI)/Feasibility Study (FS) Report (USAED 2002).

3.1 CONCEPTUAL SITE MODEL

The current CSM for the Drury Gulch areas is presented as Figure 3-1. This figure presents a generalized flow diagram of complete exposure pathways that exist at the site. Pathways for exposure to human and ecological receptors from contaminated sources in Drury Gulch include soil, air, surface water, sediments, and fruit, berries, and game species.

3.1.1 Sources of Contamination

Sources of contamination at the site include constituents in soil, sediment, and biota associated with historical releases from the dumping of metal debris or using soil cover/ backfill material containing PCBs.

3.1.2 Release Mechanisms

PCBs in Drury Gulch have been released by surface spills during disposal of metal debris or using soil cover/backfill material containing PCBs. The primary sources of contamination were originally located at the ground surface, and the majority of past releases probably occurred to surface soils. Any contamination historically released to surface soils could have then been transported to other surface soils by erosion or runoff (overland flow). Sediments and surface water could have been impacted by direct disposal of debris into the gulch and erosion from adjacent surface soils. Water and sediment movement through Drury Gulch to

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the storm sewers may have impacted marine surface water and sediments in Womens Bay. Constituents could also have been carried to the subsurface from the surface via infiltration and percolation. Once in the subsurface, contaminants can partition onto soil particles or infiltrate and percolate to groundwater.

3.1.3 Transport/Contact Media

Several transport pathways are possible. These transport pathways, and the media within which they occur, are illustrated in Figure 3-1. In general, the potential transport/contact media include groundwater, subsurface soil, biota (e.g., fruit, berries, terrestrial game species, and fish and/or shellfish), surface soil, sediment, surface water, and air. Biota that have been contaminated can serve as transport media if consumed by human or aquatic or terrestrial organisms. Contact media are so named because they are the media that potential receptors may come into contact with during exposure.

3.1.4 Human Receptors and Potential Exposure Routes

The site is currently uninhabited and is used for recreation only. Although the Upper and Lower Gulches are uninhabited, the Storm Drain area is in proximity to residences, recreational fields, an elementary school, and a firehouse. Human receptor groups under the current scenario include a recreational visitor only. Future human receptor groups for the Drury Gulch area include recreational visitors or a commercial/industrial worker. The commercial/industrial worker is identified as a future receptor should future development of the site occur. It should be noted that current access to PCBs in soil is limited because of heavy vegetation. Additionally, access to the gulch area is currently restricted by gates and posted signs indicating the presence of PCB contamination.

The following potential routes of exposure have been identified for receptors at the Drury Gulch Areas as presented in Figure 3-1:

- Inadvertent ingestion of soil or dry stream channel sediment
- Dermal contact with soil, sediment, groundwater, or surface water
- Ingestion of surface water and groundwater
- Inhalation of airborne particulates associated with surface soils and freshwater sediments
- Consumption of impacted biota such as berries or terrestrial game

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 commercial/industrial worker may have direct contact with contaminated soils and be exposed to site contaminants from inadvertent ingestion, dermal contact, or inhalation of suspended particulates. The recreational visitor is also assumed to possibly come into contact with dry stream channel sediments. A recreational user may ingest game species or berries associated with the site.

A complete exposure pathway was assumed for groundwater since groundwater may be used as drinking water. However, through investigations it was determined that the groundwater aquifer within Drury Gulch is of very limited extent and appears to be confined to the areas where fill material is the thickest. Therefore, while there is a complete pathway, it is not considered significant.

A complete exposure pathway also was assumed for surface water, freshwater, and marine sediments. While PCBs have not been detected in surface water, surface water forms a transport mechanism to move particulate PCBs to freshwater and marine sediments. Exposure to impacted shellfish or finfish assumes contamination associated with the site could migrate to the marine environment and adversely impact these biota.

3.1.5 Ecological Receptors and Potential Exposure Routes

Ecological receptor groups identified for the Drury Gulch areas include aquatic (freshwater and marine) and terrestrial organisms. Potential routes of exposure include inadvertent ingestion of soil or sediment, exposure to constituents in fresh surface water and sediments, exposure to constituents in marine surface water and marine sediments, uptake of contaminants by flora, and ingestion of contaminants in food resources (i.e., prey or flora) by consumers.

3.2 ECOLOGICAL SURVEY OF FLORA AND FAUNA

An ecological survey was conducted in Drury Gulch to investigate the presence of aquatic plants and macroinvertebrate species. The survey was conducted 25 August 2000. For the survey, eleven 1-meter by 1-meter plots were used to assess the gulch. The plots were positioned in the center of the drainage on approximately 300-foot centers. The plots began in the Upper Gulch and continued northward through the Lower Gulch, the area north of the Rezanof Highway, and through the man-made storm drain to the point where the culvert runs beneath the airport.

At the time the survey was conducted, the gulch was mostly dry due to six weeks of unseasonably low precipitation. Wet areas consisted of isolated puddles from seeps in the Upper Gulch from the upgradient drainage and one small area just north of the Rezanof Highway. The puddles measured approximately 1 meter by 1.5 meters.

Results of the survey indicated the gulch is vegetated mostly with terrestrial plants; however, in some isolated areas species were found that are associated with moist and wet habitat. Several species of non-sensitive macroinvertebrates were found in the small stagnant pools. These consisted of mosquitoes, flatworms, and true midges. A copy of the ecological survey is included in Appendix E of the RI/FS (USAED 2002).

3.3 ECOLOGICAL RISK SCREENING CALCULATIONS FOR TERRESTRIAL RECEPTORS

An ecological surface soil screening level was calculated to evaluate the state-promulgated clean-up level for PCBs (1 mg/kg) to determine if the level protects terrestrial ecological receptors at Drury Gulch as well as human health. A proposed approach was developed for calculation of the ecological soil screening level, and submitted and approved by the participating agencies in May 2001 with an addendum in February 2002. Calculation of the ecological soil screening values for different trophic levels typically found in Drury Gulch was completed based on the approved approach.

The approach, assumptions, and rationale used in calculation of the terrestrial ecological screening levels are summarized below.

The exposure characterization identified the potential magnitude and frequency of PCBs (Aroclor 1260) that indicator species may be exposed to in surface soil at Drury Gulch. In addition, the exposure characterization identified all routes of exposure by which species inhabiting the area may be exposed, and serves as input to the development of surface soil screening levels. The following components of the exposure assessment were addressed:

- Characterization of site conditions
- Identification of potential ecological indicator receptors
- Estimation of exposure to indicator species

3.3.1 Characterization of Site Conditions

The area encompassing detected PCB concentrations of the site is approximately 4 acres (16,188 square meters or approximately 1.62 hectares). Soil borings drilled at the site encountered surface topsoil to a depth of 1 or 2 inches overlaying sandy gravels, gravelly sands, silty gravels, silty sands, and silt lenses in subsurface materials. Across the site area, a volcanic ash layer composed of medium to fine pale yellow sand was encountered at depths ranging from surface outcrops to 9.5 feet below ground surface (bgs). The ash layer ranged from 6 inches to 2 feet in thickness and was underlain by a layer of tight dark reddish brown

sandy silt that was up to 2 feet thick. Beneath the silt layer were silty gravel, sandy gravel, and broken rock. This layer was interpreted to be a layer of decomposing bedrock, or "rind" overlaying more competent bedrock.

3.3.2 Identification of Potential Ecological Indicator Receptors

The primary indicator species for trophic levels 1 and 2 in the Southwest Ecoregion (i.e., Kodiak Island) are the Dark-Eyed Junco (avian species) and the Tundra Vole (terrestrial species). The indicator species for trophic level 3 are the American Robin (avian species) and the Masked Shrew (terrestrial species). The indicator species for trophic level 4 are the Northern Shrike (avian species) and the Least Weasel (terrestrial species) (ADEC 1999b).

3.3.3 Estimation of Exposure to Indicator Species

As terrestrial wildlife move through the environment, they may be exposed to contaminants via three pathways: oral, dermal, and inhalation. Oral exposure occurs through the consumption of contaminated food, water, or soil. Dermal exposure occurs when contaminants are absorbed directly through the skin. Inhalation exposure occurs when volatile compounds or fine particulates are respired into the lungs. The total exposure experienced by an individual is the sum of exposure from all three pathways.

For purposes of the screening level calculation, it was assumed that the indicator species may be exposed to surface soil only through ingestion of soil and by dietary intake (e.g., plants, seeds, soil invertebrates), depending upon the species. While dermal uptake and inhalation are possible additional exposure routes, little information is available for quantifying these exposure routes for wildlife, and their risk is considered minimal when compared to ingestion.

The details of the process involved in calculating the ecological surface soil screening level can be found in the *Technical Memorandum, Presentation of Surface Soil Ecological Screening Levels, Terrestrial Ecological Receptors*, which is provided in Appendix D of the RI/FS (USAED 2002).

Based on the results of the technical memorandum, the Masked Shrew is the most sensitive of the indicator species, and the Tundra Vole is the least sensitive species evaluated for exposure to Aroclor 1260 at the Drury Gulch site. The calculated soil screening levels (SSL) for the Masked Shrew range from 0.042 mg/kg (lowest body weight, highest area use, no-observable-adverse effect level [NOAEL] based toxicity reference values [TRV]) to 1.1 mg/kg (highest body weight, lowest area use, lowest-observable-adverse effect level [LOAEL] based TRV). The calculated SSL for the Masked Shrew based on average body weight, average area use and NOAEL based TRV is 0.07 mg/kg. The calculated SSLs for the Tundra Vole range from 2.1 mg/kg (lowest body weight, highest area use, NOAEL based TRV) to 94.5 mg/kg (highest body weight, lowest area use, LOAEL based TRV). The calculated SSL for the Tundra Vole based on average body weight, average area use and NOAEL based TRV is 4.41 mg/kg.

In addition, the surface soil clean-up goal of 1.0 mg/kg is within the calculated ranges of the SSLs using NOAEL based TRV values for all of the indicator species except the American Robin and Masked Shrew. Both of these indicator species represent trophic level 3. The surface soil clean-up goal of 1.0 mg/kg is within the calculated ranges of the SSLs for all of the indicator species using LOAEL based TRV values.

