**PACIFIC AIR FORCES**
**REGIONAL SUPPORT CENTER**

**INDIAN MOUNTAIN LRRS, ALASKA**

# RECORD OF DECISION FOR SITE OT008

# INDIAN MOUNTAIN, ALASKA

**FINAL**
**JULY 2017**

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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, xylenes |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COC | chemical of concern |
| CSM | conceptual site model |
| cy | cubic yards |
| DERA | Defense Environmental Restoration Account |
| DERP | Defense Environmental Restoration Program |
| DRO | diesel-range organics |
| ERP | Environmental Restoration Program |
| EPA | U.S. Environmental Protection Agency |
| FS | Feasibility Study |
| GRO | gasoline-range organics |
| HHRA | Human Health Risk Assessment |
| HQ | hazard quotient |
| IRP | Installation Restoration Program |
| Jacobs | Jacobs Engineering Group Inc. |
| LRRS | Long-Range Radar Site |
| LUC | land-use control |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| NCP | National Contingency Plan |
| O&M | Operation and Maintenance |
| PCB | polychlorinated biphenyl |
| PID | photoionization detector |
| PPE | personal protective equipment |
| RAO | remedial action objective |

## ACRONYMS AND ABBREVIATIONS (Continued)

| | |
|---|---|
| RCRA | Resource Conservation and Recovery Act |
| RI | Remedial Investigation |
| ROD | Record of Decision |
| RRO | residual-range organics |
| SARA | Superfund Amendments and Reauthorization Act |
| SVOC | semivolatile organic compound |
| TSCA | Toxic Substances Control Act |
| TSDF | treatment, storage, and disposal facility |
| UCL | upper confidence limit |
| USAF | U.S. Air Force |
| USC | U.S. Code |
| UU/UE | unlimited use and unrestricted exposure |
| VOC | volatile organic compound |
| WACS | White Alice Communications Site |
| °F | degrees Fahrenheit |

# 1.0 DECLARATION

## 1.1 SITE NAME AND LOCATION

OT008 is part of the Indian Mountain Long-Range Radar Site (LRRS). The installation is approximately 16 miles east-northeast of the nearest city, Hughes, Alaska, and located in the Kuskokwim Mountains. The site is 170 miles northwest of Fairbanks and 35 miles south of the Arctic Circle (Figure 1-1).

**Table 1-1**
**Project Details**

| | |
|---|---|
| **Facility Name:** | Indian Mountain LRRS |
| **Site Location** | 16 miles from Hughes, Alaska; Section 33; Township 008 North; Range 022 East; Kateel River Meridian |
| **Latitude and Longitude:** | 66.068618°N, -153.689274°W |
| **Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID Number:** | Not applicable |
| **Alaska Department of Environmental Conservation Contaminated Sites Hazard ID Number** | 24275 |
| **Operable Unit/Site:** | OT008 |

## 1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the selected remedy for the Defense Environmental Restoration Program (DERP) site, OT008, at the Indian Mountain LRRS. These remedies were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and, to the extent practicable, with the National Contingency Plan (NCP). This decision is based on the Administrative Record file for this site. The U.S. Air Force (USAF) is integrating Alaska environmental response regulation Alaska Administrative Code (AAC) Title 18 (18 AAC §75.300 et al.) into the CERCLA process under the NCP.

As part of continuing efforts to address contamination at the Indian Mountain LRRS, a Feasibility Study (FS) originally prepared in 2012 was amended with the addition of new alternatives to allow greater versatility in the selection of alternatives. The alternatives chosen for consideration in the 2015 FS (USAF 2015b) were presented for public comment and review in a Proposed Plan (USAF 2015a). The USAF is issuing this ROD under its lead agency authority, and managing remediation at OT008 in accordance with CERCLA as required by DERP. This ROD is issued in accordance with and satisfies requirements of the DERP, U.S. Code (USC) Title 10, Section 2701 et seq. (10 USC 2701 et seq.); CERCLA 42 USC 9601 et seq.; Executive Order 12580, Section 2923 (23 January 1987); and the NCP. As the lead agency, the USAF has selected a remedy for OT008.

Site remediation will be funded under the Defense Environmental Restoration Account (DERA), which was established to 1) identify, investigate, research, and clean up contamination from hazardous substances, pollutants, and contaminants; 2) correct environmental damage that creates an imminent and substantial endangerment to public health, welfare or the environment; and 3) demolish unsafe buildings and structures (10 USC 2701).

The Alaska Department of Environmental Conservation (ADEC) is the regulatory agency for this project. This oversight includes a review of the Draft version of this document and acceptance of the OT008 site remedy. ADEC concurs that, if properly implemented, the selected remedy for OT008 will comply with State of Alaska regulatory requirements.

## 1.3 ASSESSMENT OF OT008 SITE

During the 2011 Follow-On Remedial Investigation (RI), soil, sediment, and surface water samples were collected at three sites associated with OT008: the former White Alice Communications Site (WACS), the Stained Soil Area, and the Pump House (USAF 2012c). Results indicate that polychlorinated biphenyls (PCB) and diesel-range organics (DRO) are present above applicable ADEC cleanup levels in the soil at OT008. This ROD addresses CERCLA hazardous substances (PCBs), as well the petroleum constituent DRO. Petroleum and its derivatives are specifically excluded from the CERCLA definition of hazardous substances, but are regulated by the State of Alaska. The selected remedy for OT008 will address both types of contamination as well as other potentially commingled contaminants. Concentrations of PCBs exceed both the Toxic Substances Control Act (TSCA) hazardous waste threshold of 50 milligrams per kilogram (mg/kg) and the concentration at which PCBs are considered a principal threat waste (500 mg/kg) (Section 2.11).

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of pollutants, contaminants, or hazardous substances into the environment. Table 1-2 presents the applicable laws and regulations that the USAF, proceeding under its lead agency authority, will integrate into the CERCLA response at OT008.

**Table 1-2**
**Chemicals of Concern and Applicable Regulations**

| Site Name | Site Locations | Applicable Regulations | COCs Remaining at OT008 |
|---|---|---|---|
| OT008 | White Alice Communications Site, Stained Soil Area, former Pump House | CERCLA, TSCA, ADEC 18 AAC 75 | PCBs |
| | | ADEC 18 AAC 75 | DRO |

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

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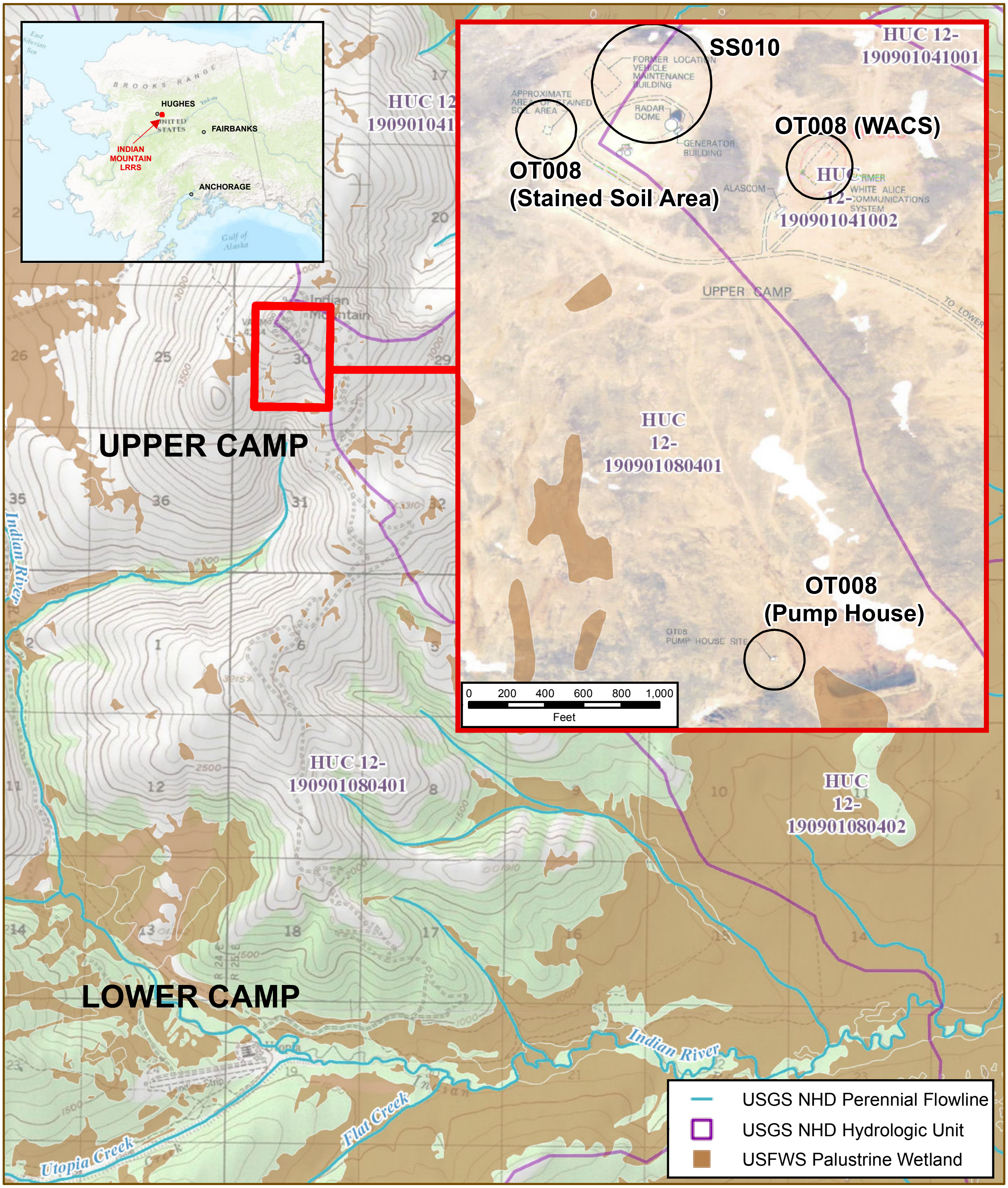


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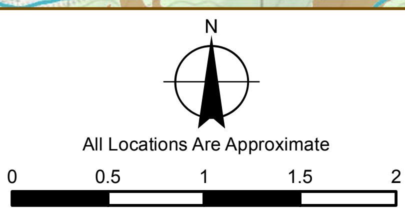
Source: USFWS
USGS The National Map: National Hydrography Dataset




WGS 1984 UTM Zone 5N

OT008 SITE LOCATION AND VICINITY MAP
INDIAN MOUNTAIN LONG RANGE RADAR SITE

INDIAN MOUNTAIN, ALASKA

JACOBS

| DATE: | PROJECT MANAGER: | FIGURE NO: |
|---|---|---|
| 30 Sep 2016 | J. WEHRMANN | 1-1 |

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## 1.4 DESCRIPTION OF THE SELECTED REMEDY

Remedial alternatives for OT008 were developed and evaluated in the 2015 FS and presented in the 2015 Proposed Plan (USAF 2015b; 2015a). Based on regulator comments received during the development of the Proposed Plan, the USAF selected PCB Alternative 5: Onsite Consolidation and Capping and Offsite Disposal and DRO Alternative 3a: Onsite Landfarming to address contamination at OT008. This remedy includes land-use controls (LUC) to protect human health and the environment from all hazardous substances above 18 AAC 75.341(c) and (d) soil cleanup levels (ADEC 2016). If properly implemented at OT008, this remedy will be protective of human health and the environment. The status of other contaminated sites at the Indian Mountain LRRS and previous investigations conducted at OT008 and the surrounding areas are described in Sections 2.1.3 and 2.5.6, respectively. Table 1-3 presents the chemicals of concern (COC) at OT008 and their respective ADEC cleanup levels, which are considered protective under a residential use scenario anywhere in Alaska.

**Table 1-3**
**Chemicals of Concern and Cleanup Levels**

| COC | Cleanup Level[1] | Authority |
|---|---|---|
| PCBs | 1 mg/kg | CERCLA |
| DRO | 10,250 mg/kg | ADEC |

**Note:**
[1] ADEC Method Two Tables B1 and B2 for the under 40-inch zone (18 AAC 75.341(c)(d); [ADEC 2016])
For definitions, see the Acronyms and Abbreviations section.

The migration to groundwater pathway appears to be incomplete; therefore, direct contact/ingestion cleanup levels were determined to be appropriate during the RI stage. Because OT008 is on a mountain top where no definitive groundwater has been detected, and because the extent of contamination appears to be confined to relatively shallow depths, migration to groundwater is not likely to occur. DRO represents a petroleum hydrocarbon range; historical samples were analyzed for two other hydrocarbon ranges referred to as GRO and RRO at OT008. Of these, only gasoline-range organics (GRO) is present above its cleanup level (1,400 mg/kg), and in only two locations: 1,600 mg/kg at SD01 and 7,700 mg/kg at SB02. For this reason, GRO contamination is considered de minimus and DRO, which has been widely identified at OT008, is the petroleum COC.

The major components of the selected remedy are as follows (more specific details are provided in the discussions of PCB Alternative 5 and DRO Alternative 3a in Section 2.9.1):

*PCBs*

- Removal and disposal (PCBs greater than or equal to 10 mg/kg, including TSCA-regulated and principal threat waste)
- Consolidation, placement of a permeable geofabric liner, and capping at the WACS (PCBs between 1 mg/kg and 10 mg/kg)
- Confirmation sampling from the Stained Soil Area and the Pump House and the lateral and vertical extents of the WACS excavation
- LUCs such as signs, fencing, and dig restrictions
- Annual LUC and cap inspections, maintenance as needed, and inspection reports
- CERCLA Five-Year Reviews

*DRO*

- Topographically flat area selection
- Pre-treatment samples from the proposed landfarm area
- Earthen berm construction
- LUCs to limit access and prevent exposure
- Excavation, mechanical mixing, and spreading of DRO-contaminated soil to a maximum depth of 10 inches
- Confirmation soil sampling from the excavations
- Baseline analytical samples at the landfarm and a field screening correlation study
- Tilling twice per year until the ADEC cleanup level has been achieved
- Analytical sampling as indicated by field screening results
- No ADEC periodic reviews required

The selected remedy satisfies the remedial action objectives (RAO) for this site, as defined in Section 2.8.

### 1.4.1 Selected CERCLA Remedy

CERCLA Section 101 (14)(F) classifies PCBs as a hazardous substance pursuant to Section 7 of TSCA. The USAF has selected a CERCLA-compliant alternative for PCBs. While PCB concentrations will remain above the EPA and ADEC cleanup levels for residential use, key components of this remedy such as the presence and maintenance of a 2-foot cap and continued industrial use of the facility (as expected), as well as five-year reviews will be implemented ensure long-term protectiveness. This remedy was developed in coordination with ADEC representatives to ensure the protectiveness of human health and the environment. The USAF will be responsible for implementing the selected remedy including removal, cap construction and maintenance, LUCs, and a deed notation indicating that PCBs remain in the soil. Any cap deficiencies will be reported to ADEC and promptly addressed by USAF. Although USAF may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, USAF shall retain ultimate responsibility for remedy integrity.

### 1.4.2 Remedy Required Under State of Alaska Regulations

State of Alaska regulations govern the petroleum contamination present at OT008. The remedy selected for these contaminants will bring DRO contamination levels below the ADEC Method Two cleanup level in the under 40-inch zone category. Once a DRO landfarm site is established at OT008, volatilization and natural attenuation will begin to occur. RAOs will be attained through these natural processes in approximately two years and three months. Until landfarming is complete and confirmation samples indicate that the cleanup level for DRO has been achieved, site controls such as fencing and signage will be maintained to ensure protectiveness of human health and the environment during soil treatment. The USAF will be responsible for implementing the selected remedy, including removal, landfarm construction, tilling, sampling, and site restoration.

## 1.5 STATUTORY DETERMINATIONS

The selected remedy for OT008 satisfies the statutory requirements of CERCLA and, to the extent practicable, the NCP. The selected remedy for PCBs—PCB Alternative 5—is protective of human health and the environment, complies with federal and state requirements applicable to the response action, is cost-effective, and utilizes permanent solutions and technologies to the maximum extent practicable.

The NCP establishes the expectation that treatment will be used to address the contaminants posed by a site whenever practicable, as specified in 40 CFR 300.430(f)(5)(ii)(F). The selected remedy for OT008 does not satisfy the statutory preference for treatment because it will not permanently or significantly reduce the toxicity, mobility, or volume of PCBs at the site. The selected remedy for OT008 was chosen, however, because few applicable treatment methods exist for this type of contamination, and the remoteness of the location makes the implementation of PCB treatment technologies costly and impractical. Five-year reviews would be required under this alternative.

The selected remedy for DRO contamination at OT008 does, however, satisfy the statutory preference for treatment because it will permanently reduce the volume of DRO-contaminated soil at the site. After the concentrations of DRO in the landfarmed soil fall below the ADEC Method Two cleanup level for ingestion (expected to take approximately two years), DRO will no longer be present onsite above the regulatory cleanup level. The landfarm site will then allow for UU/UE. Therefore, a statutory or policy five-year review will not be required for this response action to verify that the remedy is, or will be, protective of human health and the environment.

## 1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary located in Section 2.0 of this ROD:

- List of COCs and their respective concentrations (Section 2.5.7, Table 2-3).
- Baseline human health and ecological risk evaluation represented by the COCs (Section 2.7).
- Cleanup levels established for COCs and the basis for these selections (Section 2.8).
- How source materials constituting principal threat wastes are addressed (Section 2.11).
- Current and reasonably anticipated future land use assumptions (Section 2.6.1 and 2.7.1).
- Potential land and surface water use that will be available at the site as a result of the selected remedy (Sections 2.6.1 and 2.6.2).
- Estimated capital, annual operations and maintenance (O&M), total costs, and the number of years over which the remedy cost estimates are projected (Sections 2.10.7 and 2.12.3; Tables 2-11 and 2-12).

- Key factors that led to selecting the remedies including a description of how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision (Sections 2.10 and 2.12.1).

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

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## 1.7 AUTHORIZING SIGNATURES

This signature sheet documents the U.S. Air Force approval of the CERCLA remedy selected in this Record of Decision for Site OT008 at the Indian Mountain LRRS, Alaska.

By signing this declaration, the Alaska Department of Environmental Conservation concurs that proper implementation of the selected remedy for OT008 will comply with state environmental laws. These decisions will be reviewed and may be modified in the future if information becomes available that indicates the presence of contaminants or potential exposures present unacceptable risk to human health or the environment.

Suzanne W. Bilbrey — 20 June 2017

SUZANNE W. BILBREY, P.E., GS-15 — Date
AFCEC/CZ Director, Environmental Management Directorate

Kim DeRuyter — 30-June-2017

KIM DERUYTER, DSMOA Section Manager — Date
Contaminated Sites Program
Alaska Department of Environmental Conservation

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# 2.0 DECISION SUMMARY

The Decision Summary identifies the selected remedy, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of previous investigations that support remedy selection.

## 2.1 SITE NAME, LOCATION, AND DESCRIPTION

OT008 is part of the Indian Mountain LRRS. The installation is approximately 16 miles east-northeast of the nearest city, Hughes, Alaska, and located in the Kuskokwim Mountains. It is 170 miles northwest of Fairbanks and 35 miles south of the Arctic Circle (Figure 1-1).

**Table 2-1**
**Project Information**

| | |
|---|---|
| **Facility:** | Indian Mountain LRRS, Alaska |
| **Site Location:** | 16 miles from Hughes, Alaska; Section 33; Township 008 North; Range 022 East; Kateel River Meridian |
| **Latitude and Longitude:** | 66.068618°N, -153.689274°W |
| **Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID Number:** | Not Applicable |
| **Alaska Department of Environmental Conservation Contaminated Sites Hazard ID Number** | 24275 |
| **Operable Unit/Site:** | OT008 |
| **Point of Contact:** | Mr. Robert Johnston – Project Manager<br>Robert.Johnston.17@us.af.mil<br>AFCEC<br>10471 20th Street, Suite 302<br>Joint Base Elmendorf-Richardson, AK 99506<br>(907) 552-7193 |

The Indian Mountain LRRS is owned by USAF, which is issuing this CERCLA ROD under its lead agency authority. The EPA has deferred regulatory authority for this project to ADEC. As the regulatory agency, ADEC provides primary oversight of the environmental restoration actions in accordance with State of Alaska contaminated sites regulations (18 AAC 75, Article 3, *Discharge Reporting Cleanup and Disposal of Oil and Other Hazardous*

*Substances*) (ADEC 2016). The USAF integrates 18 AAC 75 into the CERCLA process for OT008. The implementation of the selected remedy for OT008 will be funded by DERA, a funding source approved by Congress to clean up contaminated sites on U.S. Department of Defense installations.

### 2.1.1 Regional Setting

The Indian Mountain LRRS was constructed as an Aircraft Control and Warning facility in 1951 and became operational in 1953. The facility consists of two separate camps, Upper Camp and Lower Camp, which are connected by a 10-mile long road (Figure 1-1). The radar facilities, including the WACS, were constructed at Upper Camp on the summit of Indian Mountain; personnel quarters and maintenance and support facilities were constructed at Lower Camp. The installation, owned by USAF, was downscaled since the early 1970s, and is currently operated and maintained year-round by contractor personnel as an LRRS.

The Upper Camp is located at the summit of Indian Mountain at an elevation of approximately 4,200 feet above mean sea level. A radar dome and a small building for a backup generator are the only structures remaining at OT008; the other facilities were demolished and buried in 1986 (USAF 2006).

### 2.1.2 Site Description

OT008 is located at Upper Camp, and comprises three areas: the former WACS, the Stained Soil Area, and the former Pump House. The WACS was activated in 1958, deactivated in 1979, and demolished in 1986. The Stained Soil Area is located approximately 1,500 feet west of the former WACS. The former Pump House is located approximately 2,750 feet south and downgradient from the former WACS. No other structures were present at OT008. The COCs for OT008 are PCBs and DRO (Section 1.4).

### 2.1.3 Facility Environmental Restoration Program History

Several large oil spills/leaks, totaling more than 60,000 gallons of diesel fuel, have occurred at the Upper Camp since records have been kept beginning in the 1970s. Several smaller 100- to

500-gallon spills of fuel, motor vehicle gasoline, and waste oils were also known to have occurred, and oily wastes were applied to the roads for dust control. Drummed waste products were stored at OT008, but were reportedly removed around 1980. Past activities potentially resulting in contaminated waste generation include:

- Fuel storage and transfer;
- Use of lubricants or solvents for vehicle and equipment maintenance activities;
- Spills and leaks from the drum accumulation area at SS010, which resulted in contaminant migration to OT008;
- Application of oily wastes to roads for dust control; and
- Use of transformer oil containing PCBs at the WACS.

PCBs and DRO were encountered during investigations at the OT008 site. The PCBs were contained in transformer fluids and paints used at the facility. Table 2-2 provides a summary of investigation activities and reports that have been conducted at the Indian Mountain LRRS Site OT008 since 1985.

**Table 2-2**
**Summary of OT008 Site Investigations and Reports**

| Consultant Lead | Investigation | Year |
|---|---|---|
| ES (Engineering – Science) | Phase I – Records Search Report (Installation Restoration Program, AAC Northern Region) | 1985 |
| Woodward-Clyde Consultants | Phase II Confirmation/Quantification Report | 1989 |
| Woodward-Clyde Consultants | Remedial Investigation/Preliminary Feasibility Study (Installation Restoration Program, Stage 2, Indian Mountain Air Force Station, Alaska) | 1991 |
| Woodward-Clyde Consultants | Final Site Investigation Report | 1993 |
| Jacobs | Construction Report for Interim Remedial Action and Treatability Study | 1995 |
| Jacobs | Remedial Investigation/Feasibility Study Final Report | 1995 |
| Jacobs | Addendum to 1995 Remedial Investigation/Feasibility Study Report | 1996 |
| Hart Crowser, Inc. | Management Action Plan | 1997 |
| Montgomery Watson | Site Investigation Report for IRP Sites LF005, LF006, OT008, SS011, and SS002/AOC07 | 2002 |
| MWH | Focused Feasibility Study for OT008 | 2006 |
| Jacobs | Follow-on Remedial Investigation at OT008 | 2009 |
| Jacobs | Remedial Investigation Report for Sites OT008 and SS010 | 2011 |

**Table 2-2**
**Summary of OT008 Site Investigations and Reports (Continued)**

| Consultant Lead | Investigation | Year |
|---|---|---|
| Jacobs | Feasibility Study for OT008 | 2012 |
| Jacobs | Proposed Plan for Site OT008 | 2012 |
| Jacobs | (Amended) Feasibility Study for OT008 | 2015 |
| Jacobs | (Amended) Proposed Plan for Site OT008 | 2015 |

Eleven Environmental Restoration Program (ERP) (formerly Installation Restoration Program [IRP]) sites have been identified and investigated at the Indian Mountain LRRS: eight areas at the Lower Camp and three at the Upper Camp (indicated with an asterisk [*]):

- Landfill/Dump Area (LF004)
- Landfill/Dump Area (LF005)
- Waste Accumulation Area (LF006)
- Landfill/Dump Area (SD001)*
- Runway/Road Oiling Area (SD007)
- Former Drum Storage Location (SS002/AOC07)
- Waste Accumulation Area (SS003)
- Waste Storage and Fuel Release Site (SS009)
- Drum Storage and Fuel Release Area (SS010)*
- Fuel Release Area (SS011)
- PCB Release Area (OT008)*

With the exception of OT008 (presented herein) and SD001, CERCLA ROD or Decision Documents have been submitted to ADEC and approved for all other Indian Mountain LRRS sites.

## 2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section provides background information, summarizes the series of investigations that led to this ROD, and describes the CERCLA response actions previously undertaken at OT008. The USAF, the lead agency for remedial activities, has conducted environmental investigations at the Indian Mountain LRRS since 1985. These activities were conducted in accordance with CERCLA under DERP (10 USC 2701 et seq.), which was established by Section 120 of SARA. Recent remedial investigations (RI) at OT008 occurred in 2008 and 2011; prior site investigations and RIs had been conducted for several of the Indian Mountain LRRS sites, and extensive sampling indicated the presence of DRO; benzene, toluene, ethylbenzene, and xylenes (BTEX); volatile organic compounds (VOC); semivolatile organic compounds (SVOC); pesticides; PCBs; and metals at varying concentrations depending on location and prior site use. The potential sources of these contaminants are described in Section 2.1.3. At this time, the COCs specific to OT008 include PCBs and DRO.

OT008 encompasses three areas: the former WACS, the Stained Soil Area, and the former Pump House. A response action in 1995 first addressed the potential for contamination to migrate between adjacent site SS010 and OT008; site work included the construction of a diversion trench between the two sites (later deemed ineffective) and a containment cell to promote passive biotreatment for the contents of 10 drums of petroleum-contaminated soil. The RI/FS that same year found PCBs at OT008, and further sampling was conducted for several Indian Mountain LRRS sites during a 2002 investigation. A Focused FS in 2006 (USAF 2006) identified and evaluated remedial alternatives to address PCB contamination at OT008, including a risk assessment. Excavation and disposal in the contiguous United States was recommended, but not implemented. PCB and petroleum contamination at OT008 were further delineated in 2009 and 2011; the 2015 FS (USAF 2015b) and the 2015 Proposed Plan (USAF 2015a) concur that a response action is necessary in order to address both PCB and DRO contamination at OT008 in order to eliminate the risk to human health and the environment, and to achieve site closure. More detailed information about previous site characterization is included in Section 2.5.6.