3.4 SURFACE SOIL

The residential cleanup level is 1 mg/kg at all depths. However, as allowed by 18 AAC 75.741, all PCBs in the soil at Drury Gulch will be cleaned up to concentrations less than 10 mg/kg. Remaining PCBs in the soil and the entire disturbed area within the gulch will be covered with a two-foot layer of an appropriate material to prevent exposure of humans and the environment to PCBs. This cover, in conjunction with institutional controls, is an allowable alternative for a residential cleanup at Drury Gulch.

3.5 SUBSURFACE SOIL

The same cleanup level for surface soil, as described above in Section 3.4, is also applicable to subsurface soil.

3.6 FRESHWATER SEDIMENT

Freshwater sediment samples were collected from the stream channel within Upper and Lower Drury Gulch, in the area between the Rezanof Highway and Tom Stiles Road, and from the man-made storm drain between Tom Stiles Road and the Kodiak Airport tarmac. All the stream channel sediment samples were compared to sediment quality guidelines protective of aquatic life (EPA 1996). This is a conservative approach because Drury Gulch is an intermittent stream where fish or sediment-dwelling aquatic amphipods do not exist. The sediment quality guideline selected for PCBs is 0.031 mg/kg.

3.7 MARINE SEDIMENT

The marine sediment data were compared to sediment quality guidelines that are protective of sediment-dwelling marine amphipods. Sediment data from Womens Bay were compared to the effects range-low (ER-L) and effects range-median (ER-M) concentrations provided in *Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in marine and Estuarine Sediments* (Long, et al 1995). The two guideline values, ER-L and ER-M, delineate three concentration ranges for a particular chemical. The concentrations below the ER-L value represent a minimal-effects range, a range intended to estimate conditions in which effects rarely would be observed. Concentrations equal to and above the ER-L, but below the ER-M, represent a possible effect range within which effects would occasionally occur. Finally, the concentration equivalent to and above the ER-M value represents a probable-effects range within which effects would frequently occur. The ER-L and ER-M for PCBs in marine and estuarine sediments are 0.0227 mg/kg and 0.18 mg/kg, respectively. The ER-L value was selected for comparison to marine sediment analytical results.

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4.0 CONTAMINANT CONCENTRATIONS/EXTENT OF CONTAMINATION

The following sections describe the different investigations that have been conducted at Drury Gulch. A summary of the results of each investigation and the concentrations and extent of the contaminants detected during each investigation is presented.

4.1 LIMITED SITE INVESTIGATION

In October 1993, the USCG conducted a limited site investigation to determine if Drury Gulch was adversely impacted by Department of Defense activities. During the limited site investigation, samples were collected from surface water, sediment, and surface soil locations throughout the main gulch area (Upper and Lower Drury Gulch). A groundwater sample was also collected from an existing monitoring well (U.S. Geological Survey-A81) within the downgradient reaches of the gulch. All samples were analyzed for constituents historically used or present at the USCG ISC in Kodiak. Five surface soil, one sediment, one groundwater, and three surface water samples were analyzed for PCBs, pesticides, metals, and total petroleum hydrocarbons (USAED 1999a). PCBs were detected during the 1993 site investigation at concentrations of 6.8 mg/kg, 0.78 mg/kg, and 14.0 mg/kg in surface soil located near the southwestern corner of upper Drury Gulch. The presence of PCBs is believed to originate from dielectric fluid used in transformers and other electrical components. Cadmium, chromium, and lead were identified in the same general location at concentrations of 5.0 mg/kg, 40.8 mg/kg, and 541 mg/kg, respectively.

4.2 SITE INVESTIGATION

Results of the 1993 limited site investigation were screened to focus further data collection efforts to only those constituents justifying further consideration and to establish interim screening levels (ISL). A site investigation work plan was drafted in the spring 1999 with the purpose of defining the extent of PCBs, metals, and potential petroleum, oil, and lubricants (POL) contamination in the soils, surface water, sediments, and groundwater within Drury Gulch.

In June 1999, a site investigation was conducted. Surface and subsurface soil, sediment, surface water, and groundwater samples were collected from various locations in an attempt to define the extent of PCB, POL, and metals contamination.

4.2.1 Lower Gulch Area Assessment Results

PCBs were detected up to 897 mg/kg in the upper 1 foot of soil and storm drainage soil/ sediments. Prior to the site investigation, the presence and the extent of PCB contamination within the Lower Gulch area was unknown. Diesel-range organics (DRO) were detected above ISLs within the Lower Gulch area; however, their quantification was attributed to associated PCB contamination and biogenic interference. Metals were not detected above ISLs in the lower area. ISLs are listed in *Technical Memorandum, 1999 Site Investigation, Drury Gulch, Alaska* (USAED 1999b).

4.2.2 Area North of Rezanof Highway Assessment Results

Limited sampling occurred in this area during the 1999 site investigation. Sampling included the collection of eight sediment samples, three surface water samples, and four soil samples to determine the distribution and magnitude of PCB contamination and other chemicals of concern.

Eight sediment samples were collected and analyzed for PCBs. Results ranged from a high of 12.8 mg/kg to a low of 0.206 mg/kg at the furthest downgradient location.

Three surface water samples were collected. Two samples were collected from the man-made storm drainage and analyzed for PCBs and RCRA metals. PCBs were not detected in any of the five samples (practical quantitation limit [PQL] of 1.03 micrograms per liter [µg/L]). An additional surface water sample was collected from the groundwater seep adjacent to the highway and analyzed for RCRA metals, DRO, and residual-range organics (RRO). Analytical results for DRO and RRO were below detectable limits. A DRO concentration of 0.1 parts per million (ppm) was estimated in one of the samples. Except for a barium concentration of 0.02 milligrams per liter (mg/L) in two of the three surface water samples,

RCRA metals were not detected in the surface water samples above water quality criteria stated in 18 AAC 80.

Soil samples were collected in the area north of Rezanof Highway at four locations and analyzed for PCBs, DRO, RRO, and total organic carbon (TOC). PCB concentrations in each sample were below detectable limits. Concentrations of DRO in the soil ranged from 8.32 mg/kg to 37.7 mg/kg. Two of the soil samples had DRO concentrations below the detection limit and were estimated at 8.32 mg/kg and 9.4 mg/kg. RRO concentrations in the soil ranged from 38.8 mg/kg to 101 mg/kg. TOC ranged from 17,400 mg/kg to 73,790 mg/kg.

4.2.3 Upper Gulch Area Assessment Results

A preliminary 100-foot by 75-foot PCB sampling grid with 25-feet by 12.5-feet grid node intervals was established in the vicinity of the three samples exhibiting PCB detections previously collected during the 1993 limited site investigation. The 1993 sampling locations could not be duplicated; however, the preliminary 100-foot by 75-foot sampling grid was situated near the sampling area indicated in the Science Applications International Corporation (SAIC) (1995) report. This 32-point grid was established in the southern, upgradient portion of the gulch, adjacent to the access road. Attempts to sample two depths of 1.5 feet and 3.0 feet bgs were made where contamination was detected in the 0.5-foot near-surface depth. Buried metal and large rocks/shallow bedrock obstructed sampling at many depths greater than 1.5 feet bgs. On receipt of preliminary sample results, the grid was stepped-out in greater node intervals in an attempt to delineate the horizontal extent of PCB contamination. The Upper Gulch area was found to contain PCBs at concentrations up to 6.74 mg/kg in the upper 2 feet of soil within an area of approximately 24,000 square feet. Chromium was detected slightly above the established ISL (23 mg/kg) in the area. POLs were not detected above ISLs in the Upper Gulch area.

4.3 EMERGENCY REMOVAL ACTION

As a result of the June 1999 site investigation, the interim removal action (IRA) to be performed was identified as time-critical. Therefore, a Time-Critical Action Memorandum was prepared and subsequently approved on 23 August 1999. Because the removal action would be performed in an apparent wetland, a Department of Army Nationwide Permit (No. 38, Clean-up of Hazardous/Toxic Waste) Pre-Construction Notification and Public Notice was issued on 7 September 1999, in accordance with the DERP-FUDS Notification procedures. The notification was issued to regulatory agencies with potential interest. IRA construction was initiated on 20 September 1999 to remove PCB-contaminated soil and potential PCB exposure pathways from Drury Gulch. The USAED contracted this remedial work through the Total Environmental Restoration Contract (TERC), Contract No. DACA 85-95-D-0018, Task Order 06.

Implementation of the IRA work plan resulted in the following accomplishments:

- Construction of a road into the Lower Gulch area to provide access for soil excavation.
- Removal of approximately 172 cubic yards of PCB-contaminated soil from the Lower Gulch area, including a hot spot of material containing 103,000 mg/kg of PCBs.
- Construction of an approximate 24,000 square foot soil cover to limit potential exposure to <10 mg/kg of PCBs in the soil in the Upper Gulch area.
- Delineation of potential PCB contamination of marine sediments at Womens Bay.
- Sampling in all directions from the Drury Gulch storm drainage to delineate the perimeter of the site affected by PCB contamination.
- Construction of a fence with warning signs and a gate to limit future access to the Upper and Lower Drury Gulch drainage.

Although significant progress was made before the onset of winter 1999, PCBs in surface and shallow soil remained in the gulch above the cover action level (PCBs > 1 mg/kg and < 10 mg/kg) and the excavation action level (PCBs >10 mg/kg) established by the September 1999 Work Plan. Surface water and groundwater samples collected and analyzed during this IRA

did not contain detectable concentrations of PCBs. As few as 4,600 cubic yards and as many as 50,000 cubic yards of material were believed to contain PCBs in excess of the established excavation action level using a conservative residential land use designation.

4.4 REMEDIAL INVESTIGATION/FEASIBILITY STUDY

In July 2000, personnel and supplies were mobilized to Drury Gulch to conduct the field portion of the RI/FS. As part of the RI/FS the following data gathering activities were performed:

- 119 surface soil and sediment samples were collected.
- 94 soil borings were advanced, and subsurface soil samples were collected as they were advanced.
- Five groundwater monitor wells were installed. Only two of these wells were found to produce water. Three rounds of groundwater samples were collected from these two water-producing monitor wells: one round in August 2000, a second round in October 2000, and a third round in January 2002.
- Aquifer testing data was analyzed after conducting slug tests in October 2000 on the two producing monitor wells (NRMW03 and LGMW02).
- Four temporary piezometers were installed in the Lower Gulch area, and four were installed in the area north of Rezanof Highway.
- Two staff gauges were installed to assist in evaluation of hydrologic conditions in the gulch.

The major findings of the RI with regard to the nature and extent of contamination, fate and transport of contaminants, and the risk analysis at each of the four Drury Gulch subareas are discussed in Section 4.4.1 and following sections.

4.4.1 Nature and Extent of Contamination

Distributions of contaminants in surface soils, subsurface soils, freshwater sediment, and marine sediment are discussed below for Upper Gulch area, Lower Gulch area, area north of Rezanof Highway, and Storm Drain area.

4.4.1.1 Upper Gulch

The Upper Gulch surface soils contain several locations with PCB concentrations exceeding the ADEC surface soil clean-up level of 1.0 mg/kg. This contamination is predominately at locations along the south and west edge of the soil cover constructed as part of the 1999 IRA. However, PCB-contaminated surface soil was found at one location (UG-28) approximately 120 feet west of the soil cover. See Figure 5-1 in the 2000 RI/FS (USAED 2002). Two surface soil samples were analyzed for hexavalent chromium. Hexavalent chromium was not detected in either sample.

PCB contamination was detected in only one subsurface soil sample equal to the ADEC standard of 10 mg/kg. The sample was from 2.5 feet to 4.5 feet bgs at location UG-12 on the eastern edge of the soil cover. See Figure 5-3 in the 2000 RI/FS (USAED 2002).

Only one freshwater sediment sample location contained PCB contamination. The sample from UG-15 contained Arochlor 1260 at a maximum of 0.58 mg/kg. This concentration exceeds the freshwater sediment quality guideline of 0.031 mg/kg.

No surface water was encountered in the Upper Gulch during the 2000 RI sampling activities.

A cluster of four temporary piezometers was installed at soil boring location UG-16, at the downstream end of the Upper Gulch area (see Figure 5-3 in the 2000 RI/FS [USAED 2002]). No groundwater was present at the time of sampling.

4.4.1.2 Lower Gulch

The surface soils in the Lower Gulch area are contaminated with the PCB Arochlor 1260. Surface soil samples indicate that the near surface samples have more widespread contamination than the deeper samples. However, in three locations (LG-29A, LG-33 and LG-40A) the contamination extends down to the 2-foot to 4-foot sample, and in one location the 8-foot to 10-foot sample is the most highly contaminated in the section (LG-24, 60 mg/kg) (see Figure 5-5 in the 2000 RI/FS [USAED 2002]). The total chromium in the surface soils was within the range of background concentrations.

No surface water was encountered in the Lower Gulch during the 2000 RI/FS sampling. Samples collected in 1999 had no detectable concentrations of PCBs, and the concentrations of metals detected were below criteria.

There were no detectable concentrations of PCBs or hexavalent chromium in the groundwater samples collected in August and October 2000. PCBs were detected in the sample collected on 30 January 2002 at a concentration of 0.0194 µg/L (Aroclor 1260), an order of magnitude less than the ADEC Groundwater Clean-up Level (0.5 µg/L).

Six freshwater sediment samples contained Arochlor 1260 in concentrations in excess of the sediment quality guideline of 0.031 mg/kg. All of these samples were collected from the Lower Gulch and represent contamination from the surface soils apparently carried by overland flow during precipitation events.

4.4.1.3 Area North of Rezanof Highway

Surface soils in the area north of Rezanof Highway contain only limited contamination. Only two of thirty surface soil samples contained PCB concentrations in excess of the ADEC standard of 1.0 mg/kg. The PCB concentrations were 1.2 mg/kg at NR-06 and 1.6 mg/kg at NR-09. (See Figure 5-10 in the 2000 RI/FS [USAED 2002].) Both of these locations are approximately 40 feet to 50 feet southeast of the Drury Gulch channel.

No contamination in excess of standards was detected in the subsurface soil samples. PCB concentrations were detected in samples from four of 16 boreholes in the area. The maximum PCB concentrations detected were 2.1 mg/kg in two samples, less than the ADEC standard of 10 mg/kg.

No groundwater contamination in excess of standards was detected in the area. One groundwater monitoring well, NRMW-03 (see Figure 5-11 in the 2000 RI/FS [USAED 2002]) was installed in the area, and four samples (including two duplicate samples) were collected from it. Samples were analyzed for polynuclear aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene and xylene (BTEX), DRO, GRO, RRO, total chromium, lead, and hexavalent chromium. Only total chromium at 0.015 mg/L, lead at 0.009 mg/L, anthracene at 0.089 µg/L, and RRO at 0.29 mg/L were detected. PCB congeners were not detected except Arochlor 1260 in the duplicate sample, which was detected at 0.38 µg/L. This value is less than the ADEC groundwater clean-up level of 0.5 µg/L. PCBs were detected in the sample collected on 30 January 2002 at a concentration of 0.013 µg/L (Aroclor 1260), an order of magnitude less than the groundwater clean-up level.

Three surface water samples collected in 1999 contained detectable concentrations of some metals (total) but no PCBs. No surface water samples were collected from the area north of Rezanof Highway in 2000. PCBs, mercury, selenium, and silver were not detected. Chromium was detected in one sample; arsenic and lead were detected in two samples, and barium and cadmium were detected in all three samples. All constituents detected are below concentrations for remedial action.

Sediments are contaminated with PCBs throughout the length of the Drury Gulch drainage channel in the area north of Rezanof Highway. Six sediment samples were collected from the channel. PCB concentrations ranged from 0.48 mg/kg to 8.2 mg/kg. All six samples exceeded the applicable freshwater sediment standard of 0.031 mg/kg.

4.4.1.4 Storm Drain

No surface soil contamination is apparent in the Storm Drain area. Two surface soil samples were collected from the area, but PCBs were not detected in either sample.

Subsurface soil contamination at concentrations exceeding standards was not detected in the area. PCBs were not detected in three of four samples. Arochlor 1260 was detected at 0.48 mg/kg from the fourth sample, less than the applicable standard of 10 mg/kg.

Two monitoring wells were constructed in the area, but both wells were dry. Thus, no groundwater samples were collected from the Storm Drain area.

No surface water samples were collected in 1999 or 2000 from the Storm Drain area.

PCB contamination was detected in all 11 freshwater sediment samples from throughout the length of the Storm Drain. Arochlor 1260 concentrations ranged from 0.7 mg/kg to 4.0 mg/kg. The PCB concentrations exceeded the ecological freshwater sediment standard of 0.031 mg/kg in all 11 samples.

Three marine sediment samples were collected from the vicinity of the Storm Drain outfall at Womens Bay. PCBs were not detected in any of the samples.

4.4.2 Fate and Transport

The major contaminants of potential concern (COPC) are the PCB family of compounds, primarily Arochlor 1260. These compounds are virtually insoluble and are resistant to both photolytic and microbial degradation. The PCBs will persist in the environment and will attach themselves to the soil particles. The mass migration of soils via overland flow and mass wasting will be the major mechanism for transport of PCBs in Upper and Lower Drury Gulch, the area north of Rezanof Highway, and the Storm Drain area.

There is a complete pathway to Womens Bay; however, any contaminated sediment that is flushed into the bay is most likely quickly dispersed and diluted to non-detectable levels by

the bay's near-shore current and tides. It is not expected that the marine sediments at the outfall are stationary long enough to build up detectable concentrations of PCBs.

Total chromium is present in the soils in concentrations considered to be background. It will be transported along with the soils during mass wasting and overland flow. No measurable concentrations of hexavalent chromium were found in either the soils or the groundwater.

4.4.3 Risk Analysis

The following sections present a summary of the risk analysis performed using the analytical results from each of the Upper Gulch, Lower Gulch, north of Rezanof Highway, and Storm Drain areas of Drury Gulch.

4.4.3.1 Upper Gulch

PCBs in the surface soils (0.0 feet to 0.5 feet bgs) exceed the ADEC standard of 1.0 mg/kg in 16 of 22 samples. From the 0.0 feet to 2.0 feet bgs interval, 13 out of 20 samples exceed the 1.0 mg/kg standard. Three of these 13 locations where PCBs exceed the standard are from the same sample locations as the 0.0 feet to 0.5 feet bgs depth interval where surface soil samples exceed the standard.

Subsurface soil samples were collected from various depths up to 12 feet bgs at 18 separate locations. None of the samples exceed the ADEC standard of 10 mg/kg.

One of the two freshwater sediment samples exceeds the freshwater sediment quality guideline of 0.031 mg/kg.

4.4.3.2 Lower Gulch

The surface soils of much of the upper (i.e., southwest) end of Lower Drury Gulch exceed the ADEC standard of 1.0 mg/kg (19 of 36 samples). At two of 40 locations, the subsurface soil samples from the 2-foot to 4-foot interval exceed the ADEC standard of 10 mg/kg, and at one of nine locations, the 8-foot to 10-foot sample also exceeds that standard.

Four of the six freshwater sediment samples exceed the sediment quality guideline of 0.031 mg/kg.

4.4.3.3 Area North of Rezanof Highway

Two of 30 surface soil samples in the area north of Rezanof Highway exceed the ADEC standard of 1.0 mg/kg. Both locations are approximately 40 feet to 50 feet southeast of the Drury Gulch channel.

Five metals were detected in surface water samples collected from the area in 1999. All constituents detected are below action levels.

Freshwater sediment samples from the entire length of the Drury Gulch drainage channel in the area north of Rezanof Highway contain PCB concentrations in excess of applicable standards. Five of six samples exceed the surface soil standard of 1.0 mg/kg, while all six samples exceed the sediment quality guideline of 0.031 mg/kg.