No Federal Facility Agreements or state agreements for the Indian Mountain LRRS are in effect. None of the Indian Mountain LRRS sites are listed on the National Priorities List. To date, there have been no regulatory enforcement activities at OT008, although hazardous substances regulated under CERCLA (PCBs) have been identified at the site.

## 2.3 COMMUNITY PARTICIPATION

NCP Section 300.430(f)(3) establishes a number of public participation activities that the lead agency must conduct following preparation of the Proposed Plan and review by the regulatory agency.

Hughes is the community nearest to the Indian Mountain LRRS; it is located approximately 16 miles from OT008. USAF held a public meeting in Hughes, Alaska on 11 May 2015 to discuss progress at the Indian Mountain LRRS and forthcoming Proposed Plans at OT008 and Military Munitions Response Program Sites AB938 and SR937. Once the Proposed Plans were finalized, the USAF distributed the *Proposed Plan for Site OT008* (USAF 2015a) on 3 December 2015 to the City of Hughes and the Village of Hughes (a federally recognized tribe) offices for public review and to solicit public input.

In accordance with NCP requirements, the 30-day public comment period for the Proposed Plan began on 7 December 2015 and was scheduled to end on 7 January 2016. A public meeting was scheduled and conducted on 27 January 2016. To accommodate a community request, the public comment period was extended until 27 February 2016.

The Proposed Plan (USAF 2015) and all newsletters, fact sheets, and community relations documents relating to the ERP (formerly IRP) sites at the Indian Mountain LRRS are located in an Administrative Record at http://afcec.publicadmin-record.us.af.mil/ by choosing Indian Mountain LRRS, AK from the dropdown list of installations on the left-hand side of the page and clicking 'Search'. A public information repository is maintained at Joint Base Elmendorf-Richardson. A notice regarding the availability of the Proposed Plan was published in the *Fairbanks Daily News Miner* on 6 December 2015, and a notice announcing the upcoming public meeting in Hughes was published in the *Fairbanks Daily News Miner* on 24, 25, and 26 January 2016. Appendix D contains more information regarding community involvement in the OT008 decision-making process.

## 2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy for OT008 is appropriate for future land use, satisfies the USAF mission requirements, and is consistent with other remediation activities at the Indian Mountain LRRS. Under its lead agency authority, USAF plans to remove PCB-contaminated soil with concentrations above 10 mg/kg from the WACS, Stained Soil Area, and the Pump House and construct and maintain a protective cap over PCB-contaminated soil that remains at concentrations below 10 mg/kg at the WACS. The USAF will also construct and till a landfarm, which will remain in operation until DRO-contaminated soil is reduced to concentrations below its cleanup level. LUCs will remain in place at the WACS to prevent exposure to PCBs; the Stained Soil Area and Pump House will be suitable for UU/UE immediately following remedy implementation. After a two-year period, during which risk to site workers will be mitigated with site controls, the potential hazards posed by DRO contamination at OT008 will have been eliminated, and the landfarm site will also be suitable for UU/UE.

## 2.5 SITE CHARACTERISTICS

Information about the surface and subsurface site conditions and patterns in climate and weather can affect the fate and transport of contaminants as well as the viability of remedial technologies at the Indian Mountain LRRS.

### 2.5.1 Topography and Stratigraphy

The Indian Mountain LRRS is located within the central Koyukuk River Region of West-Central Alaska, which encompasses an area of 6,600 square miles; Indian Mountain LRRS was named for Indian Mountain, which is a single peak within the Koyukuk River Region (elevation 4,200 feet). It is located within the central Koyukuk River Region of West-Central Alaska. Rocks in this region form broad, gentle to moderate folds broken by a complex fault system. The structural fabric is approximately east-west for the central and western part of this region, and northeast-southwest for the eastern part. This region is located within a zone of discontinuous permafrost where there may be lenses, or layers, of permafrost separated by unfrozen ground (USAF 2006).

### 2.5.2 Climate

The average maximum temperature is near 66 degrees Fahrenheit (°F) for June. The average minimum temperature is -9.1 °F for February. The average annual precipitation is 19.76 inches (Western Regional Climate Center 1981 – 2010, accessed in 2016).

Indian Mountain LRRS has a cold, continental climate with extreme temperature differences. Winters are long and cold, and summers are short. Since Indian Mountain LRRS is 35 miles south of the Arctic Circle, daylight is nearly continuous in June and July. The Indian Mountain LRRS receives only one or two hours of daylight in December and January. Winds are light to moderate in the area and predominantly from the east and northeast (USAF 1991).

### 2.5.3 Geology

Regional geology at Indian Mountain consists of Late Jurassic to Early Cretaceous andesitic lithic tuff, tuff breccia, and agglomerate that are intercalated with porphyritic andesite flows that formed as a result of volcanic eruptions in the region. The andesitic flows were likely formed during volcanic eruptions as pyroclastic flows and surges, ash fall, and lava flows that were later intruded by a Cretaceous granitic pluton on the west slope of Indian Mountain. Andesitic flows are overlain by alluvial and eolian terrace and slope deposits in the lowland bordering Indian Mountain to the east. Both the Upper and Lower Camps at Indian Mountain LRRS are underlain by this unit (USAF 2006).

At the Upper Camp, lithology is characterized by gravel, cobbles, and angular boulders with some silts, clays, and debris (USAF 2006). Bedrock at Indian Mountain LRRS has been encountered as shallow as 2 feet below ground surface (bgs) during previous investigations (USAF 1995b).

### 2.5.4 Surface and Subsurface Hydrology

***Surface Water:*** No continuous surface water sources have been identified at Upper Camp. Indian Mountain LRRS lies within the drainage basins of Indian River and Utopia Creek, with Lower Camp at the confluence (USAF 1995b). The water level of Indian River fluctuates depending on groundwater flow into the river and water flow exiting as the river replenishes the groundwater basins; both Indian River and Utopia Creek respond directly to precipitation events (USAF 2006). Both Indian River and Utopia Creek respond directly to precipitation events; runoff occurs via Sleepy Bear Creek northeast to Notoniono Creek Basin (USAF 2006).

***Groundwater:*** The primary aquifer at Indian Mountain LRRS occurs within the alluvial deposits in the drainage of Indian River and Utopia Creek. The aquifer is confined to the Lower Camp area by bedrock, permafrost, and Indian River. Groundwater is limited at the Upper Camp and has not been encountered or observed at OT008 (USAF 2006).

### 2.5.5 Ecology

***Flora:*** Most of the landscape at OT008 has been disturbed by construction activities; where undisturbed, the ground is primarily alpine tundra consisting of sedges, very low willows, cranberry bushes, mountain avens, and lichens. The tree line occurs at approximately 1,000 feet on north-facing slopes and 1,500 feet on south-facing slopes; tall shrub birch, alder, and willow thickets constitute the transition zone, and further downslope, upland spruce forests grow at the flanks of Indian Mountain (USAF 2006).

***Fauna:*** A variety of wildlife inhabits Indian Mountain. Large mammals include moose, caribou, grizzly bear, and black bear. Beaver, muskrat, and river otter use the various waterways and wetlands in the vicinity of Indian Mountain. Smaller mammals that inhabit the region include shrew, marten, weasel, mink, pine (red) squirrel, porcupine, and snowshoe hare (USAF 1993). Spruce grouse, ruffed grouse, sharp-tailed grouse, and rock ptarmigan also inhabit the area (USAF 1995b), and several common water fowl nest or migrate through the area. Hughes residents rely on Arctic grayling and Chinook salmon for subsistence; these species occur in the Indian River but are less common in Sleepy Bear Creek, which is the primary drainage for OT008. A seep in the vicinity of OT008 is ephemeral and emanates from nearby SS010; it does not support aquatic populations (USAF 2006).

No threatened or endangered species are known to inhabit Indian Mountain. Only the Yukon aster and Arctic Peregrine falcon are known to occur in the area, but neither has been identified within a 10-mile radius of Indian Mountain (USAF 2006).

### 2.5.6 Previous Site Characterization Activities

Between 1984 and 2009, a number of environmental investigations and cleanup projects were conducted at OT008 at the Indian Mountain LRRS. A description of previous environmental work conducted at OT008 is presented below by date of publication:

- 1985 – *Phase I, Records Search Report*. Eleven sites at Indian Mountain LRRS were identified as having significant potential to create environmental contamination. No sampling was conducted (USAF 1985).
- 1989 – *Phase II, Confirmation/Quantification Report (Stage 1)*. At the Upper Camp sites, investigators noted a diesel odor in soil on the northeast side of the summit, and one stream appeared stained. Sample results confirmed the presence of DRO in soil, sediments, and surface water that appeared to be migrating downstream. The highest DRO concentration from a soil sample was 422 mg/kg (USAF 1989).
- 1991 – *Remedial Investigation/Preliminary Feasibility Study Report (Stage 2)*. Investigation at both camps were continued in 1991; soil gas, soil, sediment, and surface water samples were collected from 11 source areas ranging from old landfills to roads and a runway oiled for dust control, and a geological survey was performed. Evidence of petroleum contamination at Upper Camp included DRO and small amounts of BTEX. The summit area was recommended for further investigation due to noticeable surface water sheens and petroleum odors (USAF 1991).
- 1993 – *Final Site Investigation Report*. Soil and sediment sample analysis detected VOCs, SVOCs, pesticides, PCBs, and metals (USAF 1993).
- 1995 – *Construction Report for Interim Remedial Action and Treatability Study*. Site SS010 is located adjacent to and uphill from OT008. Under this remedial action, a diversion trench was built to prevent the continued migration of contaminants from SS010 to OT008. Sediment and water samples collected from the trench showed low levels of contamination, but no PCBs. A treatability study demonstrated that passive remediation could successfully reduce petroleum contamination in soil and sediment. Concurrently, a treatability study on investigation-derived waste from 1994 drilling and sampling activities was performed. This treatability study became the design basis for a containment cell to reduce petroleum contamination through passive biotreatment (USAF 1995a).
- 1995 – *Remedial Investigation/Feasibility Study Final Report.* Soil samples were collected in 1995 as an effort to delineate the boundary of petroleum contamination at OT008. It was first believed that migration of contamination from the aboveground storage tanks at SS010 was the most likely source of contamination at OT008. DRO and PCBs were not detected in soil immediately downhill from the aboveground storage tanks. These results

suggested that movement of contaminated soil during construction and demolition of the WACS was the most likely source of contamination at OT008 (USAF 1995b).

- 2002 – *Final Site Investigation Report for IRP Sites*. Groundwater and soil samples were collected as part of this investigation at Sites LF005, LF006, SS011, OT008, and SS002/AOC07. OT008 samples analyzed for PCBs found concentrations ranging from nondetect to 4.7 mg/kg, which is above the ADEC cleanup level of 1 mg/kg currently considered protective of human health and the environment. Future sampling was recommended to investigate PCB migration from OT008 (USAF 2002b).
- 2006 – *Focused Feasibility Study for OT008*. This FS recommended the excavation and disposal of PCB-contaminated soil in the contiguous United States. A Human Health and Ecological Risk Assessment, completed as part of the FS, determined that the level of PCBs was high enough to warrant remedial action. No ecological receptors were identified in the risk assessment because poor habitat quality and rocky soil make exposure to contamination unlikely (USAF 2006).
- 2009 – *Follow-on Remedial Investigation at OT008 Technical Memorandum*. Samples were collected from two areas at OT008. The Stained Soil Area indicated PCB results well above the ADEC cleanup level of 1 mg/kg; DRO was not sampled for at the Stained Soil Area. PCBs, GRO, DRO, and RRO were all detected at the Pump House with concentrations exceeding ADEC cleanup levels (USAF 2009).
- *2011 – Follow-On Remedial Investigation Report for Sites OT008 and SS010*. In 2011, soil, sediment, and surface water samples were collected from the three source areas at OT008. Sediment and surface water samples were collected from the seeps associated with the adjacent site, SS010, to determine whether contamination was migrating into OT008; however, most of the seeps at SS010 are not in the same drainage. Only one seep with the potential to affect OT008 was sampled (USAF 2012c).
- *2012 – Feasibility Study for Site OT008*. An FS was conducted in 2012 to identify and screen potential remediation alternatives and technologies for PCB and DRO contamination at OT008. Most in situ treatment technologies were eliminated based on effectiveness, implementability, and cost. Four alternatives for PCB remediation and three alternatives for DRO contamination were retained for further analysis (USAF 2012b).
- *2012 – Proposed Plan for Site OT008*. The Proposed Plan summarized the remedial alternatives for OT008 identified in the 2012 FS and encouraged public participation in the decision-making process (USAF 2012a).
- *2015 – Feasibility Study for Site OT008*. All remedial alternatives evaluated in the original FS were retained for evaluation in an amended FS (USAF 2015b); due to its remote location and the anticipated continuation of industrial site use in the future, new onsite disposal alternatives were added to further assess the protectiveness of alternatives that leave some or all PCB-contaminated soil at the LRRS. To allow greater versatility in the selection of DRO alternatives, three new alternatives were developed for DRO that were not contingent upon PCB remedy selection (USAF 2015b).
- *2015 – Proposed Plan for Site OT008*. The Proposed Plan summarized the remedial alternatives for OT008 identified in the 2015 FS and encouraged public participation in

the decision-making process. This ROD documents the final remedy selected for OT008 (USAF 2015a).

More specifically by area, previous studies identified the following analytical results:

- Previous investigations at the WACS identified concentrations of PCBs, GRO, DRO, and RRO, above the ADEC cleanup levels with maximum concentrations of 760 mg/kg, 7,700 mg/kg, 14,000 mg/kg, and 14,000 mg/kg, respectively.
- Previous investigations at the Stained Soil Area identified concentrations of PCBs above the cleanup level. The maximum concentration of PCBs was 6,320 mg/kg.
- Previous investigations at the former Pump House identified concentrations of PCBs and DRO above the ADEC cleanup levels with concentrations of 4,544 mg/kg and 34,500 mg/kg, respectively.
- PCBs in soil at all three locations exceed 500 mg/kg, the concentration at which PCBs constitute a principal threat waste (Section 2.11).

### 2.5.7 Nature and Extent of Contamination

*Known or Suspected Sources of Contamination*

Potential contaminant sources for Site OT008 include historic spills and discharges associated with PCB-contaminated transformer oil, storage of waste oil, and fuel storage tanks. It is believed that the demolition of the WACS site, which included excavation and re-grading activities, most likely resulted in the distribution of contaminants away from the original release locations (USAF 2012c). Fuel contaminants released from the former drum storage and release area at SS010 also potentially migrated to OT008 through natural processes (i.e., runoff, erosion) or construction/demolition related activities.

As part of the 2011 Follow-On RI (USAF 2012c), a sediment and water sample (and duplicates of each) were collected from an ephemeral seep upgradient to the WACS (OT008) to determine whether contaminants had migrated from adjacent site SS010. Results for sediment contained several SVOCs above the ADEC Method Two direct contact cleanup levels. Water results exceeded the National Oceanic and Atmospheric Administration freshwater screening quick reference tables (SQuiRT) for naphthalene and barium. Fuels were detected in sediment at 17,000 mg/kg DRO and 1,900 mg/kg RRO; PCBs were detected well below 1 mg/kg at 0.0341 mg/kg in sediment and not detected in surface water. Although the seep is located at OT008, these concentrations were attributed to SS010 (USAF 2012c).

Potential cross-contamination is discussed further under the heading *Known or Potential Routes of Migration*.

*Types of Contamination and the Affected Media*

The Indian Mountain LRRS site history suggest and results from previous investigations at OT008 and surrounding areas confirm that PCBs and DRO exist in soil above their respective ADEC cleanup levels, suggesting that possible response actions are warranted.

Discrete samples were collected at locations based on the nodes of grid systems established at each of the three OT008 sites: former WACS, Stained Soil Area, and former Pump House. The sample results are summarized with regard to PCBs and DRO below; a more detailed explanation is presented in the *Follow-On Remedial Investigation Report for Sites OT008 and SS010* (USAF 2012c).

- **WACS: Soil, sediment, and surface water samples collected from the WACS site have contained concentrations of PCBs, GRO, DRO, RRO, VOCs, SVOCs, and metals above regulatory cleanup levels (See Figure 2-1).**
  - Twenty-two soil samples at the WACS contained concentrations of PCBs in the form of Aroclor 1260 that exceeded the ADEC cleanup level of 1 mg/kg. Concentrations ranged from 1.1 to 760 mg/kg.
  - Five soil samples at the WACS had DRO results that exceeded the ADEC Method Two ingestion cleanup level of 10,250 mg/kg with a maximum detection of 14,000 mg/kg.
  - Because some of the PCB and DRO contamination at the WACS overlaps, the overall volume estimates are separated into two categories: (1) 3,307 cubic yards [cy]) of PCB-only and (2) 284 cy of comingled PCB- and DRO- contaminated soil. Together, the contamination encompasses approximately 28,140 square feet.
  - A co-located sediment sample and surface water sample collected from a seep upgradient of the WACS contained concentrations of SVOCs and barium above the ADEC cleanup levels. DRO and RRO were also detected in the surface water samples, with maximum concentrations at 6.2 milligrams per liter (mg/L) and 0.85 mg/L, respectively. DRO and RRO were detected in the sediment samples with maximum concentrations at 17,000 mg/kg and 1,900 mg/kg, respectively. PCBs were also detected in sediment, but at levels below 1 mg/kg.
- **Stained Soil Area: Soil samples collected from the Stained Soil Area have contained PCBs above the ADEC cleanup level (See Figure 2-2).**

- Eleven samples contained concentrations of PCBs above 1 mg/kg, in the form of Aroclor 1260. Concentrations ranged from 21 mg/kg and 6,320 mg/kg.
- None of the DRO results exceeded the ADEC Method Two ingestion cleanup level of 10,250 mg/kg.
- Based on previous investigation data and the ADEC Method Two cleanup levels (direct contact pathway for PCBs and ingestion pathway for DRO), the Stained Soil Area contains a volume of approximately 13 cy of PCB-contaminated soil in an area that covers 134 square feet.

- **Former Pump House: Soil samples collected from within and outside of the Pump House have contained PCBs above the ADEC cleanup level (Figure 2-3).**
  - Five samples contained PCBs above the ADEC cleanup level of 1 mg/kg. Both Aroclor 1260 and Aroclor 1016 were detected with concentrations ranging from 1.11 mg/kg to 4,544 mg/kg.
  - Two samples had DRO results above the ADEC Method Two ingestion cleanup level at 34,500 mg/kg and 26,000 mg/kg.
  - Because some of the PCB and DRO contamination at the former Pump House overlaps, the overall volume estimates are separated into two categories: (1) 12 cy of either PCB-only or commingled PCB- and DRO-contaminated soil and (2) 4 cy of DRO-only contaminated soil. Together, the contamination encompasses approximately 205 square feet.
  -

| OT008 WACS Analytical Soil Sample Result Exceedances | | | | | | |
|---|---|---|---|---|---|---|
| Year Collected | Location | Sample ID[1] | Sample Depth (feet bgs) | Analyte | Results (mg/kg) | ADEC Cleanup Level (mg/kg)[2] |
| 1994 | SD01 | SE-OT08-SD01 | 0.5 | GRO | 1,600 | 1,400 |
| 1994 | SB01 | SO-OT08-SB01 | 0-1 | PCB | 8.3 | 1 |
| 1994 | SB02 | SO-OT08-SB02 | 0-1 | PCB | 760 | 1 |
| | | | | GRO | 7,700 | 1,400 |
| | | | | DRO | 14,000 | 10,250 |
| 1994 | SS03 | SO-OT08-SS03 | 0.5 | PCB | 5.1 | 1 |
| 1994 | SS04 | SO-OT08-SS04 | 0.5 | PCB | 1.8 | 1 |
| 1994 | SS05 | SO-OT08-SS05 | 0.5 | PCB | 41 | 1 |
| 1994 | SS06 | SO-OT08-SS06 | 0.5 | PCB | 1.1 | 1 |
| 2001 | L03OT08 | 01OTO001SL03OT08 | 1 | PCB | 4.7 | 1 |
| 2011 | TP01 | 01-2-SB001 | 2 | DRO | 14,000 | 10,250 |
| | | | | PCB | 3.8 | 1 |
| 2011 | TP02 | 02-2-SB004A | 2 | PCB | 3.5 | 1 |
| | | 02-2-SB004B | 2 | PCB | 15 | 1 |
| 2011 | TP04 | 04-3-SB007 | 3 | PCB | 3.1 | 1 |
| | | 04-5-SB008 | 4 | DRO | 11,000 | 10,250 |
| 2011 | TP05 | 05-3-SB010 | 3 | PCB | 1.6 | 1 |
| 2011 | TP06 | 06-3-SB013 | 3 | DRO | 11,000 | 10,250 |
| 2011 | TP07 | 07-1-SB015A | 1 | PCB | 5.9 | 1 |
| | | 07-1-SB015B | 1 | PCB | 8.2 | 1 |
| 2011 | TP10 | 10-2-SB020 | 2 | PCB | 2.7 | 1 |
| | | 10-5-SB021 | 5 | PCB | 1.6 | 1 |
| 2011 | TP14 | 14-1-SB029 | 1 | DRO | 12,000 | 10,250 |
| | | | | PCB | 8.8 | 1 |
| | | 14-5-SB031 | 5 | PCB | 5 | 1 |
| 2011 | TP15 | 15-2-SB032B | 2 | PCB | 1.2 | 1 |
| 2011 | TP25 | 25-2-SB052 | 2 | PCB | 1.9 | 1 |
| 2011 | TP26 | 26-0.5-SS054B | 1 | RRO | 14,000 | 10,000 |
| 2011 | TP30 | 30-5-SB062 | 5 | PCB | 4.4 | 1 |
| 2011 | TP40 | 40-3-SB079 | 3 | PCB | 3.1 | 1 |
| 2011 | TP45 | 45-5-SB087 | 5 | PCB | 1.1 | 1 |

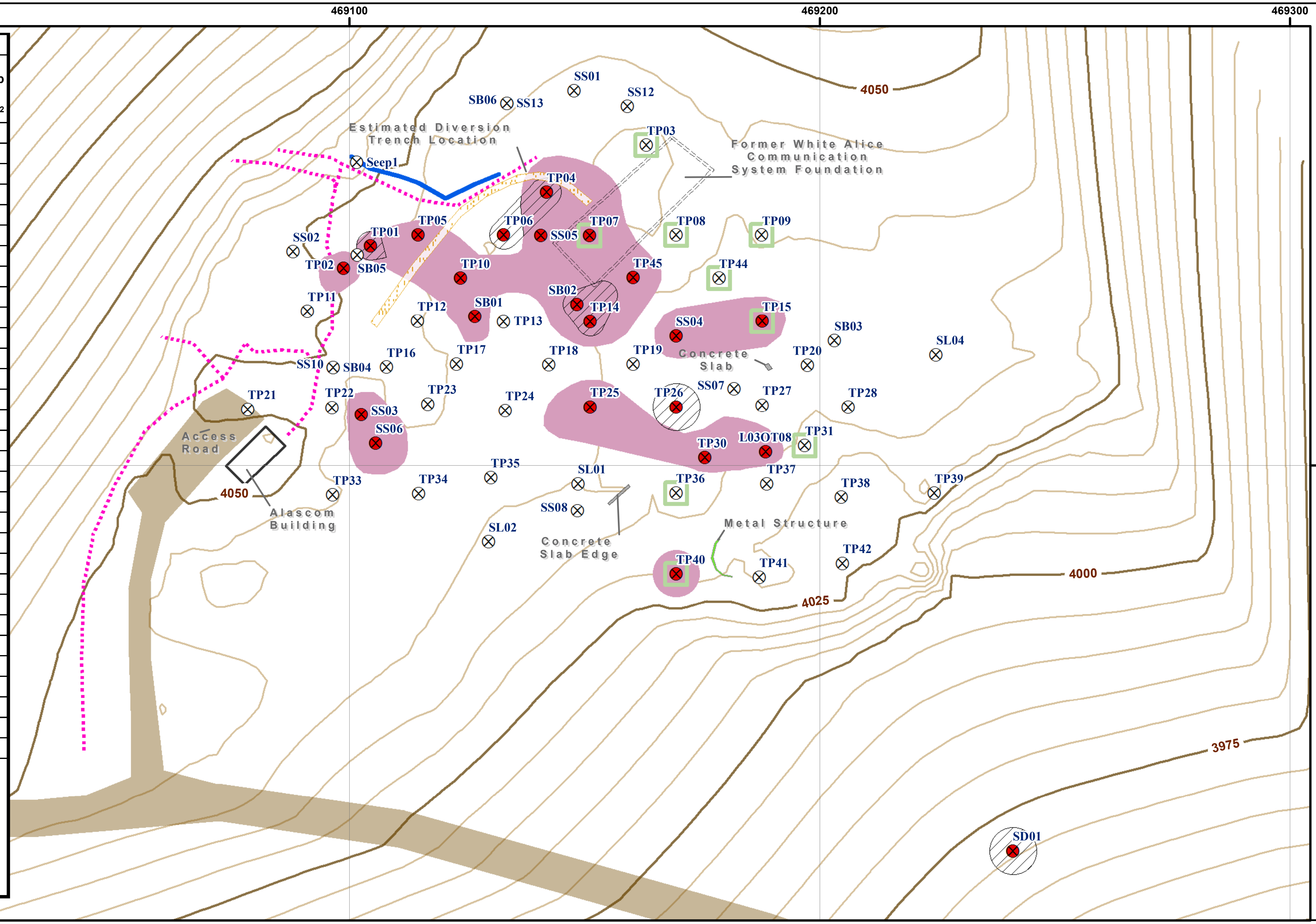
**Notes:**

[1] Sample IDs have been truncated. All 2011 Sample IDs are preceeded by 11IM-WACS-.

[2] The cleanup level for PCBs is based on 18 AAC 75 Table B1, Method Two, direct contact, under 40-inch zone (ADEC 2016). GRO & DRO cleanup levels based on 18 AAC 75 Table B2, Method Two, ingestion, under 40-inch zone (ADEC 2016).

Data qualifiers are not included.

For additional definitions, see the Acronyms and Abbreviations section.





**PCB Removal Areas**

- Approximate Extent of PCB Contamination Above Cleanup Level
- Approximate Extent of POL Contamination Above Cleanup Level
- Sample Results Below ADEC Cleanup Level
- Sample Results Above ADEC Cleanup
- Seep
- Debris Noted in Test Pit
- Building
- Diversion Trench
- Concrete
- Former Structure
- Metal Structure
- Utilities
- Road
- Index Contour (25 foot interval)

Notes:
1.) Sample locations prior to 2011 are estimated based on information provided by the USAF.
2.) Topographic contours are displayed in feet and were created from orthometric heights surveyed in WGS 1984 during 2011 field activities. They are interpolated between locations where survey data were not available.
3.) Extents of contamination are estimated from analytical results.
4.) Areas where PCB and POL contamination are comingled will be handled as PCB remediation waste.