4.4.3.4 Storm Drain

Freshwater sediment samples from the entire length of the Drury Gulch drainage channel in the Storm Drain area contain PCB concentrations in excess of applicable standards. Nine of 11 samples exceed the surface soil standard of 1.0 mg/kg, while all 11 samples exceed the sediment quality guideline of 0.031 mg/kg.

4.4.4 Conclusions

Based on the findings of the RI, the risk analysis determined an unacceptable risk to human health, safety, welfare, and the environment from exposure to PCB-contaminated surface soil in the Upper Gulch, Lower Gulch, and area north of Rezanof Highway; and from exposure to PCB-contaminated subsurface soil in the Upper and Lower Gulch areas.

The RI also determined that an unacceptable risk to ecological receptors exists in the Upper Gulch, Lower Gulch, north of Rezanof Highway, and Storm Drain areas due to exposure to PCB-contaminated sediment.

Consequently, the surface soil in Upper Gulch, Lower Gulch, and north of Rezanof Highway areas; the subsurface soil in Upper Gulch and Lower Gulch areas; and the sediment in Upper Gulch, Lower Gulch, north of Rezanof Highway, and Storm Drain areas pose an unacceptable risk to human health, safety, welfare, and the environment from exposure to PCBs and warrant remedial action. As a result, remedial alternatives for these areas were developed in the feasibility study portion of the RI/FS (USAED 2002) and are discussed in Section 5.0 of this document.

4.5 HYDROGEOLOGIC STUDY

The hydrogeological properties of Drury Gulch were noted during the 2000 RI/FS drilling program. The soil borings advanced in the four areas of the site encountered surface topsoil to a depth of 1 to 2 inches overlaying sandy gravels, gravelly sands, silty gravels, silty sands, and silt lenses in subsurface materials. Across the site area, a volcanic ash layer composed of medium to fine pale yellow sand was encountered at depths ranging from surface outcrops to 9.5 feet bgs. The ash layer ranged from 6 inches to 2 feet in thickness and was underlain by a layer of tight dark reddish-brown sandy silt up to 2-feet-thick. Beneath the silt layer were silty gravel, sandy gravel, and broken rock. This layer was interpreted to be a layer of decomposing bedrock, or "rind," overlaying more competent bedrock. Bedrock was noted at varying depths within Drury Gulch. Highway cuts along the roads on Kodiak Island showed the bedrock to be heterogeneous with areas of very competent bedrock and areas that were highly fractured. In addition, the elevation of the bedrock sequence along these cuts appeared to undulate with the overlying local surface topography.

The 2000 RI/FS field program included the installation of five monitoring wells at the site. The distribution of these wells was such that two were installed in the Lower Gulch (LGMW-01 and LGMW-02), one was installed in the North Rezanof area (NRMW-03), and two were installed in the Storm Drain area (SDMW-04 and SDMW-05). The field program also

included the installation of four temporary piezometers in the Lower Gulch and four in the North Rezanof area. The temporary piezometers were co-located with soil borings.

The only occurrences of groundwater observed during the field program were at monitoring wells LGMW-02 and NRMW-03. These wells are located near the storm drain adjacent to the highway at the Lower Gulch (LGMW-02), and at the area north of Rezanof Highway (NRMW-03). Groundwater was not observed in Lower Gulch monitoring well LGMW-01 or in the two groundwater monitoring wells in the Storm Drain area, SDMW-04 and SDMW-05, despite their completion at refusal on bedrock.

Hydraulic characteristics of the subsurface soil composing the unconfined aquifer at Drury Gulch were estimated by slug testing at the two locations consistently supporting groundwater. Wells NRMW-03 and LGMW-02 were both tested in October 2000, during a period with high groundwater levels resulting from the high seasonal rainfall typical for Kodiak in September and October. Results of this testing are provided in Appendix G of the 2000 RI/FS (USAED 2002).

Drury Gulch monitoring wells were gauged in August 2000, mid-October and again in late-October 2000 and in January 2002 to evaluate the presence of groundwater and to collect samples. The gauging events have shown that only two wells (LGMW-02 and NRMW-03) contain groundwater. A well placed in the Upper Gulch to a depth of 8 feet bgs and the piezometers installed to the depth where bedrock was encountered did not show groundwater during any gauging event. The piezometers located approximately 100 feet north of the North Rezanof Highway well (NRMW-03) also were gauged during the same timeframe and did not show groundwater. Based on these observations and the direction of surface drainage toward the Gulch from the Rezanof Highway drainage ditches, it is apparent the fill material underlaying the highway and a poorly defined lens of fill adjacent to the highway provide an ephemeral aquifer with a high conductivity but limited storage capacity. This theory is supported by the vast fluctuations in the groundwater levels measured in the wells during the summer season with very low rainfall compared to the October season with relatively high rainfall and the high hydraulic conductivities estimated with slug testing.

Groundwater was not generally encountered in the test pit excavations. However, a small amount of groundwater was observed seeping into the TP-03 test pit excavation immediately below the debris zone at a depth of approximately 12 feet bgs. The test pit excavations support the previous findings of the RI that the extent of shallow groundwater at Drury Gulch is limited in spatial extent to areas where the fill is thickest.

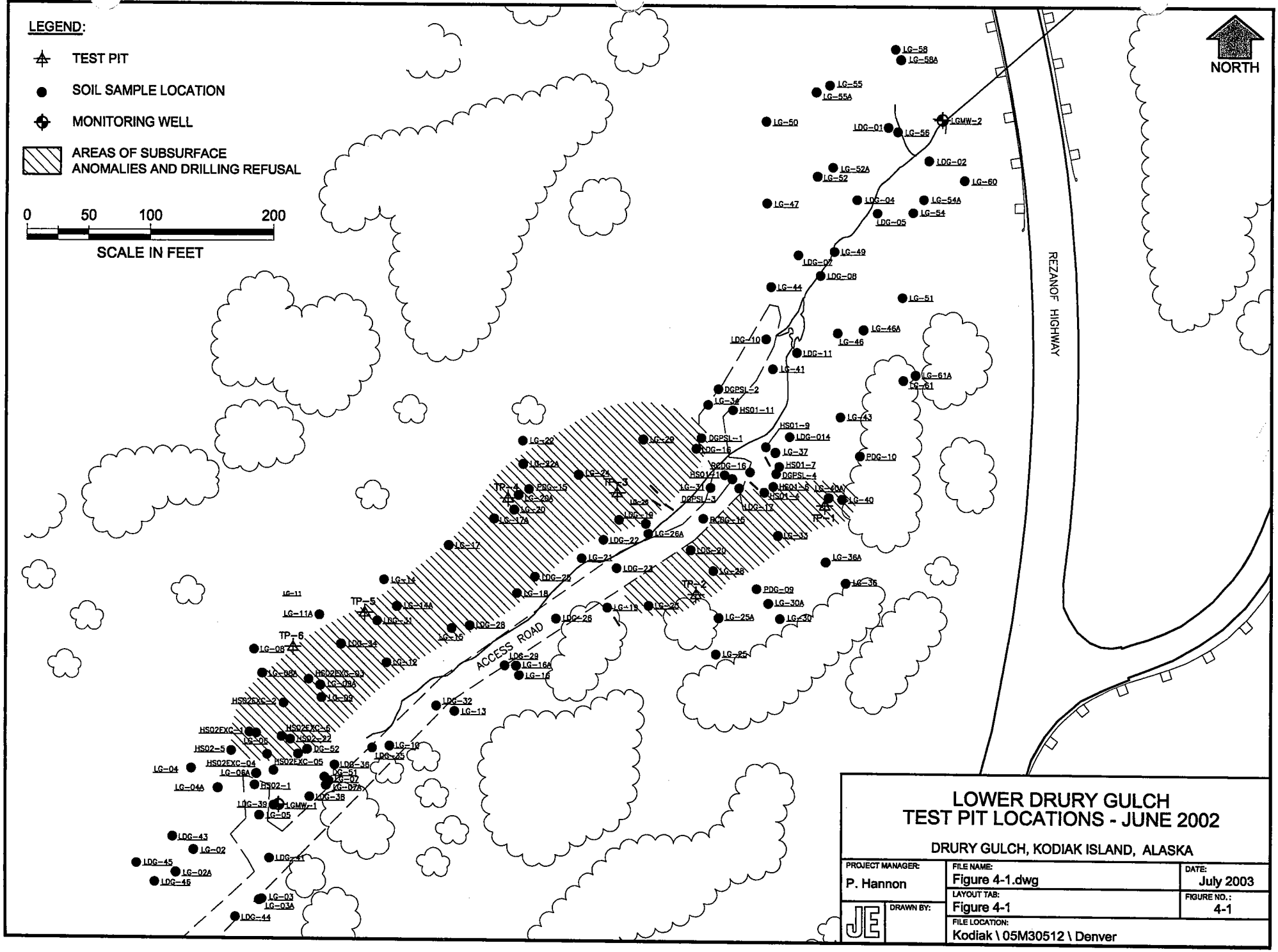
4.6 TEST PIT INVESTIGATION

The purpose of the 2002 Test Pit Investigation was to investigate two areas of Lower Drury Gulch where a high number of subsurface anomalies were encountered during the 2000 RI/FS drilling program. Before remedial and risk management decisions could be made, the project team requested additional site characterization be performed in these areas. The previous RI/FS work at the site included drilling of borings, with five of the borings converted into monitor well installations. In these locations a higher rate of refusal was met by the drilling and sampling equipment. Areas of subsurface anomalies and drilling equipment refusal discovered during the 2000 fieldwork are shown on Figure 4-1.

The test pitting activity was designed to investigate the type(s) of debris causing the refusal and concentrations of PCBs beneath the debris layer. Details of the test pitting effort can be found in *Technical Memorandum, Drury Gulch Test Pit Investigation*, which is provided in Appendix I of the 2000 RI/FS (USAED 2002).

The scope of the test pit investigation work included:

- A total of six test pits were excavated in the Lower Gulch, two on the northeast and four on the northwest.
- All debris excavated from each test pit was documented in field books and photographed by the project team.
- Discrete and composite soil samples were collected from each test pit.
- All soil excavated during the field work was placed back into respective test pits and compacted with the backhoe bucket.


LEGEND:
TEST PIT
SOIL SAMPLE LOCATION
MONITORING WELL
AREAS OF SUBSURFACE ANOMALIES AND DRILLING REFUSAL
0 50 100 200
SCALE IN FEET
NORTH
REZANOF HIGHWAY
ACCESS ROAD
TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
LGMW-1
LGMW-2
LOWER DRURY GULCH
TEST PIT LOCATIONS - JUNE 2002
DRURY GULCH, KODIAK ISLAND, ALASKA
PROJECT MANAGER: P. Hannon
FILE NAME: Figure 4-1.dwg
DATE: July 2003
DRAWN BY: JE
LAYOUT TAB: Figure 4-1
FIGURE NO.: 4-1
FILE LOCATION: Kodiak \ 05M30512 \ Denver

- All equipment was decontaminated and all investigation-derived waste properly contained.
- Test pit locations were surveyed by a state-registered land surveyor.

The six test pit locations shown on Figure 4-1 were agreed upon by the project team based on areas of split-spoon and auger refusal, as documented on the 2000 RI/FS boring logs and by soil sample analytical results. Exact test pit locations were selected and marked by the project team.

Excavation of the test pits was accomplished using a track-mounted excavator. Test pits were advanced by excavating surface soil or cover material to reach the debris layer, then through the debris down to undisturbed soil, material, or bedrock. Each location was excavated cautiously, allowing sufficient time for the project team to observe depth of cover over debris, debris thickness and components, record observations by photography, observe characteristics of test pit total depth and sample collection. All information was logged in field books. Excavated soil and debris were stockpiled beside respective test pits for further observation and sampling. When each test pit was completed, all soil and debris were placed back into the excavation and the surface compacted using the backhoe bucket.

All test pits were excavated in originally selected locations. No potential PCB-containing material or debris was encountered. Each completed and backfilled test pit was marked with labeled lath for a subsequent land survey.

Fifteen soil samples were collected over the two-day field effort. Samples included nine discrete and six composite soil samples. Single discrete soil samples were collected from beneath the debris in each of the individual test pits by a field technician.

Composite soil samples, collected for characterization purposes, were collected from four locations within the soil and debris stockpiles.

4.6.1 Observations

In general, the area of disturbed ground in Drury Gulch is visible, marked by obvious cut lines in the slope and on the east side of the gulch by large Sitka spruce that obviously pre-date any activity in the gulch. The topography of the areas where the test pits were excavated is very uneven, characterized by hummocky relief of 2 to 15 feet. This is more pronounced on the west side of the Lower Gulch than on the east side and is visible in aerial photographs from as early as 1976. The area is vegetated with grasses and alders. Throughout the Lower Gulch, debris is visible on the ground surface. Debris types range from small pieces of metal to auto bumpers, piping, and industrial equipment parts.

A significant amount of debris was encountered in all of the test pit excavations. The debris generally occurred in a discrete zone about 2 to 10 feet thick. The debris consisted of a wide variety of mostly metallic objects including corrugated sheet metal, a few crushed drums, chain, cable and wire, piping, and automobile parts. One empty heating oil tank cut in half was observed. No electrical transformers, capacitors, or other electrical equipment were observed during the test pit investigation. Little wood or concrete was observed in any test pit. In only one test pit (TP-06) were industrial wastes such as paint cans, something resembling asphalt sealant, and an unidentified white chalky substance found. No household municipal waste was identified. Petroleum and petroleum-contaminated soils were not observed; all tanks and crushed drums were empty.

There appeared to be some spatial organization or sorting of the debris. Test pit excavations in the east-northeast part of the Lower Gulch (TP-01 and TP-02) appeared to have more automobile parts and municipal metallic debris such as appliances than elsewhere. Test pit excavations on the west-southwest side of the Lower Gulch included more industrial and military-related debris. For example, crushed drums and corrugated metal debris were more common in test pits TP-05 and TP-06. An anchor chain, a Quartermaster Corps drum, and sheet metal with a U.S Navy marking also were found in these test pits. A small amount of copper wire was found in TP-03 but less debris was encountered in this test pit than the others. In TP-04 a hot water tank, pieces of pipe and sheet metal, a drum, bedsprings, and a

large amount of cable were encountered. Debris closer to the edges of the gulch appeared to be older than debris toward the center of the gulch.

The debris zone was generally overlain by a brown, silty soil (fill material) ranging from 1 to 10 feet thick. This surface fill was not encountered at test pit TP-05; in this pit, the debris zone was found at the ground surface. Small pieces of metallic debris were observed within the fill overlaying the debris at most locations. At test pit TP-03, the fill overlaying the debris zone (10 feet) was significantly thicker than elsewhere, and the debris zone was also thinner (2 feet). No crushed rock (shot-rock) was seen in the fill materials above or below the debris.

Ash or bedrock was found less than approximately 2 feet below the debris at five of the six excavations. These data indicate that only a small thickness (1 to 2 feet) of native soil underlays the debris zone at most locations. Fractured bedrock was encountered only at test pit TP-02 at a depth of 6 feet bgs.

Ash was mixed in with other soils above some of the debris at test pits TP-02 and TP-03. This observation indicates that reworking of ash has occurred at some locations and that the ash should be used with caution only as a marker horizon for the base of the disturbed areas . At the test pit excavation where an intact ash layer or bedrock was not observed (TP-03), ash was present at 12 to 14 feet bgs, but it is likely that the ash layer is reworked at this location. Soils were found below the ash from 14 feet bgs to the base of the TP-03 excavation at approximately 18 feet bgs, and minor amounts of metallic debris were present below the ash. No intact ash layer was identified in test pit TP-03.

Groundwater was not generally encountered in the test pit excavations. A small amount of groundwater was observed to be seeping into test pit excavation TP-03 immediately below the debris zone at a depth of 12 feet bgs. The test pit excavations support the previous findings of the RI that the extent of shallow groundwater at Drury Gulch is limited in spatial extent to areas where the fill is thickest.

4.6.2 Analytical Results

A total of 15 soil samples collected during the test pit effort were submitted for laboratory analysis. These included nine discrete and four composite samples; all samples were analyzed for PCBs by Method SW8082B.

Of the nine discrete samples, six were collected from beneath the debris at the total depth of each excavation as described in the 1999 Work Plan. The other three were collected within the debris zones of test pits TP-04, TP-05, and TP-06 for additional characterization of these zones, as concurred upon by the project team. The at-depth sample PCB concentrations ranged from 0.073 mg/kg in test pit TP-02 to 9.5 mg/kg in test pit TP-03. The other three discrete samples collected from within the debris zones ranged in concentration from 0.028 mg/kg in test pit TP-04 to 4.3 mg/kg in test pit TP-06.

Of the six 4-point composite soil samples collected, sampling points chosen from test pits TP-01 and TP-02 were selected randomly from the stockpiled soil and debris. Composite point soil collected from test pits TP-03 through TP-06 was picked specifically from within the debris layer. Composite sample PCB concentrations ranged from 1 mg/kg in test pit TP-06 to 32 mg/kg in test pit TP-01.

4.6.3 Debris and Contaminant Distribution

The test pit investigation changed the project team's view of the debris extent and distribution within the gulch and the extent and possible distribution of the PCB contamination. Prior to the test pit investigation, the site was characterized as an area of PCB-contaminated soils with debris present in some locations. The debris had not been characterized, nor had soils within and beneath the debris been characterized. An issue was also raised during the RI/FS as to whether debris needed to be excavated or cut off during excavation of contaminated soils. Post-test pitting, the site is now characterized as a metal debris dump that pre-dates state solid waste regulations and is therefore unpermitted. It contains soils that are contaminated with PCBs. No electrical components were noted during the 2002 Test Pit Investigation, however

there is not enough information to conclude that there is not any electrical equipment in the debris.

The area of the landfill consists of the entire disturbed area of Drury Gulch based on the following:

- Aerial photographs show that the area of metal debris storage and graded areas extend throughout the Gulch (USAED 1999c). The last period of major re-grading appears to have occurred near the time of construction of Rezanof Highway (refer to 1976 aerial photograph).
- Aerial photographs show that there are multiple periods of re-grading and changes in the debris storage locations (USAED 1999c).
- The 1976 aerial photograph appears to show the maximum extent of the disturbed area.

The analytical data collected during the RI show that the highest levels of PCB contamination generally occur in the top few feet of soil. This corresponds to the fill that overlays the debris zones. Field observations and data collected during the test pit investigation indicate that the debris areas have been covered by PCB-contaminated fill. The source of these materials (onsite or offsite) is unknown. PCB contamination could have been present in soils at the site and spread through re-grading and backfilling activities, or could be the result of soils brought in from elsewhere to use as fill, or some combination of the two. PCB detections occur throughout the disturbed area, in a random pattern. Because of the inherent uncertainties in the statistical soil sampling methods used in the RI grid sampling, it can be assumed that PCBs could be detected anywhere within the disturbed area.

Contamination within and beneath the debris zone had not been adequately characterized before the test pit investigation. In general, this investigation has demonstrated that PCB concentrations within and below the metal debris zone are commonly less than or similar to PCB concentrations in the overlying fill material and are below 10 mg/kg. Only one sample exceeded the 10-mg/kg ADEC clean-up level for subsurface soils. This sample came from a composite sample collected from test pit excavation TP-01, which is within a proposed RI hot-spot excavation area. PCB concentrations in the composite sample are consistent with

PCB soil concentrations detected in this area during the RI. The newly collected chemical data, coupled with the lack of electrical equipment at the site, suggest that there are probably not significant areas with PCB concentrations over regulatory levels within or below the debris that have not been previously characterized during the RI/FS. This suggests that there are probably not additional significant hot spot areas within or beneath the debris above TSCA regulatory criteria or ADEC clean-up standards that must be targeted for removal.