All Locations Are Approximate
WGS 1984 UTM Zone 5N
1 inch = 80 feet

0 40 80 120 160
Feet
0 10 20 30 40
Meters

N

OT008 WACS EXTENT OF CONTAMINATION
INDIAN MOUNTAIN LONG RANGE RADAR SITE
INDIAN MOUNTAIN, ALASKA

JACOBS | DATE: 23 MAR 2016 | PROJECT MANAGER: D. FELMING | FIGURE NO: 2-1

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| OT008 Stained Soil Area Analytical Soil Sample Result Exceedances | | | | | | |
|---|---|---|---|---|---|---|
| Year Collected | Location | Sample ID[1] | Sample Depth (feet bgs) | Analyte | Results (mg/kg) | ADEC Cleanup Level (mg/kg)[2] |
| 2008 | SS001 | 08UTOOT08SS001 | 0 - 0.5 | PCB | 3,320 | 1 |
| | | 08UTOOT08SS001d | 0 - 0.5 | PCB | 6,320 | 1 |
| 2008 | SS002 | 08UTOOT08SS002 | 0 - 0.5 | PCB | 2.41 | 1 |
| 2008 | SS004 | 08UTOOT08SS004 | 0 - 0.5 | PCB | 13.50 | 1 |
| 2008 | SS005 | 08UTOOT08SS005 | 0 - 0.5 | PCB | 8.33 | 1 |
| 2008 | SS006 | 08UTOOT08SS006 | 0 - 0.5 | PCB | 1.83 | 1 |
| 2008 | SS009 | 08UTOOT08SS009 | 0 - 0.5 | PCB | 4.05 | 1 |
| 2008 | SS010 | 08UTOOT08SS010 | 0 - 0.5 | PCB | 192 | 1 |
| 2008 | SS011 | 08UTOOT08SS011 | 0 - 0.5 | PCB | 5.96 | 1 |
| 2011 | TP03 (East) | 03-1E-SB006 | 1 | PCB | 680 | 1 |
| 2011 | TP07 (West) | 07-1W-SB025 | 1 | PCB | 21 | 1 |

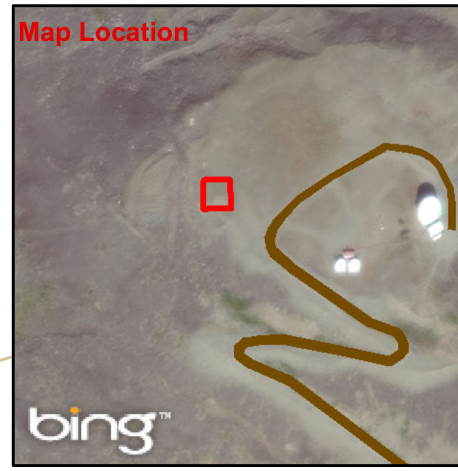
**Notes:**

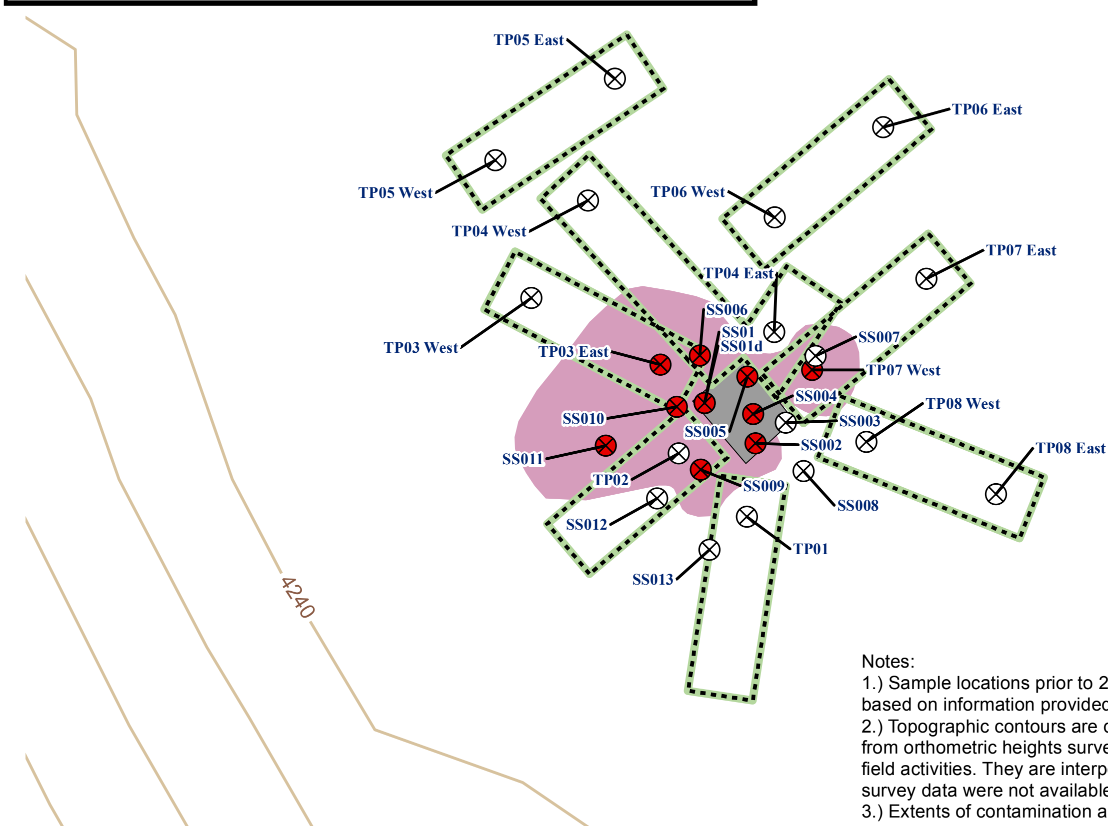
[1] Sample IDs have been truncated. 2011 sample IDs are preceeded by 11IM-SSA-.

[2] The cleanup level for PCBs is based on 18 AAC 75 Table B1, Method Two, direct contact, under 40-inch zone (ADEC 2016).

Data qualifiers are not included.

For additional definitions, see the Acronyms and Abbreviations section.




Notes:
1.) Sample locations prior to 2011 are estimated based on information provided by the USAF.
2.) Topographic contours are displayed in feet and were created from orthometric heights surveyed in WGS 1984 during 2011 field activities. They are interpolated between locations where survey data were not available.
3.) Extents of contamination are estimated from analytical results.

Sample Results Below ADEC Cleanup Level
Sample Results Above ADEC Cleanup Level
Test Pit Excavation Boundary
Debris Noted in Exploration
Concrete
Approximate Extent of PCB Contamination Above Cleanup Level
Contour Line (5 foot Interval)

All Locations Are Approximate
WGS 1984 UTM Zone 5N
1 inch = 10 feet
0 5 10 15 20
Feet

N

OT008 STAINED SOIL AREA EXTENT OF CONTAMINATION
INDIAN MOUNTAIN LONG RANGE RADAR SITE

INDIAN MOUNTAIN, ALASKA

| JACOBS | DATE: 23 MAR 2016 | PROJECT MANAGER: J. WEHRMANN | FIGURE NO: 2-2 |
|---|---|---|---|

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**OT008 Pump House Analytical Soil Sample Result Exceedances**

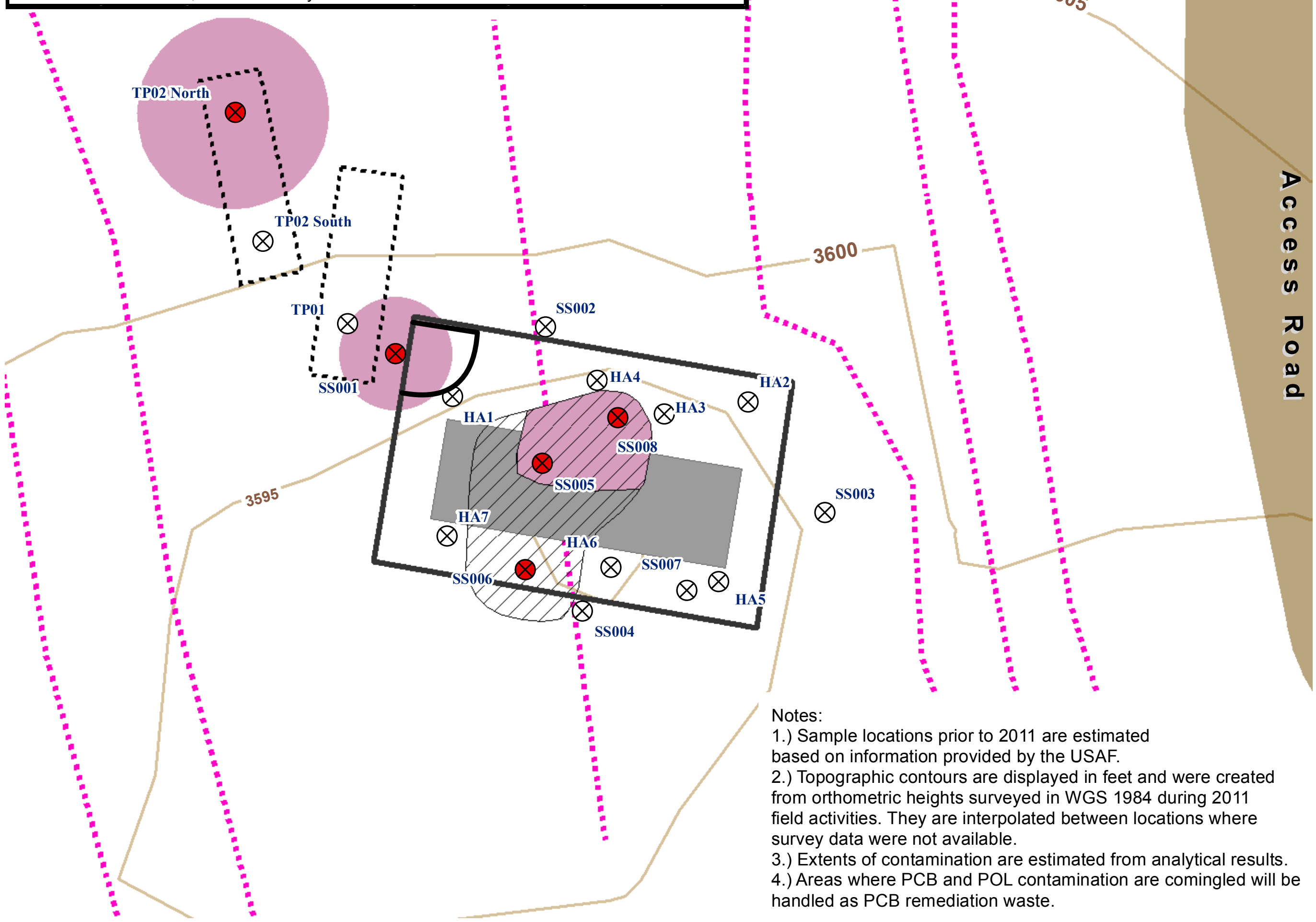
| Year Collected | Location | Sample ID | Sample Depth (feet bgs) | Analyte | Results (mg/kg) | ADEC Cleanup Level (mg/kg)[1] |
|---|---|---|---|---|---|---|
| 2008 | SS001 | 08UTOPH01SS001 | 0 -0.5 | PCB | 4.57 | 1 |
| 2008 | SS005 | 08UTOPH01SS005 | 0 -0.5 | PCB | 9.88 | 1 |
| | | | 0 -0.5 | DRO | 34,500 | 10,250 |
| 2008 | SS006 | 08UTOPH01SS006 | 0 -0.5 | DRO | 26,000 | 10,250 |
| 2008 | SS008 | 08UTOPH01SS008 | 0 -0.5 | PCB | 3.77 | 1 |
| | | 08UTOPH01SS008d | 0 -0.5 | PCB | 1.11 | 1 |
| 2011 | TP02 (North) | 11IM-PH-TP02-2N-SB019 | 2 | PCB | 4,544 | 1 |

**Notes:**

[1] The cleanup level for PCBs is based on 18 AAC 75 Table B1, Method Two, direct contact, under 40-inch zone (ADEC 2016). DRO cleanup levels based on 18 AAC 75 Table B2, Method Two, ingestion, under 40-inch zone (ADEC 2016).

Data qualifiers are not included.

For additional definitions, see the Acronyms and Abbreviations section.


Notes:
1.) Sample locations prior to 2011 are estimated based on information provided by the USAF.
2.) Topographic contours are displayed in feet and were created from orthometric heights surveyed in WGS 1984 during 2011 field activities. They are interpolated between locations where survey data were not available.
3.) Extents of contamination are estimated from analytical results.
4.) Areas where PCB and POL contamination are comingled will be handled as PCB remediation waste.

**PCB and POL Removal Areas**

- Approximate Extent of PCB Contamination Above Cleanup Level
- Approximate Extent of POL Contamination Above Cleanup Level
- Sample Location Below ADEC Cleanup Level
- Sample Locaiton Above ADEC Cleanup Level
- Pump House
- Test Pit Excavation Boundary
- Concrete Pad
- Aboveground Utility
- Contour Line (5 foot Interval)

All Locations Are Approximate
WGS 1984 UTM Zone 5N
1 inch = 10 feet

0 5 10 15 20
Feet

N

OT008 PUMP HOUSE EXTENT OF CONTAMINATION
INDIAN MOUNTIAN LONG RANGE RADAR SITE

INDIAN MOUNTAIN, ALASKA

JACOBS | DATE: 23 MAR 2016 | PROJECT MANAGER: D. FLEMING | FIGURE NO: 2-3

P:\IndianMountain\MXD16_TO165_OT008_ROD\Fig2-3_OT008_Pumphouse_ExtentOfContamination.mxd beatycj

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A comprehensive list of the soil sample result exceedances for PCBs and DRO are presented by area in Table 2-3. Complete analytical results are presented in the *Follow-On Remedial Investigation Report for Sites OT008 and SS010* (USAF 2012c).

**Table 2-3**
**PCBs and DRO Exceedances in OT008 Soil**

| Year Collected | Location | Depth (feet bgs) | Results (mg/kg) | |
|---|---|---|---|---|
| | | | Total PCBs | DRO |
| **WACS** | | | | |
| 1994 | SB01 | 0-1 | 8.3 | – |
| 1994 | SB02 | 0-1 | 760 | 14,000 |
| 1994 | SS03 | 0 | 5.1 | – |
| 1994 | SS04 | 0 | 1.8 | – |
| 1994 | SS05 | 0 | 41 | – |
| 2001 | SL03 | 0.5 | 4.7 | – |
| 2011 | TP01 | 2 | 3.8 | 14,000 |
| 2011 | TP02 | 2 | 3.5 | – |
| 2011 | TP02 | 2 | 15 | – |
| 2011 | TP04 | 3 | 3.1 | – |
| 2011 | TP04 | 4 | – | 11,000 |
| 2011 | TP05 | 3 | 1.6 | – |
| 2011 | TP06 | 3 | – | 11,000 |
| 2011 | TP07 | 1 | 5.9 | – |
| 2011 | TP07 | 1 | 6.2 | – |
| 2011 | TP10 | 2 | 2.7 | – |
| 2011 | TP10 | 5 | 1.6 | – |
| 2011 | TP14 | 1 | 8.8 | 12,000 |
| 2011 | TP14 | 5 | 5 | – |
| 2011 | TP15 | 2 | 1.2 | – |
| 2011 | TP25 | 2 | 1.9 | – |
| 2011 | TP30 | 5 | 4.4 | – |
| 2011 | TP40 | 3 | 3.1 | – |
| 2011 | TP45 | 5 | 1.1 | – |
| **Stained Soil Area** | | | | |
| 2008 | SS001 | 0-0.5 | 3,320 | – |
| 2008 | SS001 | 0-0.5 | 6,320 | – |
| 2008 | SS002 | 0-0.5 | 2.41 | – |
| 2008 | SS004 | 0-0.5 | 13.5 | – |
| 2008 | SS005 | 0-0.5 | 8.33 | – |
| 2008 | SS006 | 0-0.5 | 1.83 | – |
| 2008 | SS009 | 0-0.5 | 4.05 | – |
| 2008 | SS010 | 0-0.5 | 192 | – |
| 2008 | SS011 | 0-0.5 | 5.96 | – |
| 2011 | TP03 (East) | 1 | 680 | – |

**Table 2-3**
**PCBs and DRO Exceedances in OT008 Soil (Continued)**

| Year Collected | Location | Depth (feet bgs) | Results (mg/kg) | |
|---|---|---|---|---|
| | | | Total PCBs | DRO |
| 2011 | TP07 (West) | 1 | 21 | – |
| **Former Pump House** | | | | |
| 2008 | SS001 | 0-0.5 | 4.57 | – |
| 2008 | SS005 | 0-0.5 | 9.88 | 34,500 |
| 2008 | SS006 | 0-0.5 | – | 26,000 |
| 2008 | SS008 | 0-0.5 | 3.77 | – |
| 2008 | SS008 | 0-0.5 | 1.11 | – |
| 2011 | TP02 (North) | 2 | 4,544 | – |
| | | **Cleanup Level [1]** | **1** | **10,250** |

**Notes:**
[1] Cleanup Levels based on 18 AAC 75(c)(d), Tables B1 and B2, Method Two soil cleanup levels for direct contact in the under 40-inch zone (PCBs) and ingestion (DRO) pathways (ADEC 2016).
N/A = not applicable
– Result was below the ADEC cleanup level for the analyte indicated.
Data qualifiers are presented in the 2011 Follow-On RI (USAF 2012c).
For additional definitions, see the Acronyms and Abbreviations section.

The total estimated area of contaminated soil is 28,139 square feet at the former WACS, 134 square feet at the Stained Soil Area, and 205 square feet at the former Pump House. Tables 2-4 and 2-5 present estimated soil bank volumes based on in situ or undisturbed volumes of the soil without compensation for swell upon excavation, and weights used to develop cost estimates for potential remedial alternatives. These estimates were developed by multiplying the area of contaminated soil by its depth; however, in some locations the PCB- and DRO-contaminated soils were commingled, so the total volume of contaminated soil is less than the sum of each individually. Table 2-6 presents a summary of soil contamination located at each area of the site.

**Table 2-4**
**Estimated Bank Volume of PCB-Contaminated Soil at OT008**

| Site | PCB Soil ≥ 1 and < 10 mg/kg (cy) | PCB Soil ≥ 10 and < 25 mg/kg (cy) | PCB Soil ≥ 25 and < 50 mg/kg (cy) | PCB Soil ≥ 50 mg/kg (cy) |
|---|---|---|---|---|
| WACS | 3,073 | 154 | 46 | 34 |
| Stained Soil Area | 9 | 1 | 1 | 2 |
| Pump House | 8 | 2 | 1 | 1 |
| Total | 3,090 | 157 | 48 | 37 |

**Notes:**
PCB contamination does not appear to exceed 5 feet bgs (see Table 2-3).
For definitions, see the Acronyms and Abbreviations section.

**Table 2-5**
**Estimated Bank Volume of DRO-Contaminated Soil at OT008**

| Site | DRO Soil ≥ 10,250 mg/kg (cy) |
|---|---|
| WACS | 284 |
| Stained Soil Area | 0 |
| Pump House | 4 |
| Total | 288 |

**Notes:**
DRO contamination does not appear to exceed 4 feet bgs (see Table 2-3).
For definitions, see the Acronyms and Abbreviations section.

**Table 2-6**
**Summary of Soil Contamination by Area**

| Contaminant Type | Total Estimated Area (square feet) | Total Estimated Volume (cy) |
|---|---|---|
| **WACS** | | |
| PCB/DRO | 25,929 | 3,307 |
| DRO Only | 2,210 | 284 |
| *Total* | *28,139* | *3,591* |
| **Stained Soil Area** | | |
| PCBs Only | 134 | 13 |
| DRO Only | 0 | 0 |
| *Total* | *134* | *13* |
| **Pump House** | | |
| PCB/DRO | 148 | 12 |
| DRO Only | 57 | 4 |
| *Total* | *205* | *16* |
| **OT008 Total** | **28,478** | **3,620** |

**Notes:**
PCB/DRO commingled also includes PCB-only soils.
For definitions, see the Acronyms and Abbreviations section.

Concentrations of both PCBs and DRO in soil at OT008 decrease with depth as shown in Table 2-3. PCB concentrations in soil are unlikely to change significantly through natural processes except by dispersion of the contaminated soil; PCBs are stable compounds and persistent in the environment. The mobility of PCBs in soil is limited due to their low solubility in water; they only pose a risk to human health and the environment if affected soils are ingested or inhaled. DRO at OT008 is related to petroleum products that represent a complex mixture of aromatic, aliphatic, and polar hydrocarbons. These chemicals have limited solubility, but can be diluted or dispersed by groundwater and surface water. DRO-contaminated soil poses a risk to human health and the environment via the direct contact or ingestion pathways; however, DRO is not considered a hazardous substance under CERCLA.

*Known or Potential Routes of Migration*

Precipitation and snowmelt at Upper Camp infiltrates into the fractured rock and much of it emerges as seeps along the slopes that have been observed downslope from Upper Camp in all directions, suggesting that movement of runoff is radial rather than focused in a particular direction. One seep upgradient to the WACS emanates from SS010, which is upgradient to both the seep and to the WACS. Sample results indicated that the interceptor trench constructed between OT008 and SS010 in 1995, located on the downgradient side of the seep, did not prevent the migration of GRO, RRO, and PCBs (as well as SVOCs and barium) onto the former WACS site (USAF 2012c). This seep is described and addressed as part of the 2007 Record of Decision for Sites LF006, SS002, and SS010 (USAF 2007) and will not be included in this ROD. Surface runoff occurs via Sleepy Bear Creek northeast to Notonio Creek Basin (USAF 2006); samples collected from these potential migration pathways are also attributed to SS010 and discussed in the ROD for that site (USAF 2007). No other surface water is present at OT008.

Subsurface water at the Upper Camp appears discontinuous throughout the area, ephemeral, and related to rainfall and snowmelt; the primary aquifer is confined to the Lower Camp by bedrock, permafrost, and the Indian River.

*Conceptual Site Model*

A conceptual site model (CSM) was developed to depict the potential relationship or exposure pathway between chemical sources and receptors under current site conditions per ADEC guidance (Appendix B). An exposure pathway describes the means by which a potential receptor can be exposed to contaminants in environmental media.

Surface soil, subsurface soil, surface water, and sediment are directly affected by contamination at OT008. Soil, air, surface water, and sediment are considered exposure media. Several exposure pathways were considered complete at OT008 under current site conditions. Incidental soil ingestion and dermal absorption of contaminants from the soil or surface water are considered the most likely current exposure pathways. The inhalation of outdoor air contaminated with volatiles is possible although unlikely. Dermal contact with surface water is possible but unlikely during site work, recreational, or subsistence activities in the area. Surface water is considered a minor pathway because of the dispersion of contaminants within the water.

Actual groundwater has not been observed during any of the site investigations. If groundwater is present, regular ingestion by site workers is not reasonable or anticipated due to the availability of treated drinking water at the LRRS facility. Development of groundwater as a drinking water source in this portion of the Indian Mountain LRRS is neither likely nor feasible, but a determination under 18 AAC 75.350 has not been completed.

The most likely receptors in these areas include workers and site visitors; subsistence harvesters or consumers are not likely due to the remote location of the sites and the lack of vegetation. No residents currently live at the Upper Camp and access is limited to construction workers that access it on a temporary basis. For the purposes of evaluating human health exposure pathways to determine whether OT008 is or will be suitable for an unrestricted use determination, a residential land use scenario is assumed; the pathways for human health are presented in Table 2-7.

Birds and mammals were found to be the only ecological receptors potentially at risk from PCB and DRO contamination migrating from OT008 to the surrounding area. The pathways for ecological receptors are presented Table 2-8. An Ecoscoping Form is provided in Appendix B.

**Table 2-7**
**Human Health Conceptual Site Model**

| Current and Potential Future Contaminated Media | Release Mechanism | Potential Exposure Pathway | Potential Exposure Route | Human Receptors: Current | | | | Future[3] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SUBSISTENCE CONSUMERS | RECREATIONAL USERS | SITE WORKERS | RESIDENTS | SUBSISTENCE CONSUMERS | RECREATIONAL USERS | SITE WORKERS | RESIDENTS |
| Surface and Subsurface Soil | Historic Releases, Demolition Activities, Erosion, Wind, Precipitation, Leaching | Fugitive Dust, Rain Splatter, and/or Volatile Emissions | Outdoor Inhalation | – | – | + | N/A | – | – | + | + |
| | | | Ingestion | – | + | + | N/A | – | + | + | + |
| | | | Direct Contact | – | + | + | N/A | – | + | + | + |
| Air[1] | Volatilization | Outdoor Air | Outdoor Inhalation | – | + | + | N/A | – | + | + | + |
| Biota[2] | Bioaccumulation | Plant and Animal Uptake | Ingestion of Plants | – | – | – | N/A | – | – | – | – |
| | | | Ingestion of Meat | – | – | – | N/A | – | – | – | – |

**Notes:**
[1] Volatilization potential is minimal and applies to DRO contamination only.
[2] If significant exposure occurs, PCB concentrations may increase due to bioaccumulation.
[3] Residential use of OT008 is not anticipated; however, it is considered as a future scenario in order to determine whether the site will be suitable for UU/UE.
N/A = not applicable
+ Complete exposure pathway
– Negligible effect or incomplete pathway

## Table 2-8
## Ecological Conceptual Site Model

| Current and Potential Future Contaminated Media | Release Mechanism | Potential Exposure Pathway | Potential Exposure Route | Ecological Receptors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Current | | | | | Future | | | | |
| | | | | VEGETATION | INVERTEBRATES | FISH | BIRDS | MAMMALS | PLANTS | INVERTEBRATES | FISH | BIRDS | MAMMALS |
| Surface and Subsurface Soil | Historic Releases, Demolition Activities, Erosion, Wind, Precipitation, Leaching | Fugitive Dust, Rain Splatter, and/or Volatile Emissions | Inhalation | N/A | + | N/A | + | + | N/A | + | N/A | + | + |
| | | | Ingestion | N/A | + | N/A | + | + | N/A | + | N/A | + | + |
| | | | Direct Contact | + | + | N/A | + | + | + | + | N/A | + | + |
| Air | Volatilization | Outdoor Air | Inhalation | + | + | N/A | + | + | + | + | N/A | + | + |
| Biota[1] | Bioaccumulation | Plant and Animal Uptake | Ingestion | - | - | N/A | + | + | - | - | N/A | + | + |

**Notes:**
[1] If significant exposure occurs, PCB concentrations may increase due to bioaccumulation.
N/A = not applicable
+ Complete exposure pathway
– Negligible effect or incomplete pathway

## 2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

### 2.6.1 Land Use

A minimally attended radar unit—installed in 1984 to replace the former WACS—remains active and is currently operated and maintained year-round by contractor personnel. The closest populated area is the Koyukon Athabascan Village of Hughes, which is located approximately 16 miles from the Indian Mountain LRRS. No road connects the village to the Indian Mountain LRRS. Very little recreational activity takes place in the area around the Indian Mountain installation because of the limited access; OT008 is unlikely to be used in the future for either industrial or residential purposes because of its remote location. Subsistence activity is limited because no suitable habitat for common food sources (such as fish, moose, bears, rabbit, caribou, or waterfowl) exists at the Upper Camp.

As the lead agency, the USAF has the authority to determine the future land use of OT008. After considering input from the State of Alaska and the local community, the USAF has determined that land use is expected to remain the same.

### 2.6.2 Groundwater and Surface Water Uses

Actual groundwater has not been observed during any of the OT008 site investigations. If groundwater is present, regular ingestion by site workers is not reasonable or anticipated due to the availability of treated drinking water at the LRRS facility. Although groundwater is not a current or reasonably expected future source of drinking water at OT008, an official ADEC Groundwater Use Determination per 18 AAC 75.350 has not been prepared or submitted for this site. Residents of Hughes haul treated water to their homes from a central watering point.

## 2.7 SUMMARY OF SITE RISKS

Risk characterization is the process of quantifying cancer risk due to potential exposures to carcinogenic toxicants and of quantifying the hazard posed by potential exposures to non-carcinogenic toxicants. A baseline risk assessment estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. Cancer risk is assumed to be additive for all carcinogens. Non-cancer risk is assumed to be additive for chemicals with similar sites of toxicological action. In the event that any combination of these chemicals results in synergistic effects, risk might be underestimated. Conversely, the assumption of additivity would overestimate risk if a combination of these chemicals acted antagonistically or had no combined toxic effect at all. The methods are designed to be health-protective and tend to overestimate rather than underestimate risk. Risk characterization is limited to those source area-related chemicals selected as chemicals of potential concern selected during a screening process.

Sections 2.7.1 through 2.7.5 summarize the results of the baseline risk assessment for OT008 that was conducted in 2006 using 1994/1995 and 2001 data as well as updated risk calculations for PCBs and bulk hydrocarbons (DRO, GRO, and RRO) using the more comprehensive 2011 RI dataset. The updated risk evaluation follows EPA's methodology (EPA 1989a), as modified by more recent information and guidance, including the *Risk Assessment Procedures Manual* (ADEC 2016). This re-evaluation and comparison addresses the following potential discrepancies:

- During the 2006 HHRA, representative data for fuel contamination was insufficient to calculate a 95% upper confidence limit (UCL), so the maximum detected concentrations (14,000 mg/kg DRO and 7,700 GRO) were used for the exposure point concentrations. Potential dermal exposures of DRO and GRO were not assessed quantitatively due to a high level of uncertainty pertaining to published toxicity data. The current ADEC acceptable approach (ADEC 2015) to calculating risk from each of the associated fuel constituents and evaluating risk from the bulk hydrocarbon fractions in the uncertainty analysis. A discussion of risk associated with fuel contamination onsite based on 2011 data and revised guidance has been included in this ROD.
- Surface soil chemicals of potential concern at OT008, identified in 2006 by screening against one-tenth the most stringent ADEC Method Two cleanup levels promulgated at the time included 1,2,4-trichlorobenzene, 2,4-trinitrophenol, 4-nitrophenol, isophorone, PCB Aroclor 1260, DRO, and GRO. Of these contaminants, only PCBs and DRO exceeded the acceptable ILCR and hazard quotient (HQ) thresholds, prompting their designation as COCs. Based on a screening of 2011 data against one-tenth of current (January 2016) cleanup levels, risk calculations were performed on several other chemicals of potential concern, but no new COCs were added as a result. As in 2006, PCB Aroclor 1260 drives risk at OT008.

- No analytes for subsurface soil were retained in 2006. In 2011, several subsurface exceedance locations were identified for PCBs and DRO; subsurface exceedance data has been included in the revised exposure assessment as well as risk calculations.
- Only the WACS was sampled in 1994/5 and 2001. OT008 now comprises the Pump House and the Stained Soil Area in addition to the WACS. All three areas were sampled in 2009 and 2011 (after the baseline HHRA was prepared). All three sites are incorporated into revised risk calculations.
- Sediment and surface water results were evaluated in the 2006 baseline risk assessment; these samples were collected at the boundary between OT008 and SS010, and have since been attributed to SS010. Surface water and sediment exposures were not considered to be significant for human or ecological receptors and therefore, were not evaluated in the RA. Sediment and surface water results were filtered out of 2011 data for risk calculation.
- The site-specific exposure parameters for each pathway used in 2006 were also applied to 2011 data in the revised calculations (see Table 5-1 of the 2006 HHRA Report). Per more recent guidance, average body weight was updated from 70 to 80 kg. EPA has not published noncancer toxicity data for PCB Aroclor 1260; the reference dose used in 2006 pertains to Aroclor 1254 with undetermined applicability. HQ calculations for PCBs were not repeated on 2011 data, as the noncancer toxicity related to the specific PCB congeners has not been established (Section 2.7.3).

### 2.7.1 Identification of Chemicals of Concern

PCBs and DRO have been identified in surface and shallow subsurface soil at OT008 in concentrations that exceed ADEC risk-based screening levels (ADEC 2016). No new COCs have been added since the 2006 baseline risk assessment. The remedy to address DRO also encompasses related constituents that exceed risk screening levels.

Of the two COCs, only PCBs are defined as a hazardous substance under CERCLA; however, the USAF believes that DRO also has the potential to be harmful to human health and the environment and should therefore be considered for remediation at OT008. DRO is regulated by ADEC under 18 AAC 75.341(d).

Maximum concentrations of both COCs from all prior sample events are reported in Section 2.5.6; as no removal actions have occurred, these results represent remaining contamination. Soil contamination is not considered homogenous, although PCB and DRO contamination are sometimes commingled. For a more complete description of contaminant distribution, refer to Section 2.5.7.

### 2.7.2 Human Exposure Assessment

Currently at the Indian Mountain LRRS, personnel may be exposed to surface and subsurface soil during site work. Site visitors and subsistence harvesting activities are not anticipated due to the inaccessibility of the site, distance from Hughes, and unlikely presence of food sources. Complete pathways include ingestion, inhalation, or direct contact. The Human Health CSM presented as Appendix B depicts potential exposure pathways for COCs at OT008.

Note that human health risks from exposure to the contaminated seep at OT008 was evaluated as part of the 2007 ROD for SS010. None of the receptors evaluated in the risk assessment for SS010 (site workers, site visitors, and subsistence hunter/gatherers) represented complete exposure pathways (USAF 2007).

### 2.7.3 Toxicity Assessment

Neither the EPA Integrated Risk Information System (2016) nor the EPA Provisional Peer Reviewed Toxicity Values include assessments to determine dermal or target organ (ocular exudate) toxicity values for PCBs; therefore, the doses at which adverse effects are expected to occur were not available. In 2006, values used to calculate the HQ for PCBs (HQ = 2, above the ADEC and EPA threshold of 1) were derived from Aroclor 1254. The HQ calculation was not re-performed on 2011 PCB data due to the lack of published toxicity data, although a value of 0 likely underrepresents the risk associated with PCB Aroclor 1260.

PCBs are classified B2, indicating that they are a probable human carcinogen. The upper bound limits for cancer risk established by ADEC ($1 \times 10^{-5}$ [1 in 100,000]) and EPA (between $1 \times 10^{-4}$ and $1 \times 10^{-6}$) are used for comparison. Carcinogenic risk to site workers was evaluated for OT008 using 2011 data and the equation below.

$$ILCR = \text{CSF or IUR} \times \text{Dose}$$

Where:
ILCR = incremental lifetime cancer risk
CSF = cancer slope factor (mg/kg-day)-1
IUR = inhalation unit risk (ug/m3)-1
Dose = exposure dose (mg/kg-day)

The cancer slope factors used for PCBs vary based on the exposure pathway; risk calculations for the 2011 dataset used values published by EPA in the Integrated Risk Information System (accessed in April 2016). For a site worker at the LRRS, an exposure duration of 8 hours per day for 24 days per year over 25 years was assumed to calculate the intake rate (dose), consistent with the 2006 site-specific parameters and *Risk Assessment Guidance for Superfund* (EPA 1989). These and other values are provided on the CD that accompanies this ROD.

Fuel components were evaluated following the approach presented in the *Provisional Peer-Reviewed Toxicity Values for Complex Mixtures of Aliphatic and Aromatic Hydrocarbons* (EPA 2009b) and *Cumulative Risk Guidance* (ADEC 2008). For the DRO fraction, target analytes naphthalene and 2-methylnaphthalene were assessed separately using their specific toxicity values (oral for both compounds and inhalation for naphthalene) to generate a DRO-specific HQ.

### 2.7.4 Risk Characterization

In 2006, the cumulative ILCR estimate for potential exposure of a site worker was $3 \times 10^{-5}$, which is within the EPA range of acceptable risk but exceeds the ADEC threshold. The noncancer HI was 2, with the applicability limitations described above. The exposure point concentration for PCBs was based on a 95% UCL of 222. For the updated calculations, the exposure point concentration for PCBs increased to 362, based on a 95% UCL on 2011 data.

Consistent with the 2006 risk evaluation, potential cancer risk using 2011 data for adult site workers exceeded the ADEC risk management standard ($1 \times 10^{-5}$), but was within the EPA cancer risk range ($1 \times 10^{-4}$ and $1 \times 10^{-6}$) for PCB contamination. The cumulative ILCR estimate for all potential contaminant exposures (ingestion, dermal, and inhalation) to soils across Upper Camp for a site worker is $4 \times 10^{-5}$, which, is comparable to the 2006 ILCR. Results of the cancer and noncancer risk evaluation are summarized below; calculations are provided in Appendix E.

Specific pathway ILCRs for site workers exposed to PCB Aroclor 1260 at Upper Camp across pathways are:

- **Ingestion** $2 \times 10^{-5}$ *(exceeds ADEC risk management standard)*
- **Dermal contact** $2 \times 10^{-5}$ *(exceeds ADEC risk management standard)*
- **Inhalation** $4 \times 10^{-9}$ *(below ADEC risk management standard)*

The HQ for DRO contamination at OT008 are separated by pathway and split into aliphatic and aromatic categories; all are below the ADEC and EPA threshold of 1, even when taken cumulatively:

- **Ingestion**
  - Aliphatic 0.02
  - Aromatic 0.02
- **Dermal**
  - Aliphatic 0.001
  - Aromatic 0.002
- **Inhalation**
  - Aliphatic 0.00000006
  - Aromatic 0.0000002
- **Cumulative** **0.0073**

Uncertainty is a factor in each step of the data evaluation and the exposure and toxicity assessments presented in the preceding sections. Significant uncertainty is associated with estimating the number of days or hours per day that a site worker at Indian Mountain LRRS will be exposed to contamination; in this case, site-specific parameters from 2006 were repeated on 2011 data. The absence of information on the effects of human exposure to a chemical, such as a lack of toxicity data for PCBs or unknown cancer slope values for certain fuel constituents, make those calculations either inaccurate or impossible to perform.

The way exposure point concentrations are derived also lends uncertainty to the evaluation. Computed 95% UCLs are only estimates that are affected by number of samples, proportion of nondetects, conformance with an assumed mathematical distribution, laboratory imprecision, and elevated detection limits. The exposure assessment is likely to underestimate the exposure point concentrations in 5 percent of the cases and overestimate exposures in 95 percent of cases, imparting an overall conservative bias to the HHRA. However, the use of maximum concentrations or a 95% UCL calculated from far fewer results as conducted in 2006 also overestimates risk and is less precise. A limited number of samples may not completely characterize the source area because less information about the population from which they are drawn is provided than with larger sample sets.

In general, the overall quality of the project data was acceptable. Several issues were identified during the data review process, as discussed in Section 2.1 of the Data Quality Assessment, Appendix C of the RI Report (USAF 2012c), including thermal preservation exceedances, sample limits of detection above the ADEC cleanup levels, trip blank contamination, surrogate recovery exceedances, and matrix spike/matrix spike duplicate exceedances. These issues required sample results to be qualified; however, these qualifications did not significantly affect data quality. All data were considered usable.

Uncertainties are inherent in the HHRA process and cannot be eliminated; however, a recognition of the uncertainties is fundamental to the understanding and reasonable use of the HHRA results.

### 2.7.5 Summary of Ecological Risk Assessment

The Ecological CSM (Table 2-8) depicts the potential relationship or exposure pathway between the COCs at OT008 and both potential current and potential future ecological receptors. Complete pathways include inhalation, ingestion or direct contact with soil. The assessment includes plants, invertebrates, birds, and mammals, but applies in particular to small mammals and ground-feeding birds that are prevalent at OT008 and susceptible to bioaccumulation. If achieved, the RAOs developed for OT008 will adequately eliminate future ecological risks. An ecoscoping form for OT008 is provided in Appendix B.

### 2.7.6 Basis for Taking Action

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. If achieved, the RAOs (Section 2.8) developed for the OT008 will adequately eliminate human health risks and effectively mitigate the potential for ecological exposure.

## 2.8 REMEDIAL ACTION OBJECTIVES

RAOs provide a general description of what the CERCLA response action will accomplish. These goals typically serve as the design basis for the remedial alternatives, which were originally evaluated in the 2015 FS (USAF 2015b) and presented in the Proposed Plan (USAF 2015a). These alternatives are also discussed in the next section (Section 2.9).

The cleanup levels selected for OT008 are chemical-specific Applicable or Relevant and Appropriate Requirements (ARAR) set at the concentrations established under Method Two of 18 AAC 75.341(c) and (d) (ADEC 2016):

- ADEC Method Two soil cleanup level for PCBs (1 mg/kg for direct contact)
- ADEC Method Two soil cleanup level for DRO (10,250 mg/kg for ingestion)

The RAOs for OT008 are as follows:

- Prevent direct contact of humans to soil containing PCBs in excess of the ADEC Method Two direct contact cleanup level (1 mg/kg)
- Prevent human exposure to soil containing DRO in excess of the ADEC Method Two cleanup level for ingestion (10,250 mg/kg)
- Minimize or eliminate direct ecological exposure to PCBs and DRO above the established ADEC Method Two cleanup levels
- Reduce the potential for COCs to migrate from OT008 soil.

Although one seep is ephemerally present in the area, no definitive groundwater has been observed at or near OT008 during any site investigation. In addition, OT008 is on a mountain top and the extent of contamination appears confined to relatively shallow depths. Note that the migration to groundwater pathway at OT008 is considered incomplete and groundwater is not a reasonably expected potential future source of drinking water as defined under 18 AAC 75.350. However, a formal Groundwater Use Determination per 18 AAC 75.350 has not been prepared or approved for this site.

Achievement of these RAOs is necessary to be protective of human health and the environment while allowing continued use of OT008 for the USAF mission at Indian Mountain LRRS. The selected remedy will achieve all OT008 RAOs within two years of implementation through the transport and disposal of PCB-contaminated soil and landfarming of DRO-contaminated soil at the LRRS. Once cleanup levels have been met, the risk to human health and the environment will have been eliminated, and OT008 will then be suitable for UU/UE.

## 2.9 DESCRIPTION OF ALTERNATIVES

A set of remedial alternatives was developed for PCB-contaminated soils, and a separate set of remedial alternatives was developed for DRO-contaminated soils. The remedial alternatives summarized in Table 2-9 were evaluated in the 2015 FS (USAF 2015b) and presented in the Proposed Plan (USAF 2015a). Alternatives were retained for further analysis based on their overall protection of human health and the environment, and compliance with the ARARs applicable to OT008. These ARARs are discussed in Section 2.10.2, and a complete list of ARARs is provided in Appendix A.

In accordance with CERCLA guidance, a range of alternatives was developed to include the No Action alternative, an alternative that focuses on reducing risk by preventing exposure, and (to the extent practicable) alternatives that focus on treatment of contaminated media. The alternatives considered were generally limited by the feasibility due to the remote location of the LRRS. One PCB alternative and one DRO alternative were selected, and the resulting response actions constitute the overall site remedy for OT008.

**Table 2-9**
**Summary of Remedial Alternatives Evaluated for OT008**

| Alternative | Description | Key Assumptions | Advantages | Disadvantages | Cost Estimate[1] |
|---|---|---|---|---|---|
| **PCBs** | | | | | |
| PCB Alternative 1 | No Action | -No action planned | -Easy to Implement<br>-No cost<br>-No five-year reviews | -Not protective<br>-Regulatory concurrence unlikely<br>-Does not comply with ARARs | $0 |
| PCB Alternative 2 | Offsite Disposal of PCB-Contaminated Soil | -Volume estimates are accurate | -Highly effective<br>-All contamination above the approved cleanup levels would be removed; OT008 would be available for unrestricted use<br>-No LUCs or CERCLA five-year reviews will be required | -Highest cost<br>-Difficult to implement because it requires that large amounts of soil be shipped to the contiguous United States for disposal<br>-Does not satisfy the CERCLA statutory preference for the treatment of contamination | $26.54M |
| PCB Alternative 3 | Grain-Size Separation and Offsite Disposal of PCB-Contaminated Soil | -Volume estimates are accurate<br>-Grain-size separation is an effective way to segregate contaminated soils<br>-Rocks larger than 2 inches in diameter do not contain PCBs at concentrations ≥ 1 mg/kg | -Grain-size separation reduces the volume of soil to be shipped for disposal<br>-Satisfies CERCLA statutory preference for treatment by reducing the volume of contaminated soil through grain-size separation<br>- OT008 would be available for unrestricted use; no LUCs or CERCLA five-year reviews will be required<br>-Works in concert with DRO Alternatives 2b or 3b | -Difficult to implement because it requires the mobilization of additional heavy equipment to the site for sorting<br>-Significant cost and short-term risks associated with transportation of contaminated soil over large distances | $20.41M |

## Table 2-9
## Summary of Remedial Alternatives Evaluated for OT008 (Continued)

| Alternative | Description | Key Assumptions | Advantages | Disadvantages | Cost Estimate[1] |
|---|---|---|---|---|---|
| PCB Alternative 4 | Grain-Size Separation and Onsite/Offsite Disposal of PCB-Contaminated Soil | -Volume estimates are accurate<br>-Landfill design will effectively contain soil<br>-LUCs will effectively prevent exposure<br>-Cap will be constructed of sufficient strength and durability to withstand site conditions, and be maintained as needed<br>-Grain-size separation is an effective way to segregate contaminated soils<br>-Rocks larger than 2 inches in diameter do not contain PCBs at concentrations ≥ 1 mg/kg | -Works in concert with DRO Alternatives 2b or 3b<br>-Satisfies CERCLA statutory preference for treatment<br>-Less costly than disposal-only because the amount of contaminated soil to be shipped is further reduced<br>-PCBs above 10 mg/kg would be removed from OT008 | -LUCs and CERCLA five-year reviews would be required<br>-Significant cost and short-term risks associated with transportation of contaminated soil over long distances<br>-PCB concentrations above the cleanup level (1 mg/kg) would remain in the onsite monofill | $6.81M |
| PCB Alternative 5 | Onsite Consolidation and Capping and Offsite Disposal | -Volume estimates are accurate<br>-LUCs will effectively prevent exposure<br>-Cap will be constructed of sufficient strength and durability to withstand site conditions, and be maintained as needed | - Permeable liner and protective cap limit exposure to PCBs ≤ 10 mg/kg<br>- All PCBs 10 mg/kg and above would be transported to an appropriate treatment, storage, and disposal facility thus removing the most toxic concentrations including TSCA-regulated waste<br>-Smaller amounts of soil will be transported than is proposed under PCB Alternatives 2 and 3 | -Does not satisfy the CERCLA statutory preference for the treatment of contamination<br>-Significant cost and short-term risks associated with transportation of contaminated soil over long distances<br>-LUCs and CERCLA five-year reviews would be required | $5.85M |

## Table 2-9
## Summary of Remedial Alternatives Evaluated for OT008 (Continued)

| Alternative | Description | Key Assumptions | Advantages | Disadvantages | Cost Estimate[1] |
|---|---|---|---|---|---|
| PCB Alternative 6 | Offsite Disposal, Solidification, and Capping of PCB-Contaminated Soil | -Volume estimates are accurate<br>-Solidification will be effective in the long-term<br>-LUCs will effectively prevent exposure<br>-Cap will be constructed of sufficient strength and durability to withstand site conditions, and be maintained as needed | -Satisfies CERCLA statutory preference for treatment<br>-Maximizes protectiveness though the use of solidification as well as a protective cap | -Increases the volume of contaminated material through the addition of cementitious admixture<br>-Does not satisfy the CERCLA statutory preference for the treatment of contamination<br>-LUCs and CERCLA five-year reviews would be required | $7.38M |
| PCB Alternative 7 | Onsite consolidation and capping | -Volume estimates are accurate<br>-Cap constructed to withstand site conditions, and maintained as needed<br>-LUCs will effectively prevent exposure | -Lowest cost<br>-Shorter duration and ease of implementation | -A technical impracticability waiver would be required to dispose of TSCA-regulated waste at the LRRS.<br>-Does not satisfy the CERCLA statutory preference for the treatment of contamination<br>-LUCs and CERCLA five-year reviews would be required | $3.96M |
| **DRO** | | | | | |
| DRO Alternative 1 | No Action | -No action planned | -Easy to Implement<br>-No cost | -Not protective<br>-Does not comply with ARARs | $0 |
| DRO Alternative 2 | LUCs | -LUCs will effectively prevent exposure | -Lowest cost<br>-Shorter duration for onsite workers with no soil handling; ease of implementation | -LUCs, such as signs and fencing, will be necessary until contaminant concentrations fall below ADEC cleanup levels – these levels will not be rapidly attained without the introduction of one of the technologies outlined below | $289K |

**Table 2-9**
**Summary of Remedial Alternatives Evaluated for OT008 (Continued)**

| Alternative | Description | Key Assumptions | Advantages | Disadvantages | Cost Estimate[1] |
|---|---|---|---|---|---|
| DRO Alternative 3a | Onsite Landfarming of DRO-Contaminated Soils | -Satisfies CERCLA statutory preference for treatment<br>-LUCs will effectively prevent short-term exposure until cleanup levels are met | -Lower (moderate) cost<br>-Satisfies the CERCLA statutory preference for the treatment of contamination | -Requires periodic tilling and confirmation sampling<br>-LUCs, such as signs and fencing, will be necessary until contaminant concentrations fall below ADEC cleanup levels, estimated at 2 years | $1.26M |
| DRO Alternative 3b | Grain-Size Separation and Onsite Landfarming of DRO-Contaminated Soils | -Volume estimates are accurate<br>-Grain-size separation is an effective way to segregate contaminated soils<br>-Rocks larger than 2 inches in diameter do not contain DRO at concentrations ≥ 10,250 mg/kg<br>-Landfarming effectively reduces DRO contaminant levels within a reasonable time (estimated 2 years)<br>-LUCs will effectively prevent exposure | -Satisfies the CERCLA statutory preference for the treatment of contamination using two remedial technologies – one to reduce volume, and one to reduce toxicity<br>-Works in concert with PCB Alternatives 3 or 4 | -Requires periodic tilling and confirmation sampling<br>-Difficult to implement because it requires the mobilization of additional heavy equipment to the site for sorting<br>-LUCs, such as signs and fencing, will be necessary until contaminant concentrations fall below ADEC cleanup levels, estimated at 2 years | $1.46M |
| DRO Alternative 4a | Offsite Disposal of DRO-Contaminated Soils | -Volume estimates are accurate | -All contamination above ADEC cleanup levels would be removed; the site would be available for unrestricted use; no LUCs or CERCLA five-year reviews will be required | -Highest cost<br>-Difficult to implement because it requires that large amounts of soil be shipped for disposal<br>-Does not satisfy the CERCLA statutory preference for the treatment of contamination | $3.23M |

# Table 2-9
# Summary of Remedial Alternatives Evaluated for OT008 (Continued)

| Alternative | Description | Key Assumptions | Advantages | Disadvantages | Cost Estimate[1] |
|---|---|---|---|---|---|
| DRO Alternative 4b | Grain-size Separation and Offsite Disposal of DRO-Contaminated Soils | -Volume estimates are accurate<br>-Grain-size separation is an effective way to segregate contaminated soils<br>-Rocks larger than 2 inches in diameter do not contain DRO at concentrations ≥ 10,250 mg/kg | -Grain-size separation reduces the volume of soil to be shipped offsite for disposal<br>-Satisfies the CERCLA statutory preference for the treatment of contamination<br>-All contamination above ADEC cleanup levels would be removed; the site would be available for unrestricted use; no LUCs or CERCLA five-year reviews will be required<br>-Works in concert with PCB Alternatives 3 or 4 | -Difficult to implement because it requires the mobilization of additional heavy equipment to the site for sorting<br>-Significant cost and short-term risks associated with transport and disposal | $3.08M |

**Notes:**
[1] Costs are estimated with +50/-30% accuracy based on subcontractor quotes, construction drawings, and engineering estimates
M = millions

### 2.9.1 Description of Remedy Components

Seven alternatives for PCBs and six alternatives for POLs were developed to address soil contamination at OT008. This section provides a summary overview of the components of those alternatives. Note that the volume estimates account for bulk expansion factor as applicable, and therefore vary from the in situ estimates provided in Tables 2-4 and 2-5.

A common element shared by several of the remedies is the implementation of permanent or temporary LUCs due to the presence of PCB and DRO contamination. Permanent LUCs would be implemented under PCB Alternatives 4, 5, 6, and 7 and POL Alternative 2 and temporary LUCs would be implemented under POL Alternatives 3a and 3b; in these instances, residual soil contamination precludes recreational or residential site use. The purpose of LUCs is to protect human health from hazardous substances or pollutants and control the disposition of any soil excavated from the site. LUCs will also ensure the integrity of other site controls such as fencing or protective liners and caps.

Reasonably anticipated current and future land use at OT008 is industrial and infrequent; where LUCs are a component of the remedy, restrictions would be implemented to preclude any development or use that could affect the protectiveness of the selected remedy. LRRS personnel and any potential trespassers will be notified of hazards and restrictions through site postings (i.e. warning signs). Areas where dig restrictions are in effect will be surveyed and clearly delineated on a map that is incorporated into the *LUC Management Plan* for Pacific Air Forces Regional Support Center installations. A deed notation will be executed with the USAF real property office and in State of Alaska Department of Natural Resources land records for contamination that remains in the soil at unacceptable levels. The USAF is responsible for implementing, monitoring, maintaining, reporting on, and enforcing LUCs until concentrations are below such levels that allow for UU/UE.

*PCB Alternative 1: No Action*

- No action would be taken. This alternative is a baseline for comparison as required under the NCP, 40 CFR 300.430(e)(6).