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5.0 REMEDIAL ACTION

5.1 REMEDIAL ACTION OBJECTIVES

The initial step in developing and screening remedial action alternatives pursuant to the CERCLA and the NCP is to establish remedial action objectives (RAO). RAOs consist of medium-specific goals for protecting human health and the environment. Protection of terrestrial ecological receptors is a primary goal in developing RAOs. The RAOs specify the contaminants of concern (COC), exposure scenarios, and the corresponding acceptable chemical concentration or range of concentrations for each exposure route. The RAOs recognize that protection may be achieved by reducing exposure, as well as by reducing chemical concentrations. RAOs for protecting human receptors from contaminated media should be expressed as a contaminant level and an exposure route. The acceptable chemical concentrations presented here are levels that trigger consideration of remedial action.

Though a formal risk assessment was not completed, a risk analysis was completed for Drury Gulch, and potential human health and ecological risks were identified and reviewed. The risk analysis concluded that risk-based clean-up levels were exceeded in soil and that ecological screening benchmarks were exceeded in soil and sediment. Therefore, unacceptable human health and ecological risks exist in the surface soil, subsurface soil, and sediment at all four Drury Gulch subareas: Upper Gulch, Lower Gulch, area north of Rezanof Highway, and Storm Drain. The medium-specific RAOs for Drury Gulch are presented in the following sections. Only the media that warrant remedial action based on the results of the risk analysis are discussed below.

5.1.1 Surface Soil

The surface soil clean-up standard for PCB-contaminated soil is based on land use and the results of the ecological screening. The land use at Drury Gulch has been established as recreational. Residential clean-up levels are applicable for sites that are designated for recreational land use. The RAOs include:

- the prevention of ingestion and inhalation of surface soil containing PCB compounds in excess of 1 mg/kg, which is the chemical-specific ARAR (18 AAC 75.341), and
- the elimination of downstream transport of PCB-contaminated soil.

5.1.2 Subsurface Soil

Subsurface soil is defined as 2 feet bgs and greater. Similar to surface soil, the subsurface soil clean-up standard for PCB-contaminated soil is based on land use, and the land use is and will be recreational at Drury Gulch. However, for recreational use, the clean-up level defaults to the residential standard.

The RAOs include the prevention of ingestion and inhalation of subsurface soil containing PCB compounds in excess of 10 mg/kg, as long as the site is capped with an approved material and an appropriate deed notice or equivalent institutional control is established, which is the chemical-specific ARAR (18 AAC 75.341).

5.1.3 Freshwater Sediment

The risk analysis identified an unacceptable risk to ecological receptors due to exposure to sediment. The RAOs to protect the ecological environment include:

- the prevention of dermal contact and ingestion of sediments containing PCBs in excess of 0.031 mg/kg, which is the To Be Considered ecological benchmark screening level
- the elimination of downstream transport of PCB-contaminated sediment

5.1.4 Remedial Action Objectives Summary

A summary of the RAOs for the four Drury Gulch areas is presented in Table 5-1.

Table 5-1
Remedial Action Objectives Summary

Area	Medium	Chemical of Concern	Exposure Scenario	Acceptable Concentration
Upper Gulch	Surface Soil Subsurface Soil Freshwater Sediment	PCBs PCBs PCBs	Ingestion & inhalation. Ingestion & inhalation. Dermal contact & ingestion.	1.0 mg/kg 10.0 mg/kg* 0.031 mg/kg**
Lower Gulch	Surface Soil Subsurface Soil Freshwater Sediment	PCBs PCBs PCBs	Ingestion & inhalation. Ingestion & inhalation. Dermal contact & ingestion.	1.0 mg/kg 10.0 mg/kg* 0.031 mg/kg**
Area north of Rezanof Highway	Surface Soil Subsurface Soil Freshwater Sediment	PCBs PCBs PCBs	Ingestion & inhalation. Ingestion & inhalation. Dermal contact & ingestion.	1.0 mg/kg 10.0 mg/kg* 0.031 mg/kg**
Storm Drain	Surface Soil Subsurface Soil Freshwater Sediment	PCBs PCBs PCBs	Ingestion & inhalation. Ingestion & inhalation. Dermal contact & ingestion.	1.0 mg/kg 10.0 mg/kg* 0.031 mg/kg**

Notes:

mg/kg = milligrams per kilogram
N/A = not applicable
* = Soil containing between 1 and 10 mg/kg PCBs requires a suitable cap and institutional controls (deed notice or equivalent)
** = Sediment RAOs are based on freshwater sediment quality guidelines (EPA 1996) and are a To Be Considered (TBC) criteria. This value is protective of sediment dwelling amphipods and other aquatic organisms.

Soil RAOs are based on 18 AAC 75.341 Table B-1
For other definitions, see Acronym and Abbreviations section.

5.2 REMEDIAL ACTION ALTERNATIVES

Four remedial action alternatives were analyzed in the Drury Gulch Feasibility Study (USAED 2002). In subsequent negotiations, three variations of alternative 2 (2A, 2B, and 2C) were developed. These additional alternatives were described in various memoranda and in Appendix J of the RI/FS. The following sections present the remedial action alternatives and a description of each alternative analyzed.

5.2.1 Alternative 1 – No Action

- The NCP requires that a no action alternative be considered for all media. The no action alternative 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.

5.2.2 Alternative 2 – Cover Areas with PCB Concentrations Greater than 1.0 mg/kg; Limited Excavation; Disposal; Sedimentation Basin; and Institutional Controls

- Excavation of soil and sediment in areas with PCB concentrations of 10 mg/kg or greater. Excavated soil would be transported to and disposed of in a TSCA-permitted landfill. The excavation would be backfilled with clean material and topcover placed over the backfill material. The topcover would be revegetated.
- Removal and cutting of debris encountered during excavation. The debris would be shipped for disposal along with the PCB contaminated soil.
- Areas that have been shown to contain PCB concentrations in surface soil of 1.0 mg/kg or greater would be covered with clean soil to ensure that a minimum of 2 feet of material overlays these areas. The covered area would be approximately 3.8 acres. Alternative 2 would address the uncertainties and limitations of grid-based sampling strategies through verification. Verification sampling would be performed consistent with ARARs to ensure that the cover is placed adequately. The cover would be designed to maintain the hydraulic characteristics of the gulch, minimize erosion or abrasion, accommodate settling

and subsidence, and function with minimum maintenance. Topcover would be placed over the backfill material and would be revegetated.

- Sediment in the Drury Gulch channel with PCB concentrations greater than 0.031 mg/kg and less than 10 mg/kg would be covered with a permeable geotextile fabric and then lined with riprap. The segment of the channel beginning in Upper Gulch and extending to the point where the channel goes beneath the Rezanof Highway would be lined with the fabric and riprap. A new drainage channel would be installed adjacent to the existing channel beginning just north of the Rezanof Highway and ending where the channel goes beneath the airport runway. Soil spoils from the new channel would be used to backfill the existing channel.

- A sedimentation basin would be installed in the drainage channel located at the mid-point between the Rezanof Highway and the airport. The sedimentation basin would be designed to accommodate a 100-year storm. The basin would include an earthen dike covered with reinforced concrete. The basin would be lined with concrete to facilitate removal of sediments, if necessary. The current blockage at the culvert entrance that runs beneath the airport would be removed.

- A monitoring program would be used to assess sediment migration in the drainage channel. Sediment samples would be collected from the sedimentation basin and submitted to an analytical laboratory for analysis for PCBs. The cover inspection team, during performance of the long-term monitoring program, would collect the samples. Any damage to the sedimentation basin would be documented and subsequently repaired. The results of the sediment sampling would be used to determine the final disposition of sediment that may accumulate in the sedimentation basin. For the cost estimate it was assumed that sediments in the basin would require removal and disposal five years into the long-term monitoring program.

- An Institutional Control Plan (ICP) would be developed by the USCG to establish appropriate institutional controls for the site after the completion of the RA activities.

5.2.2.1 Alternative 2C – Complete Cover; Limited Excavation; Disposal; and Institutional Controls

- Alternative 2C was added after results of the test pit investigation in 2002 changed the understanding of the extent of debris in the gulch. In addition, the uncertainties and limitations of grid-based sampling strategies will be addressed through extending the cover over the area of disturbed fill to the extent technically practicable. This alternative is designed to cover the entire disturbed/reworked area of the gulch as determined from aerial photographs and field surveys. The cover area is estimated to be approximately 3.9 acres. Steep slopes may limit the placement of cover in some areas. As in Alternative 2, soils above 10 mg/kg will be excavated and removed. Debris encountered during excavation will be placed back in the excavation and will be under the final cover. The final cover will be graded so that the hydraulic capacity of the gulch is maintained. Because the final cover will cover all disturbed areas of the gulch, no confirmation grid sampling is required to determine if any uncovered surface soils have PCBs greater than 1 mg/kg. Alternative 2C would also eliminate the need for off-site debris disposal. No sedimentation basin would be needed, since the potential for any remaining surface soil contamination is very low. Sediment impacts would be addressed by lining the channel with geotextile fabric and riprap, and installing a new channel, as described in Alternative 2 above. A long-term monitoring and maintenance program for the cover would be put in place and institutional controls would be established as described in Alternative 2 above.

5.2.3 Alternative 3 – Excavation and Disposal

- Excavation of soil in areas with PCB concentrations of 1 mg/kg or greater. Excavated soil would be transported to and disposed of in a TSCA-permitted landfill.
- Sediment in the Drury Gulch channel with PCB concentrations of 0.031 mg/kg or greater would also be excavated, transported to, and disposed of in a TSCA-permitted landfill.
- The excavations would be backfilled with clean material and topcover placed over the backfill. The topcover would be revegetated.

5.2.4 Alternative 4 – Excavation and On-Site Treatment

- Excavation of soil in areas with PCB concentrations of 1 mg/kg or greater. Excavated soil would be treated to concentrations as low as possible (less than 1 mg/kg) onsite with a mobile incineration unit. Treated soil would be used to backfill the excavated areas. Topcover would be placed over the backfill material and revegetated.
- Excavation of sediment in the Drury Gulch channel with PCB concentrations of 0.031 mg/kg or greater. Excavated sediment would be treated to concentrations as low as possible (less than 1 mg/kg) onsite with a mobile incineration unit. Treated sediment would be used to backfill the excavated soil areas. Clean backfill material would be used as required to replace the excavated sediment in the Drury Gulch channel. Topcover would be placed over the backfill material and revegetated.

5.2.5 Soil Washing

Soil washing also was considered as an alternative. Soil washing is a mechanical process that uses liquids, usually water, to remove chemical pollutants from soils. The washing solution may be simply water or water with additives, such as detergent or acid, which help to remove the contaminants from the soil. These chemicals usually adhere to the surfaces of the silt or clay particles rather than to the coarser sand or gravel particles. The soil washing process then is used to separate the fine silt and clay particles from the coarser sand and gravel particles and then to facilitate the transfer of these chemical contaminants from the soil surface to the water, which can then be further treated.

After consideration and input from interested parties, soil washing was eliminated as a potential alternative.

5.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

The relative performance of each alternative was evaluated in accordance with the evaluation criteria specified in the NCP as defined in 40 CFR Part 300.430(f). The NCP remedy selection evaluation criteria include:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume through Treatment
- Short-Term Effectiveness
- Implementability
- Cost

Alternatives 2, 3, and 4 were similarly rated under the NCP criteria with the following exceptions:

- Only Alternative 4 satisfied the balancing criteria of reduction of toxicity, mobility, and volume through treatment.
- Alternatives 3 and 4 are characterized by superior long-term effectiveness and permanence to Alternative 2 and do not require institutional controls and long-term monitoring for this reason. Alternative 2 adequately fulfilled the long-term effectiveness and permanence balancing criteria through implementation of institutional controls and long-term monitoring.

The project team in the draft RI/FS report originally selected Alternative 2 because it adequately met the threshold NCP criteria of overall protectiveness and compliance with ARARs and was significantly less costly than Alternatives 3 and 4.

A supplemental test pit investigation (refer to Appendix I of the final RI/FS report) performed after completion of the draft RI/FS report showed that there was significantly more metal debris present in the Lower Gulch than was previously documented. A variation of Alternative 2 (Alternative 2C) was developed and evaluated to address concerns identified during the test pit investigation and review of the draft RI/FS report.

Alternative 2 includes a cover for areas with surface soils with PCBs that exceed 1 mg/kg. Under Alternative 2, portions of the disturbed fill with detected PCBs at concentrations less than 1 mg/kg would remain uncovered. The project team identified the following concerns:

- Inherent uncertainties were noted regarding grid-based soil sampling techniques. It is possible that some of the areas shown to be below the 1-mg/kg clean-up standard in the RI/FS report actually contain smaller PCB hot spots with concentrations greater than 1 mg/kg. This is particularly true given the heterogeneous nature of metal debris and fill materials in Drury Gulch. This problem creates uncertainty regarding the final configuration of the cover.
- Terrestrial ecological receptors and human receptors could potentially be exposed to concentrations of PCBs above risk-based screening concentrations along the edges of the cover, given the uncertainties in the PCB distribution described in the previous bullet and the range of risk-based screening values calculated for terrestrial receptors (refer to Appendix D of the final RI/FS report).
- Uncovered PCB-contaminated soils could be washed into the creek and be transported downstream of the site through the storm water drainage system. The marine sediment quality screening guidelines (0.022 mg/kg) and (0.18 mg/kg) are one to two orders of magnitude lower than the surface soil clean-up level standard of 1 mg/kg. The selected remedy must ensure that PCB-contaminated soils and sediments do not migrate downstream of the site through the storm water drainage system.

The final version of Alternative 2 (refer to Appendix J of the Final RI/FS report) addresses these concerns through the inclusion of: 1) detailed verification soil sampling in disturbed areas that will not be included under the cover, and 2) long-term chemical monitoring of sediments in a catch basin at the downstream end of Drury Gulch.

Alternative 2C was developed to determine if these outstanding concerns could be better addressed by expanding the cover to include all of the disturbed fill areas of Drury Gulch. Steep slopes may limit placement of the cover in a few areas.

Advantages of Alternative 2C include the following:

- Potential risks for ecologic receptors would be reduced because all disturbed fill areas with PCB contamination would be covered.
- The potential for migration of PCBs downstream of the site by soil erosion and sediment transport would be reduced because all of the disturbed fill areas would be covered.
- The requirements for soil verification sampling and long-term chemical monitoring could be substantially reduced for Alternative 2C.

Based on supplemental cost analysis provided in Appendix J of the Final RI/FS report, Alternative 2C was found to be less expensive than Alternative 2, as well as providing these potential advantages. The project team therefore selected Alternative 2C.

5.4 REVISED COST ESTIMATES FOR ALTERNATIVES 2 AND 2C

Following the completion of the test pit activities, Alternative 2C was added as a potential remediation strategy. Cost calculations were completed, and details may be found in Appendix J of the Final RI/FS. Cost calculations for Alternative 2 were refined as a result of the test pit activity, as well. These changes may also be found in Appendix J of the Final RI/FS.

6.0 DESCRIPTION OF SELECTED REMEDIAL ACTION

6.1 GENERAL

Alternative 2C – Complete Cover, Limited Excavation, Disposal, and Institutional Controls is the remedial action selected for the Drury Gulch site. This alternative meets the threshold criteria of overall protection of human health and environment and compliance with ARARs. Alternative 2C is the most cost-effective alternative with an estimated capital cost of $4,053,512. The estimated start date for this remedial action is July 2003 with completion scheduled in 2004.

6.2 ALTERNATIVE 2C

The RAOs for surface soil, subsurface soil and sediments include: (1) the prevention of ingestion and inhalation of surface soil containing PCB compounds in excess of 1 mg/kg, and the prevention of ingestion and inhalation of subsurface soil containing PCB compounds in excess of 10 mg/kg, both of which are chemical-specific ARARs (18 AAC 75.341); (2) the prevention of dermal contact and ingestion of sediments containing PCBs in excess of 0.031 mg/kg, which is a To Be Considered ecological benchmark screening level; and (3) the elimination of downstream transport of PCB-contaminated soil.

Alternative 2C will have short-term effectiveness and pose minimal risk to community, site workers, and the environment. Barriers such as straw bales and silt fences will be used where necessary to prevent surface run-off to Drury Gulch during excavation. Additionally, all channel lining activities will be performed using methods that minimize sediment migration. Heavy equipment will be used for all excavation and soil-handling activities, thereby minimizing worker contact with contaminated soil and maximizing worker protection during construction. No workers will be allowed into the excavations during construction. The length of time required for Alternative 2C to achieve the clean-up criteria for surface soil, subsurface soil and sediment is estimated to be four to five months after equipment is mobilized to the site.

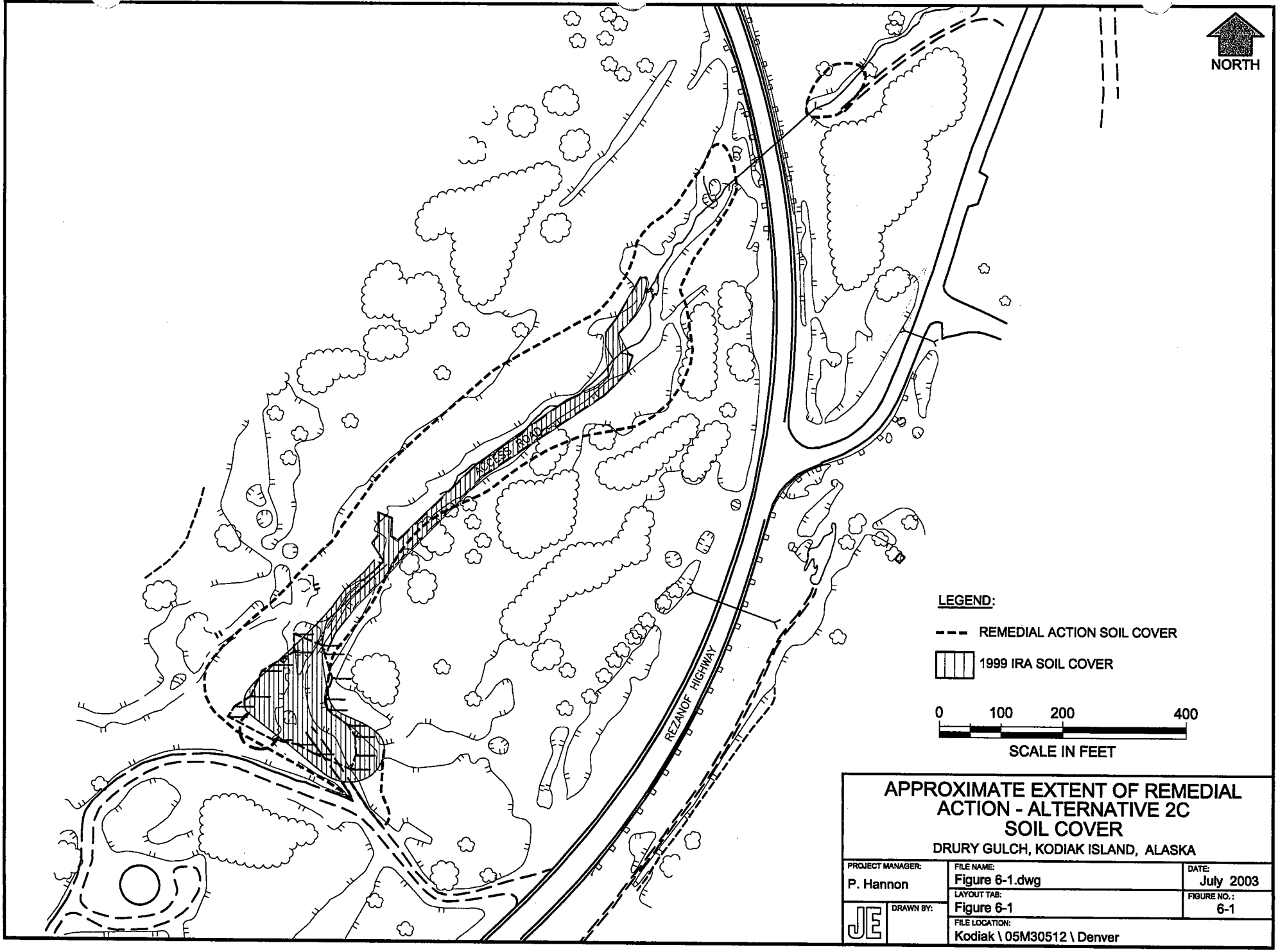
Soil and sediment in the Drury Gulch areas with PCB concentrations of 10 mg/kg and greater will be excavated using conventional equipment and techniques. The initial horizontal and vertical extent of the excavations will be based on laboratory analytical data included in the 2000 RI/FS (USAED 2002). The PCB-contaminated soil and sediment will be excavated and placed in containers for storage and transport. All debris encountered during excavation willould be buried under the soil cover.