*PCB Alternative 2: Offsite Disposal of PCB-Contaminated Soil 1 mg/kg and Above*

- All PCB-contaminated soil above the ADEC Method Two migration to groundwater cleanup level (1 mg/kg), estimated at 3,997 cy, would be excavated and transported for disposal at a permitted facility in the contiguous United States.
- PCB-contaminated soil with concentrations 50 mg/kg (37 cy) and above would be segregated, handled, and disposed of in accordance with TSCA.
- Confirmation soil samples would be collected from the excavations to show that remaining PCB concentrations are below the ADEC cleanup level (1 mg/kg).
- The approximate cost for this alternative is $26.54 million; project duration is 108 days.
- This alternative does not require five-year reviews under CERCLA. All PCB-contaminated soil above the cleanup level would be removed, and therefore OT008 would be immediately suitable for UU/UE.

*PCB Alternative 3: Grain-Size Separation and Offsite Disposal of PCB-Contaminated Soil 1 mg/kg or Above*

- All PCB-contaminated soil above the ADEC Method Two direct contact cleanup level (1 mg/kg), estimated at 3,024 cy, would be excavated and segregated into three stockpiles: [1 mg/kg to less than 25 mg/kg]; [25 mg/kg to less than 50 mg/kg], and [50 mg/kg and above], as described below:
  - Soil with concentrations from 1 mg/kg to less than 25 mg/kg would be mechanically screened for separation of grain sizes in order to reduce the waste quantity to be shipped to a permitted treatment, storage, and disposal facility (TSDF) in the contiguous United States. Rocks larger than approximately 2 inches in diameter, which have less PCB concentration per unit of mass, would be removed, visually inspected, and sampled. Once it is determined that PCB concentrations are below the cleanup level, these rocks would be used to backfill the excavation. All remaining fines, soil clumps, and large non-rock material transported for disposal at a permitted facility in the contiguous United States.
  - PCB-contaminated soil with concentrations from 25 mg/kg to less than 50 mg/kg would be transported for disposal at a permitted facility in the contiguous United States.
  - PCB-contaminated soil with concentrations 50 mg/kg (37 cy) and above would be segregated, handled, and disposed of in accordance with TSCA.
- Confirmation soil samples would be collected from the excavations to show that remaining PCB concentrations are below the ADEC cleanup level (1 mg/kg).
- The approximate cost for this alternative is $20.4 million; project duration is 110 days.
- This alternative does not require five-year reviews under CERCLA. All PCB-contaminated soil above the ADEC cleanup level would be removed, and therefore OT008 would be immediately suitable for UU/UE.

*PCB Alternative 4: Grain-Size Separation, Offsite Disposal of PCB-Contaminated Soil 10 mg/kg or Greater, and Onsite Disposal of PCB-Contaminated Soil from 1 mg/kg to Less than 10 mg/kg*

- All PCB-contaminated soil above the ADEC Method Two direct contact cleanup level (1 mg/kg), estimated at 3,024 cy, would be excavated and segregated into four stockpiles: [1 mg/kg to less than 10 mg/kg], [10 mg/kg to less than 25 mg/kg]; [25 mg/kg to less than 50 mg/kg], and [50 mg/kg and above], as described below:
  - Soil with concentrations from 1 mg/kg to less than 10 mg/kg and 10 mg/kg to less than 25 mg/kg would be mechanically screened for separation of grain sizes in order to reduce the waste quantity to be shipped. Rocks larger than approximately 2 inches in diameter, which have less PCB concentration per unit of mass, would be removed, visually inspected, and sampled. Once it is determined that PCB concentrations are below the cleanup level, these rocks would be used to backfill the excavation. All remaining fines, soil clumps, and large non-rock material from 10 mg/kg to less than 25 mg/kg (approximately 242 cy) would be transported for disposal at a permitted facility in the contiguous United States. All remaining fines, soil clumps, and large non-rock material from 1 mg/kg to less than 10 mg/kg (approximately 2,781 cy) would remain in a permitted monofill designed specifically for LRRS conditions.
  - PCB-contaminated soil with concentrations from 25 mg/kg to less than 50 mg/kg would be transported for disposal at a permitted facility in the contiguous United States.
  - PCB-contaminated soil with concentrations 50 mg/kg (37 cy) and above would be segregated, handled, and disposed of in accordance with TSCA.
- Confirmation soil samples would be collected from the excavations to show that remaining PCB concentrations are below the ADEC cleanup level (1 mg/kg).
- The approximate cost for this alternative is $6.81 million; project duration is 92 days.
- This alternative requires LUCs and five-year reviews under CERCLA because PCB-contaminated soil above the ADEC cleanup level would remain indefinitely.

*PCB Alternative 5: Offsite Disposal of PCB-Contaminated Soil 10 mg/kg and Above, and Onsite Consolidation and Capping of PCB-Contaminated Soil From 1 mg/kg to Less Than 10 mg/kg*

- All PCB-contaminated soil 10 mg/kg and above would be removed from the WACS, Stained Soil Area, and Pump House, estimated at 3,090 cy, would be excavated and removed for disposal in the contiguous United States.
- PCB-contaminated soil from 1 mg/kg to less than 10 mg/kg would be removed from the Stained Soil Area and Pump House for consolidation and capping with a minimum of 2 feet of clean fill at the WACS. PCB-contaminated soil above 1 mg/kg and less than 10 mg/kg would be covered with a permeable geofabric liner prior to capping. The cap would be designed and constructed to withstand environmental conditions, and would prevent exposure of humans and the environment to residual PCBs.

- PCB concentrations above 10 mg/kg and below 50 mg/kg would be disposed of as nonhazardous waste; PCB concentrations 50 mg/kg and above would be disposed of as hazardous waste in a Resource Conservation and Recovery Act (RCRA) Subtitle C facility.
- Soil that reaches or exceeds 50 mg/kg PCBs, including those defined as a principal threat waste (500 mg/kg and above), would be handled, transported, and disposed of in accordance with TSCA. TSCA-regulated soils are subject to more stringent storage, transportation, and disposal requirements and would be segregated from other waste soils for that reason.
- Confirmation soil samples would be collected from the excavations to show that remaining PCB concentrations are below the cleanup level (1 mg/kg) at the Stained Soil Area and the Pump House, and below 10 mg/kg at the lateral and vertical extents of the WACS excavation. Step-out sampling would occur at the WACS until 1 mg/kg is achieved to confirm that the cap would cover all soil above the RAO for PCBs.
- Cap extents would be surveyed and mapped. Annual LUC and cap inspections and maintenance as needed would be performed to ensure the long-term integrity of the cap; inspection results and photographs will be communicated in a letter report to ADEC and promptly (within one year) addressed by USAF. Preferential drainage pathways, evidence of erosion, and any instances where the geofabric liner is apparent or has been compromised would be documented and addressed.
- LUCs such as signs, fencing, and dig restrictions would be implemented to limit site access and, therefore, exposure to PCBs. Only industrial use would be permitted. USAF would be responsible for enforcing these LUCs and maintenance of these LUCs.
- This alternative would require five-year reviews under CERCLA. PCB-contaminated soil, although contained under a protective cap, would remain above cleanup levels at the WACS. Five-year reviews evaluate the overall effectiveness of the remedy and ensure that it remains protective over the long-term, to include the integrity of the landfill cap and the effectiveness of LUCs as well as any changes that may require re-evaluation of the remedy. Documentation from annual inspections and any subsequent maintenance performed as a result of deficiencies would be presented in the five-year review reports.
- Commingled PCB- and DRO-contaminated soil would be treated as PCB-contaminated soil and either removed (10 mg/kg PCBs and above) or consolidated and capped at the WACS (less than 10 mg/kg PCBs). PCBs are considered more toxic than DRO and therefore drive risk at the OT008.
- The approximate cost for this alternative is $5.85 million; project duration is 63 days.

*PCB Alternative 6: Offsite Disposal of PCB-Contaminated Soil 25 mg/kg and Above, and Solidification and Capping of PCB-Contaminated Soil From 1 mg/kg to Less Than 25 mg/kg*

- All PCB-contaminated soil above the ADEC Method Two direct contact cleanup level (1 mg/kg), estimated at 3,024 cy, would be excavated and segregated into three stockpiles: [1 mg/kg to less than 25 mg/kg]; [25 mg/kg to less than 50 mg/kg], and [50 mg/kg and above], as described below:

- Soil with PCB concentrations from 1 mg/kg to less than 25 mg/kg would be solidified with a cementitious additive and used as backfill. Project execution would be based on the results of a pilot or treatability study performed to evaluate the long-term stability of the solidified soil. The excavation would then be covered with a permeable geofabric liner and capped to prevent exposure.
- PCB-contaminated soil with concentrations from 25 mg/kg and less than 50 mg/kg (102 cy) would be transported for disposal at a permitted facility in the contiguous U.S.
- PCB-contaminated soil with concentrations 50 mg/kg (37 cy) and above would be segregated, handled, and disposed of in accordance with TSCA

- Confirmation soil samples would be collected from the excavations to show that remaining PCB concentrations are below the cleanup level.
- The approximate cost for this alternative is $7.38 million; project duration is 81 days.
- This alternative requires five-year reviews under CERCLA. PCB-contaminated soil would remain above cleanup levels. LUCs such as signs, fencing, and dig restrictions would be implemented to limit site access and, therefore, exposure to PCBs. Only nonresidential use would be permitted. USAF would be responsible for enforcing these LUCs and maintenance of these LUCs.

*PCB Alternative 7: Onsite Consolidation and Capping of PCB-contaminated soil 1 mg/kg and Above*

- An EPA technical impracticability waiver must be requested and granted in order to leave contamination above TSCA allowable limits at OT008.
- PCB-contaminated soil 1 mg/kg and above would be excavated from the Stained Soil Area and Pump House, estimated at 25 cy, and consolidated with the remaining 3,307 cy present at the WACS to be covered with a permeable geofabric liner and capped.
- Confirmation soil samples would be collected from the Stained Soil Area and Pump House excavations to show that remaining PCB concentrations are below 1 mg/kg.
- PCBs at the WACS would be covered with a minimum of 2 feet of clean fill; regular inspections and maintenance would be performed to ensure the long-term integrity of the cap, and LUCs would be implemented to control exposure risks.
- The approximate cost for this alternative is $3.96 million; project duration is 56 days.
- This alternative requires five-year reviews under CERCLA. PCB-contaminated soil would remain above cleanup levels and above TSCA regulatory limits. LUCs such as signs, fencing, and dig restrictions would be implemented to limit site access and, therefore, exposure to PCBs. Only nonresidential use would be permitted. USAF would be responsible for enforcing these LUCs and maintenance of these LUCs.

*DRO Alternative 1: No Action*

- No action would be taken. This alternative as a baseline for comparison as required under the NCP, 40 CFR 300.430(e)(6).

*DRO Alternative 2: Land-Use Controls*

- No DRO-contaminated soil would be excavated under this alternative; instead, LUCs would be placed at the WACS and the Pump House to control the risk of exposure.
- Signs, fencing, and dig restrictions would limit access and prevent exposure to DRO. Only nonresidential use would be permitted. USAF would be responsible for the implementation and long-term maintenance of these LUCs.
- The cost for this alternative is $289,000; project duration is 0 days.
- Periodic reviews under State of Alaska regulations would be required under this alternative; these could be performed concurrently with five-year reviews at OT008 and/or other Indian Mountain sites.

*DRO Alternative 3a: Onsite Landfarming of DRO-Contaminated Soils 10,250 mg/kg and Above*

- A topographically flat area would be selected for the landfarming treatment area to minimize the risk of erosion of the contaminated soil and runoff of sediments to adjacent undisturbed areas.
- An earthen berm around the DRO landfarm area would be constructed and used for containment. Pre-treatment samples from the proposed landfarm area floor and berm would be collected to ensure that the area selected is not contaminated.
- All DRO-contaminated soil above the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO) would be excavated, mechanically mixed, and spread to a maximum depth of 10 inches.
- Confirmation soil samples would be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.
- Baseline analytical samples would be collected at the landfarm according to the frequency recommended in Table 2A of ADEC *Field Sampling Guidance* and correlated with field screening results.
- Tilling would occur twice per year after the initial placing of the soil until soil samples from the landfarm show that the ADEC cleanup level for ingestion (10,250 mg/kg) has been achieved. Tilling the soil would accelerate natural volatilization and attenuation.
    - Field screening using a PID would be conducted in conjunction with tilling to estimate progress toward RAOs; analytical samples would be collected once a consistent reduction in PID readings has been established and be repeated until RAOs are achieved.

- If concentrations do not appear to be decreasing at an acceptable rate after two field seasons, nutrient testing may occur to evaluate the addition of water or fertilizer to further expedite degradation.

- LUCs such as a temporary snowfence, signs, and dig restrictions would limit access and prevent incidental contact by workers periodically visiting the Upper Camp until the cleanup level is achieved (approximately two years) and the area becomes suitable for UU/UE. Only nonresidential use would be permitted. USAF would be responsible for the implementation maintenance of these LUCs in the interim and site restoration to include deconstruction and grading to match natural contours once treatment is complete. The fence, signage, and restrictions would be removed upon remedy completion.

- This alternative does not require periodic reviews under State of Alaska regulations. All DRO-contaminated soil above the ADEC cleanup level would be treated at the LRRS; once cleanup levels are achieved (approximately two years), OT008 would be suitable for UU/UE.

- The cost for this alternative is $1.26 million; project duration is 18 days.

*DRO Alternative 3b: Grain-Size Separation and Onsite Landfarming of DRO-Contaminated Soils 10,250 mg/kg and Above*

- All DRO-contaminated soil greater than or equal to the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO) would be excavated and mechanically screened for separation of grain sizes.

- Confirmation soil samples would be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.

- Rocks larger than approximately 2 inches in diameter, which have less DRO contamination per unit of mass, would be removed and visually inspected to determine whether DRO concentrations are below the cleanup level; this oversized material would be used to backfill the excavations.

- All fine-grained DRO-contaminated soils (260 cy) would be landfarmed to a maximum depth of 10 inches, allowing volatilization and natural attenuation to take place at an accelerated rate.

- An earthen berm would be constructed to prevent contaminant migration from the landfarming area, and the soil would be mechanically tilled twice per year to encourage biodegradation.

  - Baseline analytical samples would be collected at the frequency recommended in Table 2A of ADEC Field Sampling Guidance and correlated with field screening results.

  - Field screening using a PID would be conducted in conjunction with tilling to estimate progress toward RAOs; analytical samples would be collected once a consistent reduction in PID readings has been established and be repeated until RAOs are achieved.

- If concentrations do not appear to be decreasing at an acceptable rate after two field seasons, nutrient testing may occur to evaluate the addition of water or fertilizer to further expedite degradation.

- LUCs such as signs, fencing, and dig restrictions would limit access and prevent exposure to DRO until the cleanup level is achieved (approximately two years). Only nonresidential use would be permitted. USAF would be responsible for the maintenance of these LUCs in the interim and site restoration to include deconstruction and grading to match natural contours once treatment is complete..
- The cost for this alternative is $1.46 million; project duration is 19 days.
- This alternative does not require periodic reviews under State of Alaska regulations. All DRO-contaminated soil above the ADEC cleanup level would be treated; once cleanup levels are achieved (approximately two years), OT008 would be suitable for UU/UE.

*DRO Alternative 4a: Offsite Disposal of DRO-Contaminated Soils 10,250 mg/kg and Above*

- All DRO-contaminated soil greater than or equal to the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO), approximately 346 cy, would be excavated and removed for treatment and disposal.
- Confirmation soil samples would be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.
- The cost for this alternative is $3.32 million; project duration is 16 days.
- This alternative does not require periodic reviews under State of Alaska regulations. All DRO-contaminated soil above the cleanup level would be removed, and therefore OT008 would be immediately suitable for UU/UE.

*DRO Alternative 4b: Grain-Size Separation and Offsite Disposal of DRO-Contaminated Soils 10,250 mg/kg and Above*

- All DRO-contaminated soil greater than or equal to the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO) would be excavated and mechanically screened for separation of grain sizes.
- Confirmation soil samples would be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.
- Rocks larger than approximately 2 inches in diameter, which have less DRO contamination per unit of mass, would be removed, visually inspected visually inspected to determine whether DRO concentrations are below the cleanup level; this oversized material would be used to backfill the excavations.
- All fine-grained DRO-contaminated soils (260 cy) would be transported to a permitted landfill within Alaska for disposal.
- The cost for this alternative is $3.08 million; project duration is 16 days.

- This alternative does not require periodic reviews under State of Alaska regulations. All DRO-contaminated soil above the cleanup level would be removed, and therefore OT008 would be immediately suitable for UU/UE.

## 2.10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, the alternatives for OT008 were evaluated using the nine criteria described in Section 121(b) of CERCLA and the NCP §300.430(f)(5)(i). These criteria are classified as threshold criteria, balancing criteria, and modifying criteria.

**Threshold criteria** are standards that an alternative must meet to be eligible for selection as a response action. There is little flexibility in meeting the threshold criteria—the alternative must meet them or it is unacceptable. The following are classified as threshold criteria:

- Overall protection of human health and the environment
- Compliance with ARARs

**Balancing criteria** weigh the tradeoffs between alternatives. These criteria represent the standards upon which the detailed evaluation and comparative analysis of alternatives are based. In general, a high rating on one criterion can offset a low rating on another balancing criterion. Five of the nine criteria are considered balancing criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume through treatment
- Short-term effectiveness
- Implementability
- Cost

**Modifying criteria** indicate whether technical and administrative issues have been met by the alternative and address the public concerns in the decision-making process. Modifying criteria are listed below:

- Community acceptance
- Regulatory acceptance

Table 2-10 and the following sections summarize how well each alternative satisfies the evaluation criteria and provides a basis for comparison to the other alternatives under consideration.

## Table 2-10
## Screening of Alternatives for PCB- and DRO-Contaminated Soil

| Alternative | Threshold Criteria | | Primary Balancing Criteria | | | | | Modifying Criteria | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 (millions) | State Acceptance | Community Acceptance |
| **PCBs** | | | | | | | | | |
| PCB 1: No Action | ○ | ○ | 0 | 0 | 0 | 5 | $ 0 | No | No |
| PCB 2: Offsite Disposal | ● | ● | 5 | 0 | 2 | 3 | $ 26.54 | Yes | Yes |
| PCB 3: Grain-Size Separation and Offsite Disposal | ● | ● | 5 | 2 | 2 | 5 | $ 20.41 | Yes | Yes |
| PCB 4: Grain-Size Separation and Onsite/Offsite Disposal | ● | ● | 4 | 2 | 3 | 4 | $ 6.81 | Yes | Yes |
| PCB 5:Onsite Consolidation and Capping and Offsite Disposal | ● | ● | 2 | 0 | 4 | 5 | $ 5.85 | Yes | Yes |
| PCB 6: Offsite Disposal, and Onsite Solidification | ● | ● | 4 | 3 | 2 | 3 | $ 7.38 | Yes | Yes |
| PCB 7: Onsite Consolidation and Capping | ● | ○ | 2 | 0 | 4 | 4 | $ 3.96 | No | No |

**Notes:**

● or 5 = Fully meets criterion

◐ or 1 to 4 = Somewhat meets criterion

○ or 0 = Does not meet criterion

## Table 2-12
## Screening of Alternatives for PCB- and POL-Contaminated Soil (Continued)

| Alternative | Threshold Criteria | | Primary Balancing Criteria | | | | | Modifying Criteria | |
|---|---|---|---|---|---|---|---|---|---|
| | 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 (millions) | State Acceptance | Community Acceptance |
| **DRO** | | | | | | | | | |
| DRO 1: No Action | ○ | ○ | 0 | 0 | 0 | 5 | $ 0 | No | No |
| DRO 2: Land-Use Controls | ● | ● | 2 | 0 | 4 | 5 | $ 0.29 | Yes | No |
| DRO 3a: Onsite Landfarming | ● | ● | 4 | 3 | 3 | 4 | $ 1.26 | Yes | Yes |
| DRO 3b: Grain-Size Separation and Onsite Landfarming | ● | ● | 4 | 4 | 3 | 3 | $ 1.46 | Yes | Yes |
| DRO 4a: Offsite Disposal | ● | ● | 5 | 1 | 3 | 2 | $ 3.3 | Yes | Yes |
| DRO 4b: Grain-Size Separation and Offsite Disposal | ● | ● | 5 | 2 | 2 | 3 | $ 3.1 | Yes | Yes |

**Notes:**
● or 5 = Fully meets criterion
◐ or 1 to 4 = Somewhat meets criterion
○ or 0 = Does not meet criterion

### 2.10.1 Overall Protection of Human Health and the Environment

The No Action alternative fails to comply with the threshold criteria for PCBs or DRO. Because this alternative lacks either LUCs or contaminant removal, a possibility exists that humans could be exposed to site contaminants that are above cleanup levels. The remaining alternatives are protective of human health and the environment at project completion and would be implemented in a manner that complies with all chemical-, location-, and action-specific ARARs. Because PCB and DRO Alternative 1 fail to attain the threshold criteria, they will not be considered further, but will be used as a baseline for comparison of the other alternatives.

PCB Alternatives 2, 3, 4, 5, and 6 all include transportation and disposal components for PCB-contaminated soil. LUCs will be implemented to protect human health and the environment where contamination above the cleanup level remains (PCB Alternatives 4, 5, 6, and 7). These PCB alternatives meet the threshold criteria and, thus, are further evaluated. DRO Alternatives 2, 3a, 3b, 4a, and 4b meet the threshold criteria by protecting human health and the environment through LUCs, treatment, disposal, or a combination of those technologies; these DRO alternatives are further evaluated.

### 2.10.2 Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that response actions at CERCLA sites satisfy legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations—collectively referred to as "ARARs"—unless waived under CERCLA Section 121(d)(4). Compliance with ARARs addresses whether a remedy will meet all federal and state environmental regulations, or provides a basis for invoking a waiver.

ARARs are divided into three categories: chemical-, location-, and action-specific. The ARARs for OT008 are presented in Appendix A. Chemical-specific ARARs were used to set cleanup levels that are both protective of human health and ecological receptors; during site work, other key chemical-specific ARARs include RCRA (42 USC 6901), which establishes procedures for cradle-to-grave waste manifesting, and the TSCA (40 CFR 761), which regulates storage and disposal of PCB contamination. Location-specific ARARs require that potential wildlife habitat, migration patterns, and negative effects on the ecosystem be considered as part of project design. Action-specific ARARs are included to highlight proper waste management procedures and provide pollution control and notification procedures in the event of a spill. ARARs, once identified, are then further classified as applicable, relevant and appropriate, or to be considered. ARARs for OT008 are included in Appendix A.

**Applicable requirements** are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental regulations or facility-citing laws that specifically address a hazardous substance, pollutant, contaminant, response action, location, or other circumstance found at a CERCLA site. State standards may be applicable provided they are more stringent than federal requirements and are identified in a timely manner.

**Relevant and appropriate** requirements are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental regulations or facility-citing laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, response action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site (relevant) that their use is well-suited (appropriate) to the particular site. State standards may only be relevant and appropriate if they are identified in a timely manner and are more stringent than federal requirements.

PCB Alternative 1, PCB Alternative 7, and DRO Alternative 1 are not compliant with the ARARs. The No Action alternatives would result in PCB- and DRO-contaminated soil remaining in an uncontrolled manner. This would not be protective of human health or the environment and would not comply with ARARs. PCB Alternative 7 does not comply with all ARARs because under this alternative, TSCA-regulated concentrations of PCBs would remain at OT008. A technical impracticability waiver would be required in order for this alternative to be selected. All DRO Alternatives comply with the ARARs identified for OT008 (Appendix A). All waste streams will be handled, manifested, transported, and disposed of in accordance with applicable federal and state regulations including, but not limited to: RCRA, TSCA, and 18 AAC 75.

### 2.10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time after the selected alternative has been implemented. This criterion includes the consideration of residual risk that will remain and the adequacy and reliability of controls.

Each alternative, with the exception of the No Action alternatives, provides some degree of long-term protection. Residual risks will be immediately eliminated under PCB Alternative 2, PCB Alternative 3, and DRO Alternatives 4a and 4b. Under PCB Alternatives 4, 5, 6, and 7 and DRO Alternative 2, long-term effectiveness and permanence are dependent upon the adequate maintenance and implementation of LUCs. The temporary exposure risks resulting in the implementation of DRO Alternatives 3a and 3b will be mitigated through site controls and an earthen berm surrounding the DRO landfarm area for approximately two years, after which contaminant concentrations are anticipated to have decreased to below the ADEC cleanup level for DRO, at which time the landfarm site will be suitable for UU/UE.

Contamination remains indefinitely at the LRRS under PCB Alternatives 4, 5, 6, and 7. Of these, the contamination remaining under PCB Alternatives 4 and 5 would be below 10 mg/kg and capped to prevent exposure. PCB Alternative 6, although it includes leaving contamination onsite up to 25 mg/kg, also includes the added solidification process to further minimize exposure risks over the long-term. All PCB alternatives that allow contamination above the cleanup level to remain include site controls to limit access and exposure, maintenance, and CERCLA five-year reviews for 30 years as principal elements of the remedy to ensure its long-term protectiveness, effectiveness, and permanence.

### 2.10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Under

CERCLA, there is a preference for alternatives that reduce the toxicity, mobility, and/or volume of contaminated media through treatment. For this site, PCB Alternatives 3 and 4 reduce the volume of contamination through grain-size separation, and PCB Alternative 6 reduces the mobility of contamination through solidification – however, the volume of contamination actually increases under PCB Alternative 6 with the introduction of a cementitious admixture to bind the soil together.

For DRO, the grain-size separation that would occur under DRO Alternatives 3b and 4b reduces the volume of contamination. The landfarming that would occur under DRO Alternatives 3a and 3b is a treatment technology that enhances natural processes (oxygenation, volatilization, natural attenuation) to reduce toxicity over time. Of these options, treatment technologies are most effectively employed under DRO Alternative 3b, which includes components to reduce both volume and toxicity.

### 2.10.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the alternative and any potential adverse impacts on workers, the community, and the environment during construction and operation of the alternative. Although not included in the NCP as part of this balancing criterion, additional risks to the environment include potential harm to the environment where increased fossil fuels and greenhouse gas emissions are required for remedy implementation (ITRC 2011).

The consolidation and capping proposed under PCB Alternative 7 represent the best short-term effectiveness because the short-term exposure to site workers would be minimized; this PCB remedy implementation has the shortest duration at 56 days. However, under this alternative, it is unlikely that OT008 would ever be available for UU/UE. Therefore, under this criterion, alternatives that provide a higher level of protectiveness while reducing worker exposure are preferred. PCB Alternative 5 has a higher degree of protectiveness because the highest levels of contamination would be shipped for disposal prior to implementing the protective cap, which would add only one week as compared to PCB Alternative 7. If selected, all site workers would undergo proper training prior to project execution. During site work, proper handling procedures would be followed, and appropriate personal protective equipment (PPE) would be required.