Once the initial extent of the PCB-contaminated soil volume has been excavated, confirmation sampling will be performed. The excavation will remain open until laboratory analyses indicate the soil meets the clean-up criterion. Additional excavation and confirmation sampling will be performed as necessary. Once the confirmation samples indicate the levels of PCBs are less than 10 mg/kg, the excavation will be backfilled with clean material. Sample(s) from the backfill borrow source will be collected and submitted to an analytical laboratory and tested to ensure the material is clean. The backfill material will be placed into and on top of the excavations as required for the two-foot cover and to maintain the proper grade. This alternative will also use treated soil from other FUDS located on Kodiak Island for cover material. Two to three inches of topcover will then be placed over the backfill. The topcover material will also be tested to ensure it is clean. The topcover will be revegetated.

The entire disturbed and reworked surface of the Drury Gulch area will be covered with soil to ensure that a minimum of two feet of clean material overlays the area. The actual cover area will be determined from aerial photographs and field surveys. The proposed area to be covered is shown in Figure 6-1.

The cover will be constructed using clean backfill material. The backfill material will be tested to ensure PCBs are not present in the soils above quantitation limits. The backfill material will be transported from an offsite borrow source to Drury Gulch. Topcover will be placed over the backfill material once the grade has been established. Again, the topcover material will be tested to ensure the material is clean. The minimum thickness of the topcover material will be 3 inches. The cover areas will also be revegetated to minimize erosion.

G:\Autocad\KODIAK\0[illegible]2\Denver\FIG 6-1.dwg Jul 17,2003 -avakarcs



APPROXIMATE EXTENT OF REMEDIAL ACTION - ALTERNATIVE 2C SOIL COVER

DRURY GULCH, KODIAK ISLAND, ALASKA

PROJECT MANAGER: P. Hannon	FILE NAME: Figure 6-1.dwg	DATE: July 2003
DRAWN BY: JE	LAYOUT TAB: Figure 6-1	FIGURE NO.: 6-1
	FILE LOCATION: Kodiak \ 05M30512 \ Denver	

Land surveys will be performed in the area(s) where a cover will be installed. Surveys will be performed as required, prior to placing any backfill material, after placing backfill material, and after placement of topcover. The results of the land surveys will be used to ensure positive drainage is achieved and the minimum thickness of the cover materials is placed over the area(s). An as-built drawing will be completed based on final survey measurements.

Sediment in the Upper and Lower Drury Gulch channel with PCB concentrations greater than 0.031 mg/kg and less than 10 mg/kg will be covered with a semi-permeable geotextile fabric and then lined with riprap. This is the segment of the channel beginning in Upper Gulch and extending to the point where the channel goes beneath the Rezanof Highway. A new drainage channel will be installed adjacent to the existing channel beginning just north of the Rezanof Highway and ending at the airport. Clean soil spoils from the new channel will be used to backfill the existing channel. By covering the old channel with two feet of clean soil, contaminated sediments will be inaccessible for transport via surface water. The current blockage at the culvert entrance that runs beneath the airport will be removed.

A monitoring and maintenance plan (MMP) will be developed and included in the Remedial Action Work Plan. The purpose of the MMP will be to ensure that the integrity of the cover, geotextile fabric, and riprap is maintained. The MMP will include periodic inspections of the general conditions of the cover and drainage, and documentation of the conditions with photographs. The MMP will include quarterly inspections for the first year and semi-annual inspections thereafter. The total duration of the monitoring and maintenance will be specified in the site closure document.

In addition, USAED and USCG will enter into a Memorandum of Agreement for the monitoring and maintenance with the following provisions:

- Parties agree that the FUDS program will be responsible for monitoring and maintenance of the Drury Gulch RA cover for five years following the signing of a notification of completion of construction memorandum.

- Prior to the end of the five-year period that begins with the signing of this Decision Document, USAED will conduct a review to evaluate the effectiveness of the selected remedy for Drury Gulch.
- Monitoring and maintenance under the FUDS program will be conducted in accordance with the MMP of the 2003 Drury Gulch Remedial Action Work Plan. A letter report will be produced annually that describes the results and findings of the inspection and maintenance activities at Drury Gulch. The report will be distributed to USCG, ADEC and EPA.
- Monitoring and maintenance beyond the five-year FUDS execution period will be the responsibility of the landowner.
- The FUDS program will return to the site if the remedy selected in this decision document and implemented in the field, fails to protect human health and the environment, or if a previously unknown issue at the site becomes FUDS eligible.
- Natural disasters that exceed the design criteria, such as fire, earthquake, or flooding that occur after the five-year FUDS monitoring and maintenance period are specifically excluded. Any repairs to the cover required as a result of these events are the responsibility of the landowner. Disputes between parties over responsibility will be mediated by an independent third party.
- USAED will provide the landowner with a letter notifying the end of their involvement in the monitoring and maintenance program. The notification will be made six months prior to completion of the program.
- USAED will host a final site inspection prior to turning over Drury Gulch to USCG. The final site inspection will correspond with the last scheduled monitoring and maintenance event. USAED will be responsible to provide notification of any final FUDS action required after the final inspection.
- Implementation of any part or all of this agreement is subject to availability of funds. All requirements of this agreement requiring the expenditure of Corps funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by the Corps under the terms of

this agreement will require or be interpreted to require a commitment to expend funds not obligated for a particular purpose. If the Corps cannot perform the obligations set forth in this agreement due to the unavailability of funds, the Corps agrees to apply its best efforts to renegotiate the provision and may require the parties initiate consultation to develop an amendment to this agreement when appropriate.

A site-specific ICP will also be developed by the USCG. The ICP will identify the objective of the controls to restrict activities within the remedial action area at Drury Gulch, including listing the actions necessary to achieve the objective, and warn potential receptors of the contaminants at the site. It is anticipated that the ICP, the MMP and the Memorandum of Agreement will be the controlling documents for the site after completion of the RA activities.

7.0 REVIEW OF REMEDIAL ACTION AFTER SITE CLOSURE

Alternative 2C will reduce the unacceptable risk from PCB-contaminated soil through the excavation of soil containing more than 10 mg/kg PCBs and disposal at a TSCA-permitted facility. Soil with PCB concentrations between 1 and 10 mg/kg will be left onsite, covered with clean fill material. The cover will be designed to maintain the hydraulic capacity of the gulch, promote drainage, minimize erosion or abrasion, accommodate settling and subsidence, and function with minimum maintenance. The construction of a cover to meet these design criteria will provide an effective, long-term engineering control to eliminate the exposure pathway to contaminated soil.

Once the cover is placed at the site, no operation and maintenance activities other than cover monitoring and any necessary repair will be required for this remedial action. Cover monitoring will include inspections by a team of engineers and/or scientists who will inspect the general conditions of the cover and document the conditions. If cover monitoring indicates that the cover is not effective and requires maintenance, corrective actions will be taken in coordination with ADEC and EPA.

Sediment will remain onsite and will be covered with geotextile material and riprap to prevent exposure to the environment. These controls are sufficient to ensure potential exposure of environmental receptors to PCB-contaminated sediment is within protective levels.

These decisions may be reviewed and modified in the future if new information becomes available that indicates the presence of previously undiscovered contamination or exposure routes that may cause a risk to human health or the environment.

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8.0 SUMMARY OF PUBLIC INVOLVEMENT ACTIVITIES

As one of the projects scheduled to be addressed under the TERC, information on Drury Gulch has been distributed and discussed with the public. The forum for information distribution has been through fact sheets and Open Houses. Open Houses were conducted during the spring and fall beginning in 1999. The Open Houses were held in the Safeway Lobby on Kodiak Island on the dates listed below:

Open Houses:

- 04 March 1999
- 10 August 1999
- 19 May 2000
- 20 October 2000
- 04 May 2001
- 19 October 2001
- 24 May 2002
- 18 October 2002
- 4 April 2003

An Open House to address any questions from the Public on the Proposed Plan (issued on 18 March 2003) was held in Kodiak on 4 April 2003. The public was given 30 days to provide comments pertaining to the selected remedial alternative.

No public comments on the selected remedial alternative were received. The meeting minutes from this Open House are provided in Appendix A.

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9.0 REFERENCES

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EPA (U.S. Environmental Protection Agency). 1996. *Calculation and Evaluation of Sediment Effect Concentrations for the Amphipod Hyalella azteca and the Midge Chironomus riparius.* EPA 905-R96-008. Great Lakes National Program Office, Chicago, IL.

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USAED (U.S. Army Engineer District, Alaska). 2002 (October). *2000 Remedial Investigation/Feasibility Study, Drury Gulch, Kodiak, Alaska. Final.*

USAED. 1999a (December). *Draft 1999 Interim Removal Action, Kodiak, Alaska.* Prepared by Jacobs Engineering Group Inc.

USAED. 1999b. *Technical Memorandum, 1999 Site Investigation, Drury Gulch, Alaska.*

USAED. 1999c. E-mail memo from Pete Hannon to Kodiak Project Team – Preliminary Drury Gulch Aerial Photo Analysis.

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APPENDIX A

Responsiveness Summary

COMMENTS SUMMARY

A Proposed Plan for this project was distributed to the residents of Kodiak for review on 20 March 2003. In addition, an open house was held on 4 April 2003 at the Safeway lobby in Kodiak to answer any questions on the Proposed Plan. No substantive verbal comments were received, and no written comments were received.