However, all shipment and disposal Alternatives (PCB Alternatives 2 and 3, and, to a lesser degree, 4, 5, and 6, require burning significantly more fossil fuels that generate air emissions and greenhouse gases than PCB Alternative 7. For example, PCB Alternative 2 would require 364 flights to dispose of contaminated soil, but PCB Alternative 6 would require only 10 flights. Furthermore, although unlikely, the increased amount of soil to be transported for disposal correlates to the probability that spills could occur while in transit. All federal regulations governing waste characterization, transportation, and disposal would be followed, but the risk of exposure increases with the transportation of waste and the length of time required. DRO Alternative 2 is perhaps the most effective in the short-term, but its efficacy is dependent on site controls alone. The disposal options (DRO Alternatives 4a and 4b) require slightly less time to implement than the landfarming options (DRO Alternatives 3a and 3b), and the site would be immediately suitable for UU/UE upon completion.

### 2.10.6 Implementability

Implementability addresses the technical and administrative feasibility of the alternative from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Offsite landfilling in the contiguous 48 states, which occurs under PCB Alternatives 2 and 3 and, to a lesser degree, 4, 5, and 6 as well as under DRO Alternatives 4a and 4b, makes those alternatives relatively easy to implement in terms of administrative requirements and the availability of materials and services, but very difficult from a technical standpoint given the long and complex transportation chain that exists between the remote site location and the nearest landfills established, permitted, and willing to accept the waste. Likewise the alternatives that include grain-size separation, which reduces the amount of contamination to be shipped, would require the mobilization of heavy equipment and longer overall project durations during a short field season.

PCB Alternative 7, while perhaps the most technically implementable remedy for PCBs, would only be possible if EPA were to grant a technical impracticability waiver; therefore, it is the least administratively feasible alternative with the exception of No Action. DRO Alternative 2, LUCs, is perhaps the most technically implementable remedy for DRO but contamination would remain and periodic reviews would be required indefinitely.

### 2.10.7 Relative Cost

Due to the remoteness of the Indian Mountain LRRS, the primary cost factor for any response action is the quantity of waste that needs to be transported, which is why the most expensive options are complete removal and disposal of PCB- and DRO-contaminated soils (PCB Alternative 2 and DRO Alternative 3a). If removal occurs, contaminated soil will have to be transported by air and then either 1) by barge to the contiguous 48 states (for commingled PCB- and DRO-contaminated soil) or 2) by truck and/or train to a permitted facility in Alaska for soil contaminated with DRO only. Note that PCB-contaminated soil and commingled PCB/DRO-contaminated soil constitute the majority of the overall soil volume for disposal under these alternatives.

After No Action, which has no associated cost but is not likely to be selected or approved, the next cheapest combined remedy for OT008 is PCB Alternative 7 and DRO Alternative 2. Contamination above cleanup levels will remain under both of these alternatives: permanently with consolidation, capping, and LUCs in the case of PCB Alternative 7; and permanently with access restricted through LUCs in the case of DRO Alternative 2.

Costs for each alternative are presented in Table 2-11. These estimates include labor, equipment, waste transport and disposal, laboratory analysis, sampling, re-seeding, and five-year monitoring where applicable for a period of 30 years although it would continue indefinitely so long as contaminants remain above acceptable levels.

**Table 2-11**
**OT008 PCB and DRO Alternatives Cost Summary**

| Alternative | Capital[1] | Operation & Maintenance[2] | Total Present Worth Cost[3] |
|---|---|---|---|
| **PCB Alternatives** | | | |
| Alternative 1 | $ 0 | $ 0 | $ 0 |
| Alternative 2 | $ 26.54 M | $ 0 | $ 26.54 M |
| Alternative 3 | $ 20.41 M | $ 0 | $ 20.41 M |
| Alternative 4 | $ 6.68 M | $ 126,487 | $ 6.81 M |
| Alternative 5 | $ 5.71 M | $ 142,918 | $ 5.85 M |
| Alternative 6 | $ 7.25 M | $ 128,736 | $ 7.38 M |
| Alternative 7 | $ 3.81 M | $ 142,918 | $ 3.96 M |
| **DRO Alternatives** | | | |
| Alternative 1 | $ 0 | $ 0 | $ 0 |
| Alternative 2 | $ 0.24 M | $ 45,224 | $ 0.29 M |
| Alternative 3a | $ 1.24 M | $ 18,427 | $ 1.26 M |
| Alternative 3b | $ 1.44 M | $ 18,427 | $ 1.46 M |
| Alternative 4a | $ 3.23 M | $ 0 | $ 3.23 M |
| Alternative 4b | $ 3.08 M | $ 0 | $ 3.08 M |

**Notes:**
[1] The costs for Five Year and periodic reviews conducted every 5 years for 30 years are incorporated into the capital cost for PCB Alternatives 4, 5, 6, and 7 and DRO Alternative 2, respectively.
[2] Operations and maintenance include tasks such as LUC inspections (PCB Alternatives 4, 5, 6, 7 and DRO Alternative 2), confirmation sampling (DRO Alternatives 3a and 3b), and annual cap inspections and cap maintenance (PCB Alternatives 4, 5, 6, 7).
[3] Costs estimated with +50% / -30% accuracy based on subcontractor quotes, construction drawings, and engineering estimates. Values include Total Capital Costs, Total Annual Costs, and Present Worth of Annual Costs (5% rate of return).
M = millions

### 2.10.8 State/Support Agency and Land Manager Acceptance

ADEC will not accept either of the No Action alternatives because they are neither protective of human health and the environment, nor do they comply with the ARARs. Administrative concurrence of PCB Alternative 7 is not possible because high concentrations of contamination would remain in perpetuity; risks would be controlled but not eliminated, and USAF could not easily transfer the land back to the state if desired.

ADEC concurs that, if implemented correctly, all other PCB and DRO alternatives would be protective of human health and the environment. Of these, both USAF and ADEC concur that

PCB Alternative 5 and DRO Alternative 3a provide the best combination for OT008 because they achieve RAOs, comply with ARARs, and meet the threshold criteria while providing the best balance of tradeoffs with respect to the balancing criteria, in particular, implementability at this remote site.

#### 2.10.9 Community Acceptance

Several substantive questions and concerns were expressed by the Native Village of Hughes during the 27 January 2016 public meeting, and an official comment letter from the Hughes Village Council was received by USAF (Appendix D). For OT008, the community accepted the selection of DRO Alternative 3a as presented in the Proposed Plan, but indicated that the protective cap proposed for PCB contamination was insufficiently protective as written, citing the likelihood that it would incur damage given the extreme weather and the persistence of the contaminant in the environment should a release occur.

### 2.11 PRINCIPAL THREAT WASTES

Contamination has been identified that exceeds the concentration at which PCBs are considered a principal threat waste (500 mg/kg) at all three OT008 sites. The principal threat concept refers to the source materials at a CERCLA site considered to be highly toxic or highly mobile that generally cannot be reliably controlled in place. Source materials act as a reservoir for migration to groundwater, surface water, or air, or act as a source for direct exposure (EPA 1991).

### 2.12 SELECTED REMEDY

The primary indicator of response action performance will be satisfying the RAOs for OT008 (see Section 2.8) and protecting human health and the environment. Performance measures are defined herein as the required actions to achieve RAOs. It is anticipated that successful implementation, operation, maintenance, and completion of the performance measures will achieve a protective and legally compliant remedy for OT008.

The selected remedy for OT008, PCB Alternative 5 and DRO Alternative 3a, was evaluated against other alternatives in the FS (USAF 2015b) and presented for public comment in the Proposed Plan (USAF 2015a). It was chosen based upon its overall ability to protect human health and the environment, compliance with ARARs, ability to achieve RAOs, and state and community acceptance. These alternatives are recommended because they will achieve substantial risk reduction by preventing exposure to PCB contamination, including concentrations that constitute principal threat wastes, and treating DRO contamination.

This remedy provides the best balance of tradeoffs with respect the balancing criteria, implementability in particular, and long-term effectiveness and permanence. The selected remedy is protective of human health and the environment because exposure to residual PCBs will be controlled through LUCs, inspections, and prompt maintenance of any protective cap deficiencies noted at the WACS and the onsite treatment of DRO contamination until cleanup levels are achieved. The Stained Soil Area and the Pump House will be suitable for UU/UE upon remedy implementation, and after a period of approximately two years, during which residual risk will be mitigated with site controls, the landfarm area will also be suitable for UU/UE once it is confirmed clean. Five-year reviews will be conducted at the WACS indefinitely; USAF will maintain responsibility for this site in perpetuity or until such a time that contaminants no longer pose a threat to human health and the environment.

As the lead agency, USAF is responsible for implementing, maintaining, and monitoring the response action identified herein for the duration of the remedy selected in this ROD. The USAF will exercise this responsibility in accordance with CERCLA and the NCP.

### 2.12.1 Summary of the Rationale for the Selected Remedy

The selected remedy for OT008 is PCB Alternative 5 and DRO Alternative 3a. USAF and ADEC believe that the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. A comparative analysis among alternatives for OT008 (see Table 2-10) found PCB Alternative 5 and DRO Alternative 3a to be the best response action alternatives for addressing the risks associated with the site characteristics, land use, and type of contamination currently present at OT008.

Removing all PCB-contaminated soil greater than or equal to 10 mg/kg and capping all remaining PCB-contaminated soil greater than or equal to 1 mg/kg will eliminate the potential for human/ecological exposure and future contaminant migration from OT008. Transportation and disposal costs are high and logistics are difficult in a remote site—PCB Alternative 5 allows the majority of PCBs to be safely disposed of at the LRRS provided that the protective cap is maintained and LUCs are implemented and enforced.

Likewise, DRO Alternative 3a is the best alternative for DRO contamination given the remoteness of the Indian Mountain LRRS and nature of the contamination, which lends itself to biodegradation (natural attenuation). The landfarming alternative passes threshold criteria, is protective of human health and the environment over the long-term, and is more implementable and less costly than complete removal and disposal.

### 2.12.2 Description of the Selected Remedy

Remedial alternatives for OT008 were developed and evaluated in the FS (USAF 2015b). In the Proposed Plan (USAF 2015a), USAF selected a combination of PCB Alternative 5 and DRO Alternative 3a as the overall remedy for OT008. The overall objective of the OT008 remedy is to achieve cleanup complete status under CERCLA and 18 AAC 75 (ADEC 2016). The major components of the selected remedy include:

*PCBs*

- All PCB-contaminated soil 10 mg/kg and above will be removed from the WACS, Stained Soil Area, and Pump House, estimated at 3,090 cy, will be excavated and removed for disposal in the contiguous United States.
- PCB-contaminated soil from 1 mg/kg to less than 10 mg/kg will be removed from the Stained Soil Area and Pump House for consolidation and capping with a minimum of 2 feet of clean fill at the WACS. PCB-contaminated soil above 1 mg/kg and less than 10 mg/kg will be covered with a permeable geofabric liner prior to capping. The cap will be designed and constructed to withstand environmental conditions, and will prevent exposure of humans and the environment to residual PCBs.

- PCB concentrations above 10 mg/kg and below 50 mg/kg will be disposed of as nonhazardous waste; PCB concentrations 50 mg/kg and above will be disposed of as hazardous waste in a Resource Conservation and Recovery Act (RCRA) Subtitle C facility.
- Soil that reaches or exceeds 50 mg/kg PCBs, including those defined as a principal threat waste (500 mg/kg and above), will be handled, transported, and disposed of in accordance with TSCA. TSCA-regulated soils are subject to more stringent storage, transportation, and disposal requirements and will be segregated from other waste soils for that reason.
- Confirmation soil samples will be collected from the excavations to show that remaining PCB concentrations are below the cleanup level (1 mg/kg) at the Stained Soil Area and the Pump House, and below 10 mg/kg at the lateral and vertical extents of the WACS excavation. Step-out sampling will occur at the WACS until 1 mg/kg is achieved to confirm that the cap will cover all soil above the RAO for PCBs.
- Cap extents will be surveyed and mapped. Annual LUC and cap inspections and maintenance as needed will be performed to ensure the long-term integrity of the cap; inspection results and photographs will be communicated in a letter report to ADEC and promptly (within one year) addressed by USAF. Preferential drainage pathways, evidence of erosion, and any instances where the geofabric liner is apparent or has been compromised will be documented and addressed.
- LUCs such as signage and dig restrictions will be implemented to limit site access and, therefore, human exposure to PCBs. Long-term LUC management is described below:
    - Current site use is industrial and expected to remain industrial. The Air Force shall restrict any future site use that has the potential to affect the protectiveness of the selected remedy including residential development, recreational use, and disposition and use of any soil excavated from the site, in the *LUC Management Plan*.
    - LUC boundaries will be surveyed and mapped for inclusion into the LUC Management Plan and use during annual LUC and cap inspections.
    - LUCs are anticipated to be permanent at the WACS, as PCB concentrations are unlikely to degrade naturally. The Air Force shall file a notice with the USAF real property office and in State of Alaska Department of Natural Resources land records that describes the nature and location of the pollutants or contaminants and the types and locations of LUCs.
    - The Air Force shall include signage around OT008 to prevent unauthorized access. The signage will be implemented and maintained by 611th Civil Engineer Squadron (611 CES).
    - The Air Force will utilize the base dig permit system, which will prevent activities that could disturb the buried anomalies. The base dig permit system is implemented by 611 CES.
    - The Air Force will utilize the base construction review process, which will prevent ground-disturbing construction activities. The base construction review process is implemented by 611 CES.

- The Air Force is responsible for implementing, maintaining, monitoring, reporting, and enforcing LUCs. The Air Force shall inform, monitor, enforce, and bind, where appropriate, authorized lessees, tenants, contractors, and other authorized occupants of Indian Mountain LRRS regarding the LUCs affecting OT008.
- Although the Air Force may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Air Force shall retain ultimate responsibility for remedy implementation and protectiveness.
- The Air Force will notify ADEC as soon as practicable, but no longer than ten days after discovery, of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. The Air Force will take prompt measures to correct the violation or deficiency and prevent its recurrence. In this notification, the Air Force will identify any corrective measures it has taken or any corrective measures it plans to take and the estimated time frame for completing them. For corrective measures taken after the notification, the Air Force shall notify ADEC when the measures are complete.
- The Air Force must provide notice to ADEC at least six months prior to any transfer or sale of property containing LUCs so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify ADEC at least six months prior to any transfer or sale, then the facility will notify the state as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. The Air Force agrees to provide ADEC with such notice, within the same time frames, for federal-to-federal transfer of property accountability. The Air Force shall provide either access to or a copy of the executed deed or transfer assembly to ADEC.
- The Air Force shall not modify or terminate LUCs, modify land uses that might impact the effectiveness of the LUCs, take any anticipated action that might disrupt the effectiveness of the LUCs, or take any action that might alter or negate the need for LUCs without 45 days prior to the change seeking and obtaining approval from ADEC of any required ROD modification.
- The Air Force will monitor and inspect all site areas subject to LUCs as PCB-contaminated soil will remain onsite indefinitely. LUC and cap inspections will be conducted and reported annually.
- The Air Force will report no less often than once every five years to ADEC on the frequency, scope, and nature of LUC monitoring activities, the results of such monitoring, any changes to the LUCs, and any corrective measures resulting from monitoring during the time period.

• This alternative will require five-year reviews under CERCLA. PCB-contaminated soil, although contained under a protective cap, will remain above cleanup levels at the WACS. Five-year reviews evaluate the overall effectiveness of the remedy and ensure that it remains protective over the long-term, to include the integrity of the landfill cap and the frequency, scope, and nature of LUC monitoring activities, the results of such monitoring, any changes to the LUCs, and any corrective measures resulting from monitoring during the time period. Documentation from annual inspections and any subsequent maintenance performed as a result of deficiencies will be compiled in the five-year review reports.

- Commingled PCB- and DRO-contaminated soil will be treated as PCB-contaminated soil and either removed (10 mg/kg PCBs and above) or consolidated and capped at the WACS (less than 10 mg/kg PCBs). PCBs are considered more toxic than DRO and therefore drive risk at the OT008.

*DRO*

- A topographically flat area will be selected for the landfarming treatment area to minimize the risk of erosion of the contaminated soil and runoff of sediments to adjacent undisturbed areas.
- An earthen berm around the DRO landfarm area will be constructed and used for containment. Pre-treatment samples from the proposed landfarm area floor and berm will be collected to ensure that the area selected is not contaminated.
- All DRO-contaminated soil above the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO) will be excavated, mechanically mixed, and spread to a maximum depth of 10 inches.
- Confirmation soil samples will be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.
- Baseline analytical samples will be collected at the landfarm according to the frequency recommended in Table 2A of ADEC *Field Sampling Guidance* and correlated with field screening results.
- Tilling will occur twice per year after the initial placing of the soil until soil samples from the landfarm show that the ADEC cleanup level for ingestion (10,250 mg/kg) has been achieved. Tilling the soil will accelerate natural volatilization and attenuation.
    - Field screening using a PID will be conducted in conjunction with tilling to estimate progress toward RAOs; analytical samples will be collected once a consistent reduction in PID readings has been established and be repeated until RAOs are achieved.
    - If concentrations do not appear to be decreasing at an acceptable rate after two field seasons, nutrient testing may occur to evaluate the addition of water or fertilizer to further expedite degradation.
- LUCs such as a temporary snowfence, signs, and dig restrictions will limit access and prevent incidental contact by workers periodically visiting the Upper Camp until the cleanup level is achieved (approximately two years) and the area becomes suitable for UU/UE. Only nonresidential use will be permitted. USAF will be responsible for the implementation maintenance of these LUCs in the interim and site restoration to include deconstruction and grading to match natural contours once treatment is complete. The fence, signage, and restrictions will be removed upon remedy completion.
- This alternative does not require periodic reviews under State of Alaska regulations. All DRO-contaminated soil above the ADEC cleanup level will be treated at the LRRS; once

cleanup levels are achieved (approximately two years), OT008 will be suitable for UU/UE.

Following these activities, cleanup will be complete (with institutional controls at the WACS) under CERCLA and 18 AAC 75. Any changes, if they occur, to the selected remedy as described in this ROD will be documented in a technical memorandum that will be made available in the Administrative Record, an Explanation of Significant Differences document, and/or a ROD amendment.

### 2.12.3 Summary of Estimated Remedy Costs

The information in the cost estimate summary is based on the best available information regarding the anticipated scope of the remedial alternatives. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the selected alternative. Table 2-12 presents an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Detailed cost estimates are provided in the FS (USAF 2015b).

**Table 2-12**
**Cost Estimate Summary – Capital and O&M Costs for the Selected Remedy**

| Remedy | Description | Cost[1] ($) |
|---|---|---|
| PCB Alternative 5 Offsite Disposal and Onsite Consolidation and Capping | Equipment, Labor, and Reporting | 3.57 M |
| | Laboratory Analysis | 20.0 K |
| | Five-Year Reviews | 185.0 K |
| | Offsite Transportation and Disposal | 102.7 K |
| | Materials and Consumables | 118.6 K |
| | Annual Costs over 30 years, 5% Rate of Return | 142.9 K |
| | **Total Cost** | 4.14 M **\| 5.85 M*** |
| DRO Alternative 3a Onsite Landfarming | Equipment, Labor, and Reporting | 893.6 K |
| | Laboratory Analysis | 21.1 K |
| | Site Controls & Inspection | 20.3 K |
| | Materials and Consumables | 23.3 K |
| | **Total Cost** | 0.96 M **\| 1.26 M*** |
| | **Combined OT008 Remedy** | **7.11 M*** |

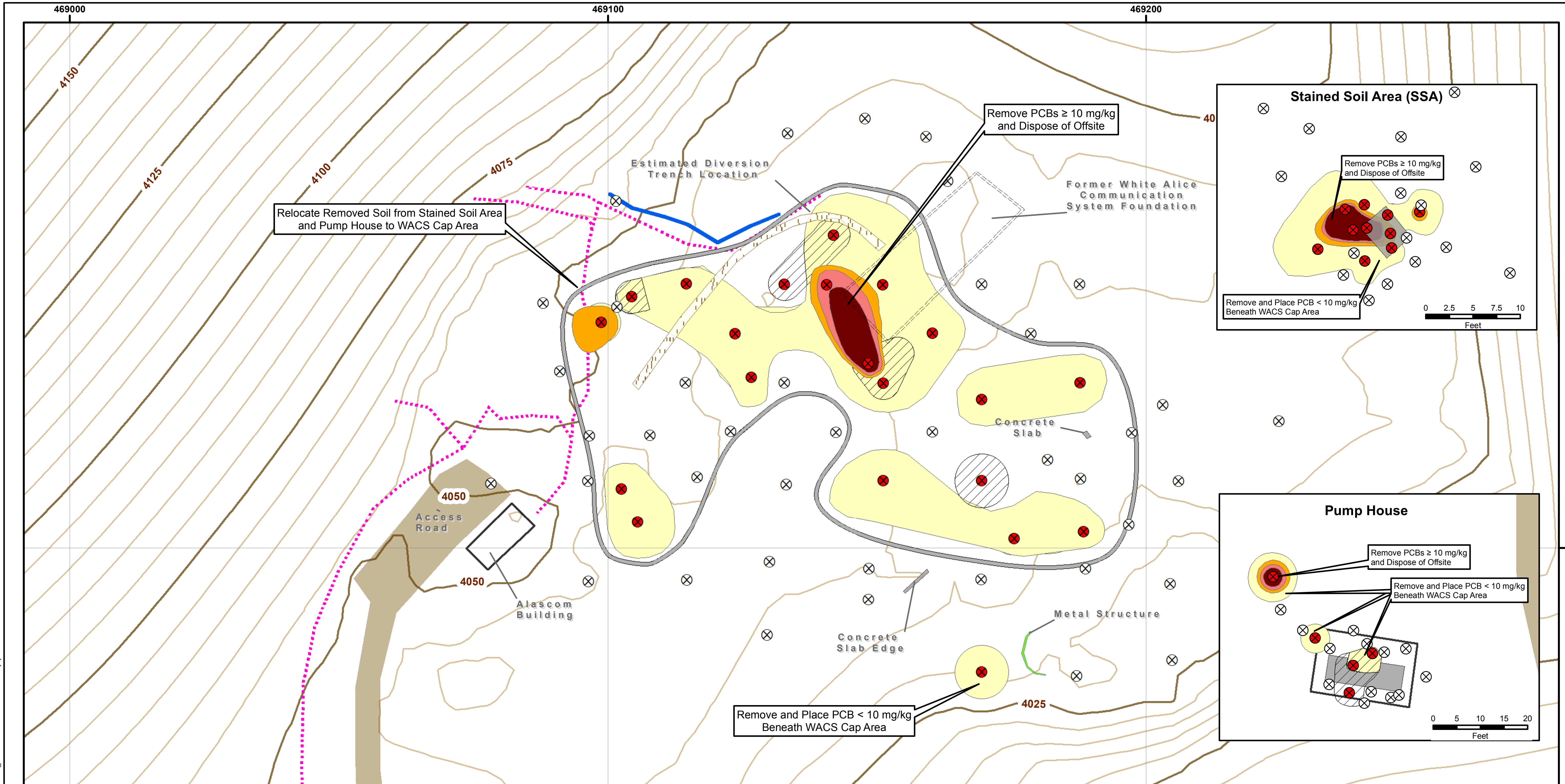
**Notes:**
* Total cost estimates (in **bold**) include a 20 percent project management fee, a 10 percent contractor's fee, and a 10 percent estimating contingency.
[1] Costs estimated with +50% / -30% accuracy based on subcontractor quotes, construction drawings, and engineering estimates. A complete breakdown of costs is available as Appendix B to the Feasibility Study (USAF 2015b).
K = thousands, M = millions

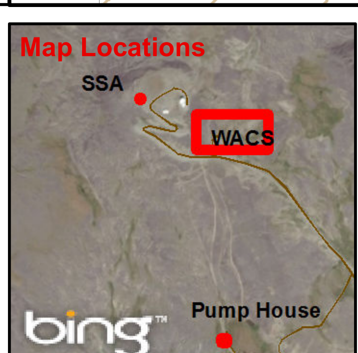
### 2.12.4 Expected Outcome of the Selected Remedy

Under this set of alternatives, PCB contamination will remain at OT008 and DRO concentrations would fall below the cleanup level after approximately 2 years. Areas of DRO-only contamination would be restored for UU/UE.

The cleanup level for PCBs at OT008, ADEC Method Two direct contact cleanup level (1 mg/kg), is protective for residential use. Because this cleanup level will not be achieved, the WACS portion of OT008 will not be suitable for UU/UE. CERCLA five-year reviews would be required indefinitely and annual LUC and cap inspections and all necessary maintenance would occur promptly to ensure that the remedy remains protective over the long-term.

Land use at OT008 is not anticipated to change. Removal of the PCB soil contamination at 10 mg/kg and above will mitigate the potential for exposure to the highest levels of contamination, and the implementation of a 2-foot cap over remaining contamination and LUCs to include signage and dig restrictions, if properly implemented, are an effective and legally compliant way to prevent both human and ecological exposure.




**Approximate PCB and POL Removal Areas**

- PCBs at ≥ 1 to < 10 mg/kg
- PCBs at 10 to < 25 mg/kg
- PCBs at 25 to < 50 mg/kg
- PCBs 50 mg/kg and Above
- POL 10250 mg/kg and Above
- Sample Results Below ADEC Cleanup Level
- Sample Results Above ADEC Cleanup Level
- Seep
- Utilities
- Road
- Index Contour (25 foot interval)
- Building
- Diversion Trench
- Concrete
- Former Structure
- Metal Structure
- Cap Area (Approximate)

PCB Alternative 5:
PCB-contaminated soil up to 10 mg/kg will be capped onsite with 2 feet of clean soil. PCB-contaminated soil 10 mg/kg and above will be excavated, containerized, and transported to a TSDF located outside of Alaska for disposal. PCB Alternative 5 assumes that all excavation areas will be backfilled with clean, unclassified fill. Cap maintenance, ongoing monitoring, and land-use controls are key components of this alternative. CERCLA Five-Year Reviews will be required.

All Locations Are Approximate
WGS 1984 UTM Zone 5N
1 inch = 60 feet

0 30 60 90 120 Feet
0 10 20 30 40 Meters

N

OT008 WACS PCB REMEDIAL ALTERNATIVE 5
INDIAN MOUNTAIN LONG RANGE RADAR SITE
INDIAN MOUNTAIN, ALASKA

| JACOBS | DATE: 23 MAR 2016 | PROJECT MANAGER: D. FLEMING | FIGURE NO: 2-4 |
|---|---|---|---|

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## 2.13 STATUTORY DETERMINATIONS

Under CERCLA §121 as required by NCP §300.430(f)(5)(ii), the lead agency must select a remedy that is protective of human health and the environment, complies with ARARs (or receives a waiver), is cost-effective, and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes 1) a statutory preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element; and 2) a bias against offsite disposal of untreated wastes.

The overall selected remedy for OT008 only partially complies with the statutory preference for treatment as a principal element. Few treatment technologies are available to treat PCB contamination, and none are feasible due to the remote location of the Indian Mountain LRRS; therefore, the selected remedy for PCBs does not meet the statutory requirement for treatment. Only DRO Alternative 3a meets the statutory preference for treatment. Landfarming is a treatment technology enhances the oxygenation of the soil and therefore expedites the occurrence of natural attenuation, and is expected to achieve the ADEC cleanup level within approximately two years.

### 2.13.1 Protection of Human Health and the Environment

The selected remedy, PCB Alternative 5 and DRO Alternative 3a, will protect human health and the environment by permanently eliminating exposure risks to PCB and DRO contamination above ADEC Method Two ingestion cleanup levels, including concentrations that constitute principal threat wastes. Short-term risks to site workers or visitors will be mitigated appropriately through the use of site controls and PPE. RAOs will be achieved for PCBs upon remedy implementation and the Stained Soil Area and the Pump House will be available for UU/UE immediately; the landfarm area will be available for UU/UE in approximately two years, after volatilization and natural attenuation have reduced the concentration of DRO to below the risk-based cleanup level.

### 2.13.2 Compliance with ARARs

Response actions must comply with both the federal and state ARARs presented and described in Appendix A. Both PCB Alternative 5 and DRO Alternative 3a comply with the chemical-specific, location-specific, and action-specific ARARs. The selected remedy for OT008 complies with the chemical-specific, location-specific, and action-specific ARARs, including RCRA (42 USC 6901), the Alaska Oil and Other Hazardous Substances Pollution Control regulations (18 AAC 75), Alaska Air Quality Control Regulations (18 AAC 50, 15), Alaska Solid Waste Management Regulations (18 AAC 60), Alaska Hazardous Waste Regulations (18 AAC 62), TSCA (40 CFR 761), Clean Air Act (42 USC 7401, 40 CFR 230), Migratory Bird Treaty Act (50 CFR Parts 10, 20, 21), and U.S. Department of Transportation Regulations (49 CFR 170-199; 40 CFR 263).

### 2.13.3 Cost Effectiveness

In the USAF's judgment, the selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition from 40 CFR 300.430(f)(1)(ii)(D) was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." This determination was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfy the threshold criteria, meaning that they are protective of human health and the environment and compliant with the ARARs identified for OT008. The overall effectiveness of the selected remedy for OT008 was demonstrated in the comparative analysis of alternatives (Section 2.10) and is summarized in Table 2-13. The estimated present worth cost of the selected remedy is $7.11 M (in 2015 U.S. dollars).

**Table 2-13**
**Cost and Effectiveness Summary**

| Alternative | Present-Worth Cost ($) | Long-Term Effectiveness and Permanence | Reduction of Toxicity, Mobility, or Volume Through Treatment | Short-Term Effectiveness |
|---|---|---|---|---|
| PCB Alternative 5 Onsite Consolidation and Capping and Offsite Disposal | $ 5.85 M | Eliminates exposure to PCBs 10 mg/kg and above through removal and disposal; prevents exposure to residual PCBs through consolidation, capping, and cap maintenance. | No reduction in toxicity, mobility, or volume through treatment will occur under this alternative.<br><br>Few treatment technologies exist for this type of contamination, and implementation would be difficult and costly in a remote site. PCBs are stable compounds that are not likely to reduce in concentration or volume naturally. | During site work, exposure risks would be minimized with proper training and the use of appropriate PPE.<br><br>Capping rapidly prevents exposure to residual contamination at the subsurface.<br><br>LUCs will be implemented to ensure that this remedy remains protective to human health and the environment. |
| DRO Alternative 3a Onsite Landfarming of DRO-Contaminated Soils | $ 1.26 M | Eliminates long-term risk to human health and the environment posed by DRO contamination 10,250 mg/kg and above in approximately two years. | DRO toxicity would be reduced through volatilization and natural attenuation, processes that will be enhanced through active tilling of contaminated soil. | During site work, exposure risks would be minimized with proper training and the use of appropriate PPE.<br><br>Short-term risks to site workers or visitors to the site would be mitigated through the use of site controls such as fencing and signage will be used to restrict access until the cleanup level is reached.<br><br>The landfarm would be placed in a secure area and surrounded with an earthen berm to prevent migration. |

### 2.13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

While the WACS is unlikely to become available for UU/UE under PCB Alternative 5, exposure risks will have been minimized upon remedy implementation through the removal of PCBs above 10 mg/kg and mitigated through the implementation of a protective cap designed to withstand site conditions. Five-year reviews will ensure that cap maintenance and annual LUC and cap inspections remain effective in preventing exposure to the subsurface in perpetuity. For DRO, both the Stained Soil Area and the Pump House will be suitable for UU/UE upon remedy implementation, and the landfarm area will be suitable for UU/UE upon project completion.

### 2.13.5 Preference for Treatment as a Principal Element

The NCP establishes the expectation that treatment will be used to address the principal threats posed by a site wherever practicable based on 40 CFR 300.430(a)(1)(iii)(A). The selected remedy for OT008 only partially satisfies the statutory preference for treatment of all waste streams as a principal element of remediation. PCBs in soils will be partially removed and sent to a TSDF and the rest capped, but not treated because the costs would be substantially higher without a significant reduction in risk at this remote site. Landfarming DRO-contaminated soil represents a treatment for toxicity as a principal element of the remedy; this technology will reduce contaminant levels below the ADEC cleanup level (ingestion pathway) for DRO through enhanced natural processes.

### 2.13.6 Five-Year Review Requirements

Pursuant to CERCLA §121(c) and NCP §300.430(f)(4)(ii), because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining above levels that allow for UU/UE at the WACS, a statutory review will be required five years after initiation of the response action to verify that the remedy is, or will be, protective of human health and the environment. The five-year review is separate from but inclusive of the annual LUC and cap inspections that are a primary remedy component.

DRO contamination is not regulated under CERCLA; however, the DRO cleanup level promulgated under 18 AAC 75.341(d) is anticipated to be reached within two years of the recommended response actions. Site controls will be used to prevent site access and exposure to DRO-contaminated soil until the landfarm area becomes suitable for UU/UE. No periodic reviews will be required once confirmation sample results indicate that the DRO cleanup level has been achieved.

## 2.14 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for OT008 (USAF 2015a) was released for public comment on 3 December 2015. The 2015 Proposed Plan identified PCB Alternative 5, Onsite Consolidation and Capping, and POL Alternative 3a, Onsite Landfarming, as the preferred remedy for PCB- and POL-contaminated soils at OT008, respectively. This preferred remedy has been selected and the discussion has been amended as described below:

- Section 2.7 of this ROD includes previously unpublished data regarding human health risk at OT008. The overall risk information presented in the Proposed Plan – that unacceptable risk exists related to PCB contamination, and therefore remedial action is warranted – has not changed. Baseline HHRA values from 2006 have been re-calculated based on the more comprehensive 2011 dataset.
- Alternatives formerly labeled with “POL” are now labeled with “DRO” to alleviate confusion as this represents the actual site COC rather than a category of contaminants. The labels have also been modified slightly to account for confusion related to “greater than” and “less than.”
- Clarifications have been added to the selected remedy for PCBs to allay community concerns about cap protectiveness. USAF recognizes high winds, earthquakes, and storms have the potential to affect even a well-constructed cap. The cap will be of sufficient strength to withstand anticipated site conditions, and any cap deficiencies will be the responsibility of USAF. Annual LUC and cap inspections will be performed and recorded using an inspection form and photographic documentation will be provided. Inspection results will be communicated in a letter report to ADEC and any deficiencies will be promptly addressed by USAF in the year following the annual inspection during which deficiencies are identified. Inspection results and records of site maintenance will be compiled in the five-year reviews.

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# 3.0 RESPONSIVENESS SUMMARY

This section provides a summary of the public comments regarding the *Proposed Plan for OT008 at the Indian Mountain Long-Range Radar Site, Alaska* (USAF 2015a). At the time of the public review period, the USAF proposed two remedial alternatives as the preferred remedy for OT008: PCB Alternative 5, Onsite Consolidation and Capping, and DRO Alternative 3a, Onsite Landfarming.

Under contract with USAF, Jacobs prepared an FS to evaluate and address risks posed by the release of CERCLA-regulated hazardous substances and petroleum contamination currently present at OT008. Jacobs also prepared a Proposed Plan to further evaluate those remedial alternatives retained for consideration due to their ability to protect human health and the environment, and compliance with site-specific ARARs. Both USAF and the state regulatory agency, ADEC, were invited to comment on the Draft version of both reports prior to the public comment period.

NCP 300.430(f)(3) establishes a number of public participation activities that the lead agency must conduct as part of the CERCLA process and is discussed in detail in Section 2.3. The oral comments summarized in Section 3.1.1 were recorded during the 27 January 2016 Public Meeting held in Hughes, Alaska. Written comments summarized in Section 3.1.2 are from an official letter received from the Hughes Village Council.

## 3.1 ORAL AND WRITTEN COMMENTS AND RESPONSES

As described above and in Section 2.3, a public meeting was held in Hughes, Alaska, on 27 January 2016. A complete transcript of the public meeting is available in Appendix D. Only substantive questions are included in the discussion below, and they have been summarized and merged/consolidated where pertinent. The responses initially given at the meeting were further researched and have been elaborated upon to provide the most complete and accurate information available.

### 3.1.1 Public Meeting Comments/Questions

**Can PCBs be used as a lubricant?**

PCBs at OT008 are likely from use in transformers at the radar station. In general, PCBs were used in electrical equipment such as capacitors, regulators and switches, motors and hydraulic systems, fluorescent light ballasts, insulation material, adhesives and taps, oil-based paint, caulking, and finishes. PCB-contaminated oil has been used to keep dust down on dirt roads at other sites in Alaska. It is a pervasive chemical that was widely used and distributed until it was banned in the 1970s.

**What does cradle-to-grave mean? Is the manufacturer responsible?**

"Cradle-to-Grave" is the provision (Subtitle C) of the Resource Conservation and Recovery Act that directs the EPA to control hazardous waste management from the point of generation through transport and treatment on to storage and/or disposal. The regulatory framework includes recordkeeping and reporting requirements for generators, transporters, and treatment, storage and disposal facilities handling hazardous waste.

"Polluter Pays" is a guiding principle and primary objective of CERCLA. It means that if pollution occurs, the person or organization that causes pollution should pay for the consequences of the pollution. When the polluter cannot pay or no polluter can be readily identified, an initial trust fund was initiated to cover cleanup costs based on a hazard ranking system established in 1981.

**Is there a time limit? How are the sites prioritized?**

There is no time limit, per se, but given the liability it's in the best interest of those responsible to clean the sites up as soon as possible. The CERCLA hazard ranking system is used to prioritize sites into the National Priorities List. Here in Alaska, remote site cleanup efforts are prioritized by USAF according to proximity to the population.

**Why has the volume estimate increased from 2,100 cy to 3,307 cubic yards since the previous Proposed Plan? What's the difference?**

A more conservative approach was used to estimate the volume of contaminated material. This approach factors in greater distances outside the areas where concentrations of contaminants are known to exceed cleanup levels, i.e., in the prior Proposed Plan, calculations were from within the area of exceedances, but now the calculations include a larger area that begins halfway between exceedance and non-exceedance sample locations. This approach will better prepare USAF and a future contractor for the amount of soil this is actually likely to be encountered as the remedy is implemented. All of the removal alternatives include confirmation sampling; the analytical result is what will indicate that RAOs have been met, but for project planning, knowing the approximate amount of soil is helpful.

**Why are they bringing it through us? Why not transport it directly through Lynden Transport directly out of Indian Mountain?**

Contaminated soil would not be brought to or through Hughes. The contaminated material would likely be transported via cargo plane directly to Fairbanks or Anchorage before it is transported out of state on a barge to a TSDF in the contiguous United States.

**Have you come up with the cheapest or easiest way to close this site?**

The least expensive and most implementable remedy would be to cap all of the contamination in place. However, multiple factors are considered when selecting a remedy. The comparative analysis criteria are split into threshold (protective of human health and compliant with ARARs), balancing (long- and short-term protectiveness factors, implementability concerns, reduction in toxicity/mobility/volume through treatment, and overall cost), and modifying (state and community acceptance) criteria. In addition, there's a statutory preference for treatment options and against disposal options, but the harsh climate and remoteness of some of these sites often precludes treatment options while at the same time making disposal options difficult and risky to implement, which increases costs.

**I think it should all be removed. That would be the safest for the residents.**

The remedy must also factor in the safety of onsite workers who are handling and packaging the contaminated soil as well as personnel along the transportation chain who may come into contact with it. Complete removal of the contaminated soil would involve 364 flights from Indian Mountain LRRS to Anchorage. In Anchorage, the soil would have to be transferred onto a barge to the contiguous United States, where it would again be transferred to trucks or trains that would take it to the nearest appropriately permitted facility, probably in Idaho or Oregon. There is a potential for contaminant release anywhere between the Indian Mountain LRRS and the final destination.

Complete removal of soil could also contribute to climate change, as each flight uses large amounts of fuel and emit greenhouse gases.

**Can wind cause PCB migration? It's very windy at the top of Indian Mountain. Is it possible that contamination would enter the Indian River, and has sampling been done there?**

PCBs adhere to soil particles, so wind dispersion is a transport mechanism although it's more prevalent in sandy soils than the cobbles and rocks present at the top of Indian Mountain. PCBs probably would not be found in the water because of the type of contaminant. They aren't soluble; they don't dissolve in water. However, they can adhere to sediment. If PCBs are detected in water, it is likely due to suspended sediment or particulates in the water column.

A fish tissue study was published in 2008 as an addendum to the *Source Area SS009 Technical Report*. As part of this investigation, Arctic Grayling samples were submitted for volatile organic compounds, fuels, and lead. Sediment and surface water were analyzed for the same compounds plus PCBs, which were not detected. DRO concentrations reported in fish tissue were re-examined and attributed to naturally occurring fats. DRO is often reported in laboratory samples as a result of naturally occurring organic materials like vegetative materials, oils and fats, etc.

**How many samples? One sample is not enough; they need to continue sampling.**

Several years of fish sampling for pesticides were compared over time. Events took place annually in the vicinity of Indian Mountain from 1969 to 1973 and then again in the years 1977, 1984, 1986, and 1996. In the most recent study, in 2000, no pesticides were detected in the Koyukuk River fish and concentrations in the Indian River fish were well below the cleanup levels.

As part of a separate investigation to determine whether contamination at Upper Camp had affected waterways, surface water/sediment and fish tissue samples were collected in 2007 as described above.

As part of remediation at OT008, additional soil sampling will occur at a rate of one sample per 250 feet to confirm that PCB and DRO concentrations meet the target levels before the cleanup is considered complete.

**Did you test contaminants in [an upriver tributary] of the Indian River?**

No. Given the historic site use and the location of the LRRS, an upstream source would not likely be attributed to USAF activities at the LRRS. Sampling would only be conducted upriver if (1) contamination had been identified in the Indian River, which it hasn't, and (2) an upgradient offsite source were likely, for example, higher levels or a different type of contamination than was found in soil at adjacent areas within the LRRS. A seep upgradient of OT008 on Indian Mountain was sampled to see whether contamination at SS010 was contributing to OT008; contaminant migration from SS010 to OT008 is likely to have occurred.

**When do you test for contaminants and what do you test for?**

A Conceptual Site Model is used to look at identified and likely sources contaminants and how they spread. Sample types and locations are determined based on potential sources using site maps and records of site use and contaminant releases, aerial photographs, and as-built drawings with source areas such as drains or disposal areas. When there's evidence that additional contamination may exist, step-out locations are selected based on patterns of potential migration. Often, the investigation focus will shift through the process from determining whether contamination exists, to identifying the areas of potential human exposure, to recording the areas of highest contamination, to finding boundaries or extents of previously identified contamination.

**When will it be decided? How long is the Process? Are there limits to the funding?**

Funding for environmental cleanups on Federal sites is appropriated by Congress. The length of time between the decision making process (i.e., finalization of the ROD) and remedy implementation varies depending on the availability of funding and the prioritization assigned to the site. The Record of Decision for OT008 will be published in June. Remedy implementation is programmed for 2017.

**I have stakeholders other than those who live in Hughes such as folks who recreate in this region. How do people find this [Proposed Plan] if they want to comment on it and they aren't here at this meeting? (Katie Banti, Tanana Tribal Council Office of Environmental Health)**

**I think the people of Huslia should know about this. They're downriver – it's the way the river runs and the way the wind blows.**

The comment period was extended by 30 days. Katie Banti (TTC) agreed to take extra copies of the Proposed Plans to Huslia. The Proposed Plan accessible (and is still accessible) at the website listed on the back: http://afcec.publicadmin-record.us.af.mil/.

### 3.1.2 Official Comment Letter

On 25 February 2016, a letter (dated 3 February) was received from Wilmer Beetus, First Chief, on behalf of the Hughes Village Council. A complete copy of the letter is provided in Appendix D. An excerpt of his letter is included below.

**As pointed out in the Proposed Plan documents, any damage to the cap resulting in substantial exposure of the material would require a re-evaluation of the selected remedy. This alone seems unsustainable. Indian Mountain, like all of Alaska, is under constant exposure to extreme weather and other events … earthquakes, landslides, and wildfires are not unlikely in the area; we are concerned about the potential for the remaining contamination to impact surrounding lands, wildlife, and waterways should disruption of the cap occur.**

USAF recognizes the potential for environmental factors to reduce the effectiveness and durability of the site cap. Additional text has been added throughout this ROD to address this concern, including clear definition of USAF responsibilities concerning cap inspection, which will be documented and photographed on an annual basis and prompt maintenance to occur within one year of noted deficiencies. CERCLA stipulates that these activities, as mandated by a ROD, will be conducted in perpetuity or until such a time that contaminants no longer pose a threat to human health or the environment. Five-year reviews will ensure that annual inspections have taken place as planned and all necessary follow-up (i.e. maintenance and repair) activities have been conducted. In addition, the reviews will evaluate the overall continued protectiveness and effectiveness of the selected remedy over the long-term. These clarifications have been incorporated into Sections 2.9.1, 2.12, and 2.14 of this ROD.

## 3.2 TECHNICAL / LEGAL ISSUES

No technical or legal issues are anticipated based on the remedy selected in this ROD.

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# APPENDIX A

## Applicable or Relevant and Appropriate Requirements (ARARs)

# APPENDIX A

## APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS SITE OT008, INDIAN MOUNTAIN LRRS, ALASKA

This appendix reviews potential Applicable or Relevant and Appropriate Requirements (ARAR) for the OT008 site at the Indian Mountain Long-Range Radar Site (LRRS), Alaska. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), three types of ARARs are considered:

- Chemical-specific
- Location-specific
- Action-specific

Each ARAR has been assessed based on its applicability to the site, and categorized as follows: applicable or relevant and appropriate. Table A-1 presents chemical-specific ARARs. These standards have been used to select cleanup levels appropriate to the site. Table A-2 presents location-specific ARARs and Table A-3 presents action-specific ARARs.

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| A | applicable |
| AAC | Alaska Administrative Code |
| ADEC | Alaska Department of Environmental Conservation |
| ARAR | applicable or relevant and appropriate requirement |
| CAA | Clean Air Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| EPA | U.S. Environmental Protection Agency |
| HSWA | hazardous and solid waste amendments |
| mg/kg | milligrams per kilogram |
| OSHA | Occupational Safety and Health Administration |
| PCB | polychlorinated biphenyl |
| POL | petroleum, oil, and lubricants |
| RA | relevant and appropriate |
| RCRA | Resource Conservation and Recovery Act |
| USC | United States Code |

## CHEMICAL-SPECIFIC ARARS

Chemical-specific ARARs provide numerical cleanup values that establish acceptable contaminant concentrations that may remain following a remedial response (Table A-1). The Alaska Administrative Code (AAC), Title 18, Chapter 75, Article 3, *Oil and Hazardous Substances Pollution Control Regulations - Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances*, Method Two soil cleanup criteria (18 AAC 75.341[c] and [d]) – Tables B1 and B2) establish the applicable chemical-specific soil cleanup values. The regulation tabulates soil cleanup criteria for diesel-range organics (DRO) and polychlorinated biphenyls (PCB). The standards applicable at the Indian Mountain LRRS are for sites located in a non-arctic zone with annual precipitation of less than or equal to 40 inches.

Human exposure can occur directly (by ingestion or inhalation) or indirectly (via migration from contaminated soil to groundwater). Different cleanup criteria are presented for each of three exposure routes: direct contact or ingestion, inhalation, and migration to groundwater. Groundwater is not known to exist at Site OT008; therefore, migration to groundwater does not act as a transport mechanism for site contaminants, and only the more stringent of the standards for the direct contact (or ingestion) and outdoor inhalation exposure pathways are applicable for cleanup.

**Table A-1**
**Chemical-Specific Applicable or Relevant and Appropriate Requirements**

| Regulation | Description | A or RA | Rationale |
|---|---|---|---|
| RCRA of 1976 as amended by the HSWA of 1984, Subtitles C and D, other than corrective action requirements (42 USC 6901) | Establishes protections and protocols for the creation and recycling of waste including cradle to grave manifesting. | A | Excavated materials designated as waste (e.g., contaminated soils) are subject to the requirements of RCRA. |
| Toxic Substances Control Act (40 CFR 761) | Regulates storage and disposal requirements, including onsite storage limitations for PCB wastes. Specifies notification and recordkeeping requirements for PCB disposal. | A | Concentrations of PCBs greater than 50 mg/kg are present at the site. |
| Alaska Oil and Other Hazardous Substance Pollution Control regulations (18 AAC 75) | Governs discharge of oil and hazardous substances and state cleanup requirements. | A | The site is known to be affected by a release of PCBs and POL constituents. Alternative soil cleanup levels may be applied. |

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

## LOCATION-SPECIFIC ARARS

Location-specific ARARs are restrictions developed on the conduct of activities at specific locations (Table A-2). These ARARs may restrict or preclude certain remedial actions, or they may apply only to certain portions of an installation. Location-specific factors that may require the identification of ARARs include sensitive habitats, floodplains, wetlands, endangered species habitat, fault locations, and historic or archeological resources.

**Table A-2**
**Location-Specific Applicable or Relevant and Appropriate Requirements**

| Regulation | Description | A or RA | Rationale |
|---|---|---|---|
| Bald Eagle Protection Act<br>(16 USC 668-668c) | Protects bald eagles/habitat in the area and provides for permitted activities. | A | Bald eagles have not been identified in the project area, but the possibility for their presence exists. |
| Migratory Bird Treaty Act<br>(37 Stat. 878, Ch. 45; 16 USC 703-712 (§709 has been omitted);<br>50 CFR Parts 10, 20, 21) | Prohibits taking or possession of any migratory bird listed, including parts, nests, or products. | A | Considered for possible impacts to birds at Indian Mountain. |

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

## ACTION-SPECIFIC ARARS

Action-specific ARARs are requirements that apply to specific investigative or remedial actions (Table A-3). Action-specific requirements do not in themselves determine remedial alternatives; they indicate how a selected alternative must be achieved. Action-specific ARARs are refined during remedial design as specific information becomes available.

**Table A-3**
**Action-Specific Applicable or Relevant and Appropriate Requirements**

| Regulation | Description | A or RA | Rationale |
|---|---|---|---|
| Alaska Spill Reporting and Notification (18 AAC 75) | ADEC has authority for specifying soil, surface water, and groundwater cleanup levels resulting from the discharge of oil or a hazardous substance. | A | 18 AAC 75.360 lists requirements for cleanup work plans. |
| Alaska Air Quality Control Regulations (18 AAC 50, 15) and CAA (40 CFR 230, 33 CFR 320-330) | Regulations governing identification, prevention, abatement, and control of air pollution | A | Cleanup methods will require the use of heavy machinery and trucks for transporting soil. |
| U.S. Department of Transportation Regulations (49 CFR 170-199; 40 CFR 263) | Governs the packaging, marking, labeling, recordkeeping, transportation, and transporters of hazardous materials. | A | Monitoring samples are transported from the project area. |
| Alaska Hazardous Waste Regulations (18 AAC 62) | | | |
| Toxic Substances Control Act (40 CFR 761) | Regulates storage and disposal requirements, including onsite storage limitations for PCB wastes. Specifies notification and recordkeeping requirements for PCB disposal. | A | PCBs greater than 50 mg/kg are present at the site. |
| Solid Waste Management Regulations (40 CFR 257, 40 CFR 264, 49 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 261, 40 CFR 262) | Governs the management of solid wastes generated during remedial activity. Specifies restrictions on land disposal of specific types of hazardous waste based on levels achievable by current technology. | A | Excavated soils and monitoring samples may be generated from the project area. Remedial alternatives may create contaminated media to be removed from the site. |
| Alaska Solid Waste Management Regulations (18 AAC 60) | | | |

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

# APPENDIX B

# Conceptual Site Model

# HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

*Site:* Indian Mountain Long-Range Radar Site, Site OT008

*Completed By:* Jacobs Engineering Group Inc.

*Date Completed:* 3/9/2016

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

**(1)** *Check the media that could be directly affected by the release.*

**(2)** *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

**(3)** *Check all exposure media identified in (2).*

**(4)** *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

**(5)** *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

## Media / Transport Mechanisms

| Media | Transport Mechanisms | |
|---|---|---|
| ☑ Surface Soil (0-2 ft bgs) | Direct release to surface soil | check soil |
| | ☑ Migration to subsurface | check soil |
| | ☐ Migration to groundwater | check groundwater |
| | ☑ Volatilization | check air |
| | ☑ Runoff or erosion | check surface water |
| | ☐ Uptake by plants or animals | check biota |
| | ☐ Other (list):______ | |
| ☑ Subsurface Soil (2-15 ft bgs) | Direct release to subsurface soil | check soil |
| | ☐ Migration to groundwater | check groundwater |
| | ☑ Volatilization | check air |
| | ☐ Uptake by plants or animals | check biota |
| | ☐ Other (list):______ | |
| ☐ Ground-water | Direct release to groundwater | check groundwater |
| | ☐ Volatilization | check air |
| | ☐ Flow to surface water body | check surface water |
| | ☐ Flow to sediment | check sediment |
| | ☐ Uptake by plants or animals | check biota |
| | ☐ Other (list):______ | |
| ☐ Surface Water | Direct release to surface water | check surface water |
| | ☐ Volatilization | check air |
| | ☐ Sedimentation | check sediment |
| | ☐ Uptake by plants or animals | check biota |
| | ☐ Other (list):______ | |
| ☐ Sediment | Direct release to sediment | check sediment |
| | ☐ Resuspension, runoff, or erosion | check surface water |
| | ☐ Uptake by plants or animals | check biota |
| | ☐ Other (list):______ | |

## Exposure Media / Exposure Pathway/Route / Current & Future Receptors

| Exposure Media | Exposure Pathway/Route | Residents (adults or children) | Commercial or industrial workers | Site visitors, trespassers, or recreational users | Construction workers | Farmers or subsistence harvesters | Subsistence consumers | Other |
|---|---|---|---|---|---|---|---|---|
| ☑ soil | ☑ Incidental Soil Ingestion | F | C/F | C/F | C/F | | I | |
| | ☑ Dermal Absorption of Contaminants from Soil | F | C/F | C/F | C/F | | I | |
| | ☑ Inhalation of Fugitive Dust | F | C/F | C/F | C/F | | I | |
| ☐ groundwater | ☐ Ingestion of Groundwater | | | | | | | |
| | ☐ Dermal Absorption of Contaminants in Groundwater | | | | | | | |
| | ☐ Inhalation of Volatile Compounds in Tap Water | | | | | | | |
| ☑ air | ☑ Inhalation of Outdoor Air | F | C/F | C/F | C/F | | I | |
| | ☐ Inhalation of Indoor Air | | | | | | | |
| | ☐ Inhalation of Fugitive Dust | | | | | | | |
| ☐ surface water | ☐ Ingestion of Surface Water | | | | | | | |
| | ☐ Dermal Absorption of Contaminants in Surface Water | | | | | | | |
| | ☐ Inhalation of Volatile Compounds in Tap Water | | | | | | | |
| ☐ sediment | ☐ Direct Contact with Sediment | | | | | | | |
| ☐ biota | ☐ Ingestion of Wild or Farmed Foods | | | | | | | |

Revised 1/29/2013

# Human Health Conceptual Site Model
# Scoping Form

**Site Name:** Indian Mountain LRRS, Site OT008

**File Number:** 775.26.002

**Completed by:** Jacobs Engineering Group

**Introduction**

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

***General Instructions: Follow the italicized instructions in each section below.***

## 1. General Information:

**Sources** *(check potential sources at the site)*

- ☒ USTs
- ☒ ASTs
- ☐ Dispensers/fuel loading racks
- ☒ Drums
- ☐ Vehicles
- ☐ Landfills
- ☒ Transformers
- ☐ Other:

**Release Mechanisms** *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☒ Other: Excavation/grading at SS010 may have distributed contaminants away from original release locations.

**Impacted Media** *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☐ Sediment
- ☐ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

**Receptors** *(check receptors that could be affected by contamination at the site)*

- ☐ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☒ Subsistence harvester (i.e. gathers wild foods)
- ☒ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

## 2. **Exposure Pathways:** *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

*If the box is checked, label this pathway complete:* Complete

Comments:

PCBs and fuels are present in surface soil at OT008 above ADEC cleanup levels.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

*If both boxes are checked, label this pathway complete:* Complete

Comments:

PCBs have the ability to permeate skin.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☐

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the ground-water is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

*If both boxes are checked, label this pathway complete:* Incomplete

Comments:

No groundwater has been encountered at OT008. Subsurface water is discontinuous throughout the area, ephemeral, and related to rainfall or snowmelt.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☐

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

*If both boxes are checked, label this pathway complete:* Incomplete

Comments:

Surface water at OT008 is ephemeral and related to rainfall or snowmelt.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☐

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☐

*If all of the boxes are checked, label this pathway complete:* Incomplete

Comments:

The lack of vegetation likely presents a minimal exposure route for subsistence hunting and gathering as no traditional food sources occur at OT008.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

*If both boxes are checked, label this pathway complete:* Complete

Comments:

Fuels in surface soil are considered volatile. PCBs, although not typically considered volatile, are an emerging contaminant for VI investigation.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☐

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

*If both boxes are checked, label this pathway complete:* Incomplete

Comments:

No occupied buildings remain within or nearby OT008.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

**Dermal Exposure to Contaminants in Groundwater and Surface Water**

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- o Climate permits recreational use of waters for swimming.
- o Climate permits exposure to groundwater during activities, such as construction.
- o Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

*Check the box if further evaluation of this pathway is needed:* ☐

Comments:

The remoteness and harsh climate at OT008 are not conducive to recreational use of any kind. No groundwater is present. Ephemeral surface/subsurface seeps would not be a viable source for for household use.

**Inhalation of Volatile Compounds in Tap Water**

Inhalation of volatile compounds in tap water may be a complete pathway if:

- o The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- o The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

*Check the box if further evaluation of this pathway is needed*: ☐

Comments:

Treated water is available for onsite contractor personnel at the LRRS.

**Inhalation of Fugitive Dust**

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - $PM_{10}$). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

*Check the box if further evaluation of this pathway is needed:* ☐

Comments:

Soils are mostly cobbles and rocks, not fine-grained particles carried easily by wind.

**Direct Contact with Sediment**

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

*Check the box if further evaluation of this pathway is needed:* ☐

Comments:

No sediment is present at OT008.

**4. Other Comments** *(Provide other comments as necessary to support the information provided in this form.)*

# Ecosystem Conceptual Site Model
# Scoping Form

**Site Name:** Indian Mountain
**Completed by:** Jacobs Engineering
**Date:** 2/22/2012

***Instructions: Follow the italicized instructions in each section below. "Off-ramps," where the evaluation ends before completing all of the sections, can be taken when indicated by the instructions. Comment boxes should be used to help support your answers.***

## 1. Direct Visual Impacts and Acute Toxicity

Are direct impacts that may result from the site contaminants evident, or is acute toxicity from high contaminant concentrations suspected? *Check the appropriate box.*

- [x] Yes – *describe observations below and evaluate all of the remaining sections without taking any off-ramps.*
- [ ] No – *go to next section.*

Comments:

| |
|---|
| Stained soil indicating significant total petroleum hydrocarbon contamination. |

## 2. Terrestrial and Aquatic Exposure Routes

*Check each terrestrial and aquatic route that could occur at the site.*

Terrestrial Exposure Routes

- [ ] Exposure to water-borne contaminants as a result of wading or swimming in contaminated waters or ingesting contaminated water
- [x] Contaminant uptake in terrestrial plants whose roots are in contact with contaminated surface water
- [x] Contaminant migration via saturated or unsaturated groundwater zones and discharge at upland "seep" locations (not associated with a wetland or water body)
- [x] Contaminant uptake by terrestrial plants whose roots are in contact with soil moisture or groundwater present within the root zone (generally no more than 4 feet below ground surface
- [x] Particulates deposited on plants directly or from rain splash
- [x] Incidental ingestion and/or exposure while animals grub for food, burrow (up to 2 feet for small animals or 6 feet for large animals), or groom

- [x] Inhalation of fugitive dust or vapors disturbed by foraging or burrowing activities
- [x] Bioaccumulatives (other than PAHs, which bioaccumulate more readily in aquatic environments) taken up by soil invertebrates, which are in turn eaten by higher food chain organisms (see the Policy Guidance on Developing Conceptual Site Models)
- [ ] Other site-specific exposure pathways

<u>Aquatic Exposure Routes</u>

- [x] Contaminated surface runoff migration to water bodies through swales, drainage ditches, or overland flow
- [ ] Aquatic receptors exposed through osmotic exchange, respiration, or ventilation of surface waters
- [ ] Contaminant migration via saturated or unsaturated groundwater zones and discharge at "seep" locations along banks or directly to surface water
- [ ] Deposition into sediments from upwelling of contaminated groundwater
- [ ] Aquatic receptors may be exposed directly to contaminated sediments through foraging or burrowing, or indirectly exposed due to osmotic exchange, respiration, or ventilation of sediment pore water.
- [ ] Aquatic plants rooted in contaminated sediments
- [x] Bioaccumulatives (see the Policy Guidance on Developing Conceptual Site Models) taken up by sediment invertebrates, which are in turn eaten by higher food chain organisms
- [ ] Other site-specific exposure pathways

*If any of the above boxes are checked go on to the next section. If none are checked, end the evaluation and check the box below.*

- [ ] OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

| |
|---|
| A contaminated seep was located north of the OT008 site. |

### 3. Habitat

*Check all that may apply. See Ecoscoping Guidance for additional help.*

- [ ] Habitat that could be affected by the contamination supports valued species (i.e., species that are regulated, used for subsistence, have ceremonial importance, have commercial value, or provide recreational opportunity)
- [ ] Critical habitat or anadromous stream in an area that could be affected by the contamination
- [ ] Habitat that is important to the region that could be affected by the contamination

- [ ] Contamination is in a park, preserve, or wildlife refuge

*If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below.*

- [x] OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

| |
|---|
| |

## 4. Contaminant Quantity

*Check all that may apply. See Ecoscoping Guidance for additional help.*

- [ ] Endangered-, threatened-, or species of special concern are present
- [ ] The aquatic environment is or could be affected
- [ ] Non-petroleum contaminants may be present, or the total area of petroleum-contaminated surface soil exceeds one-half acre

*If any of the above boxes are checked go on to the next scoping factor. If none are checked, end the evaluation and check the box below.*

- [ ] OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

| |
|---|
| |

## 5. Toxicity Determination

*Check all that apply.*

- [ ] Bioaccumulative chemicals are present (see Policy Guidance on Developing Conceptual Site Models)
- [ ] Contaminants exceed benchmark levels (see the Ecological Benchmark Tool in RAIS, available at: http://rais.ornl.gov/tools/eco_search.php)

*If either box is checked complete a detailed Ecological Conceptual Site Model (see DEC's Conceptual Site Model Guidance) and submit it with the form to you DEC Project Manager.*

*If neither box is checked, check the box below and submit this form to your DEC Project Manager.*

☐ OFF-RAMP: NO FURTHER ECOLOGICAL EVALUATION NECESSARY

Comments:

| |
|---|
| |

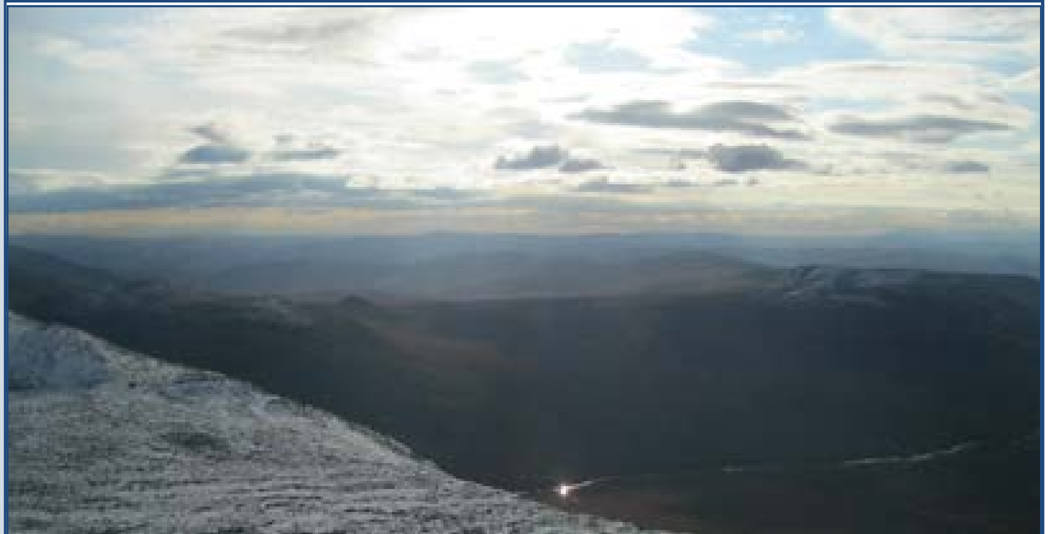
# APPENDIX C

## 2015 OT008 Proposed Plan

# Proposed Plan For Site OT008

## Indian Mountain Long-Range Radar Site, Alaska

**Final — December 2015**



*View from the White Alice Communications System at Indian Mountain (2011)*

## U.S. AIR FORCE ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred remedial action for OT008 at the Indian Mountain Long-Range Radar Site (LRRS), Alaska (Figure 1). OT008 encompasses a former White Alice Communications System (WACS), a Stained Soil Area, and a former Pump House. Based on previous investigations, the chemicals of concern specific to OT008 include polychlorinated biphenyls (PCB) and fuels collectively known as petroleum, oil, and lubricants (POL) and their related constituents.

The Indian Mountain LRRS is located in the Kuskokwim Mountains, approximately 170 miles northwest of Fairbanks and 35 miles south of the Arctic Circle. The closest populated area is Hughes, which is located 16 miles to the west-southwest and has a current population of 79. The installation, built in 1951, has been downscaled since the early 1970s and is currently operated and maintained year-round as an LRRS by contractor personnel. The Feasibility Study for OT008 prepared in 2015 evaluated potential technologies and alternatives for OT008 site remediation; seven alternatives for PCBs and four alternatives for POL were retained for further analysis. This Proposed Plan details each alternative and provides a rationale for the preferred remedy to mitigate the PCB- and POL-contaminated soil at OT008.

**Contents**



**The preferred remedy is a combination of PCB Alternative 5, Onsite Capping and Offsite Disposal, and POL Alternative 3a, Onsite Landfarming. This approach was developed in coordination with the Alaska Department of Environmental Conservation (ADEC).**

## HOW YOU CAN PARTICIPATE

You are encouraged to comment on this Proposed Plan. The public comment period begins 7 December 2015 and ends 7 January 2016. USAF will accept written comments during the public comment period. A pre-addressed form is included with this document. Comment letters must be postmarked by 7 January 2016.

Submit comments to:


Robert Johnston
Remedial Project Manager
USAF AFCEC/CZOP
10471 20th Street, Suite 343
JBER, Alaska 99506
robert.johnston.17@us.af.mil


USAF encourages the public to review the Administrative Record for the Indian Mountain LRRS to gain a more comprehensive understanding of remedial activities that have been conducted at OT008. Please refer to the information presented on Pages 2 and 3 and the Community Participation section on Page 24 for further details.

Implementing this remedy at OT008 would require a technical impracticability (TI) waiver for Toxic Substances Control Act (TSCA)-regulated soil to remain onsite. A TI waiver may be used when compliance with an Applicable or Relevant and Appropriate Requirement (ARAR) is technically impracticable; that is, compliance is not feasible from an engineering standpoint or because of excessive costs, particularly in relation to performance.

More detailed information about the remedial alternatives that were evaluated for OT008 are provided in the 2015 Feasibility Study, the 2011 Remedial Investigation, and other related documents available in the Administrative Record for the Indian Mountain LRRS at http://afcec.publicadmin-record.us.af.mil/ and on Joint Base Elmendorf-Richardson (JBER). Questions about the Administrative Record can be directed to Robert Johnston at robert.johnston.17@us.af.mil.

As the lead agency, the U.S. Air Force (USAF) Pacific Air Forces Regional Support Center is issuing this Proposed Plan in accordance with §117(a) of the Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986; U.S. Code (USC) Title 42, Chapter 103, §9617(a) [42 USC 103 §9617(a)]; and Code of Federal Regulations Title 40, §300.430 (f)(2) and (3), the National Oil and Hazardous Substances Pollution Contingency Plan. Although POL is not regulated under CERCLA, PCBs are classified under CERCLA as hazardous substances and, therefore, the CERCLA process is being followed at OT008 to address both PCB and POL contamination. The regulatory agency for this project is ADEC. Site remediation will be funded under the Defense Environmental Restoration Account (DERA), which was established by §211 of the Superfund Amendments and Reauthorization Act (10 USC 160, §2701).

As outlined in the National Oil and Hazardous Substances Pollution Contingency Plan, the objective of this Proposed Plan is to facilitate public involvement in the selection of a remedial alternative for OT008. A final remedial action will not be chosen until the public has had an opportunity to comment on this Proposed Plan, and all substantive comments have been considered.

The USAF will then prepare a Record of Decision to document the remedy selected for OT008. The Record of Decision will contain a summary of significant public comments received and responses.

## Previous Investigations

**1985 – Phase I, Records Search.** Eleven source areas at the Indian Mountain LRRS with potential environmental contamination were identified. No sampling was conducted.

**1989 – Phase II, Confirmation/Quantification (Stage 1).** Investigators noted a diesel odor in soil on the northeast side of the summit, and one stream appeared stained at the Upper Camp. Sample results confirmed the presence of POL in soil, sediments, and surface water that appeared to be migrating downstream. Additional investigation was recommended.

**1991 – Remedial Investigation/Preliminary Feasibility Study (Stage 2).** Soil gas, soil, sediment, and surface water samples were collected from 11 source areas ranging from old landfills to roads and a runway oiled for dust control. The summit area at Upper Camp was recommended for further investigation due to visible surface water sheens and petroleum odors.

**1993 – Site Investigation.** Samples collected from several former landfills and waste accumulation areas, road and runway oiling locations, and groundwater target locations indicated the presence of volatile organic compounds, semivolatile organic compounds, pesticides, PCBs, and metals in soil and sediment.

**1995 – Construction Report for Interim Remedial Action and Treatability Study.** Under this remedial action, a diversion trench was built to prevent the continued migration of contaminants from SS010 to OT008. Sediment and water samples collected from the trench showed low levels of fuel contamination, but no PCBs. Note that Site SS010 is located adjacent to and uphill from OT008.

## Previous Investigations (continued)

A treatability study demonstrated that passive remediation could successfully reduce fuel contamination in soil and sediment. Concurrently, a treatability study on investigation-derived waste from 1994 drilling and sampling activities was performed. This treatability study became the design basis for a containment cell to reduce petroleum contamination through passive biotreatment.

**1995 – Remedial Investigation/Feasibility Study.** Soil samples were collected in an effort to delineate the boundaries of fuel and PCB contamination at OT008. Initially, migration of contamination from the aboveground storage tanks at SS010 was suspected to be the most likely source of contamination at OT008. However, fuel and PCBs were not detected in soil immediately downhill from the aboveground storage tanks. These results suggested that movement of contaminated soil during construction and demolition of the WACS was the most likely source of contamination at OT008.

**2002 – Supplemental Site Investigation.** Four surface samples were collected from OT008. PCB concentrations ranged from nondetect to 4.7 milligrams per kilogram (mg/kg). Future sampling was recommended to investigate PCB migration from the site.

**2006 – Focused Feasibility Study for OT008.** The Feasibility Study recommended the excavation and offsite disposal of PCB-contaminated soil. A Human Health and Ecological Risk Assessment determined that the level of PCBs present onsite was high enough to warrant remedial action. No ecological receptors were identified in the risk assessment because poor habitat quality and rocky soil make exposure to contamination unlikely.

**2009 – Supplemental Remedial Investigation at OT008 Technical Memorandum.** Samples were collected from two of the areas of contamination at OT008: PCBs were detected at the Stained Soil Area up to 6,320 mg/kg, and both PCBs and fuel exceeded ADEC cleanup levels at the former Pump House at concentrations up to 9.88 and 34,500 mg/kg, respectively.

**2011 – Supplemental Follow-On Remedial Investigation.** Soil, sediment, and surface water samples were collected from OT008. PCBs and POL above ADEC cleanup levels were identified, results over time were compared, and areas of contamination were delineated. Sediment and surface water samples were collected from the seeps associated with the adjacent Site SS010 to determine whether contamination was migrating into OT008. One seep located north of OT008 that is within the same drainage and could therefore potentially affect OT008 was sampled. The report recommended the evaluation of impoundment measures, such as absorbent booms, to prevent migration from occurring and the preparation of a Feasibility Study (FS) to evaluate remedial alternatives at OT008.

**2012 – Feasibility Study for Site OT008.** An FS was conducted in 2012 to identify and screen potential remediation alternatives and technologies for PCB and petroleum contamination at OT008. Most in situ treatment technologies were eliminated based on effectiveness, implementability, and cost. Four alternatives for PCB remediation and three alternatives for POL contamination were retained for further analysis.

**2012 – Proposed Plan for Site OT008.** The Proposed Plan summarized the remedial alternatives for OT008 identified in the 2012 FS and encouraged public participation in the decision-making process. The preferred alternative was Grain-Size Separation and Offsite Disposal for PCBs and Grain-Size Separation and Onsite Landspreading for POL.

**2015 – Feasibility Study for Site OT008.** All remedial alternatives evaluated in the original FS were retained for evaluation in an amended FS; due to its remote location and the anticipated continuation of industrial site use, new onsite disposal alternatives were added for PCBs. To allow greater versatility in the selection of POL alternatives, new alternatives were added that were not contingent upon PCB remedy selection.

## SITE BACKGROUND

The Indian Mountain LRRS facility consists of two separate camps, Upper Camp and Lower Camp, which are connected by a 10-mile-long road (Figure 1). The radar facilities were constructed at Upper Camp on the summit of Indian Mountain; personnel quarters and maintenance and support facilities were constructed at Lower Camp. OT008, located at Upper Camp, comprises three areas of soil contamination (Figure 2). The former WACS was activated in 1958, deactivated in 1979, and demolished in 1986. The Stained Soil Area is approximately 1,500 feet west of the former WACS, and the former Pump House is located approximately 2,750 feet south and downhill from the former WACS.

Potential contamination sources for OT008 include historical spills and discharges associated with PCB-contaminated transformer oil, storage of waste oil, and fuel storage tanks. Several large spills/leaks, totaling more than 60,000 gallons of diesel fuel, have occurred at the upper camp since records have been kept (beginning in the 1970s). Several smaller 100- to 500-gallon spills of fuel, motor vehicle gasoline, and oil have also occurred, and oily wastes were applied to the roads for dust control. Drummed waste products were stored at OT008, but were reportedly removed around 1980. It is believed that the demolition and excavation of the WACS, which included excavation and re-grading activities, most likely resulted in the distribution of contaminants away from the original release locations. It is also possible, but less likely based on 2011 Remedial Investigation results (see Previous Investigations, Pages 2 and 3), that fuel contaminants released from the former drum storage and release area at SS010 have migrated to OT008.

## SITE CHARACTERISTICS

The Indian Mountain LRRS has a cold, continental climate with extreme temperature differences. Winters are long and cold, and summers are short. Winds are light to moderate in the area and are predominantly from the east and northeast. The Indian Mountain LRRS can only be accessed by air transport throughout the year and by snowmachine in the winter months when frozen rivers serve as ice roads.

The Upper Camp, where OT008 is located, is treeless with thick tundra at an elevation of 4,324 feet above mean sea level; it consists of thin deposits of sand, gravel, and cobbles overlying bedrock, and surface water that drains into the Yukon River by way of the Koyukuk River downstream of the Village of Hughes. This region is located within a zone of discontinuous permafrost where there may be lenses, or layers, of permafrost separated by unfrozen ground. Groundwater is limited at the Upper Camp; bedrock at the Indian Mountain LRRS has been encountered as shallow as 2 feet below ground surface (bgs) during previous investigations. Groundwater has not been identified in any prior site investigations at OT008. Although seeps and perched water are present, they most likely represent surface water and not groundwater.

## SCOPE AND ROLE

The overall goals of this project are to reduce risk to human health and the environment and to obtain site closure (with LUCs, where applicable) in compliance with state and federal regulations. Both PCB and POL contaminants are present in surface and subsurface soil above ADEC cleanup levels at OT008, and PCB contamination exceeds both TSCA (50 mg/kg) and the concentration at which PCBs are considered a principal threat waste (500 mg/kg). Soil quantities were estimated as mixed PCB/POL and POL only. The ADEC Method Two under 40-inch zone cleanup levels for PCBs (1 mg/kg) and diesel-range organics (DRO) (10,250 mg/kg) will be used to guide remedial action at the Indian Mountain LRRS. The total estimated volume of commingled soil is presented in Table 1 (see Page 8).

## SUMMARY OF SITE RISKS

Site risks at OT008 include exposure to PCBs and POL (such as gasoline-range organics, DRO, residual-range organics, and related constituents), which exist in soil above cleanup levels. Complete exposure pathways include: dermal absorption of soil, sediment, or surface water; incidental soil ingestion; and dust inhalation. Although PCBs are bioaccumulative, the lack of vegetation in these highly disturbed areas likely presents a minimal exposure route through the ingestion of wild or farmed foods. Subsistence hunting or

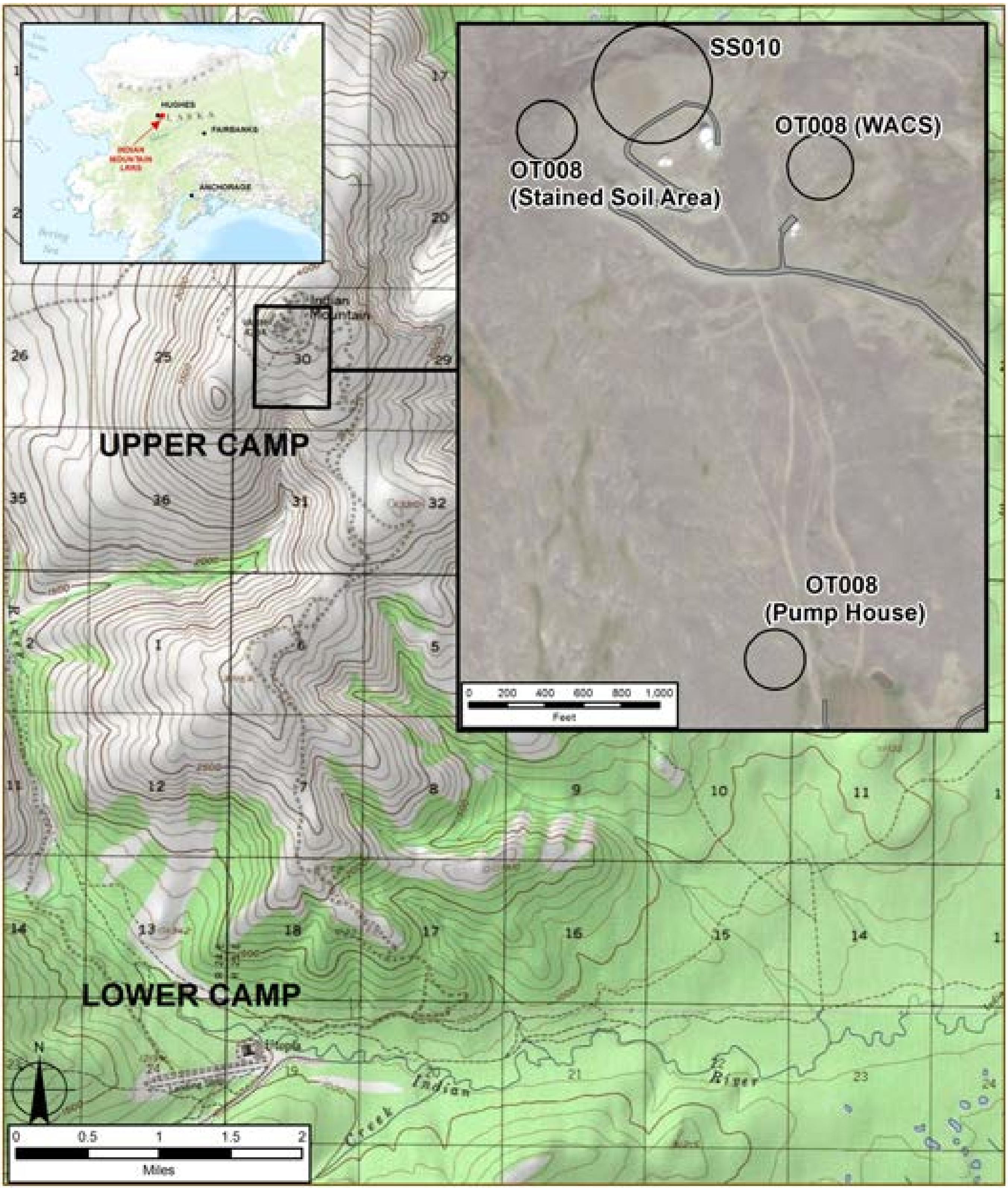



*Figure 1: Site Location and Vicinity Map*

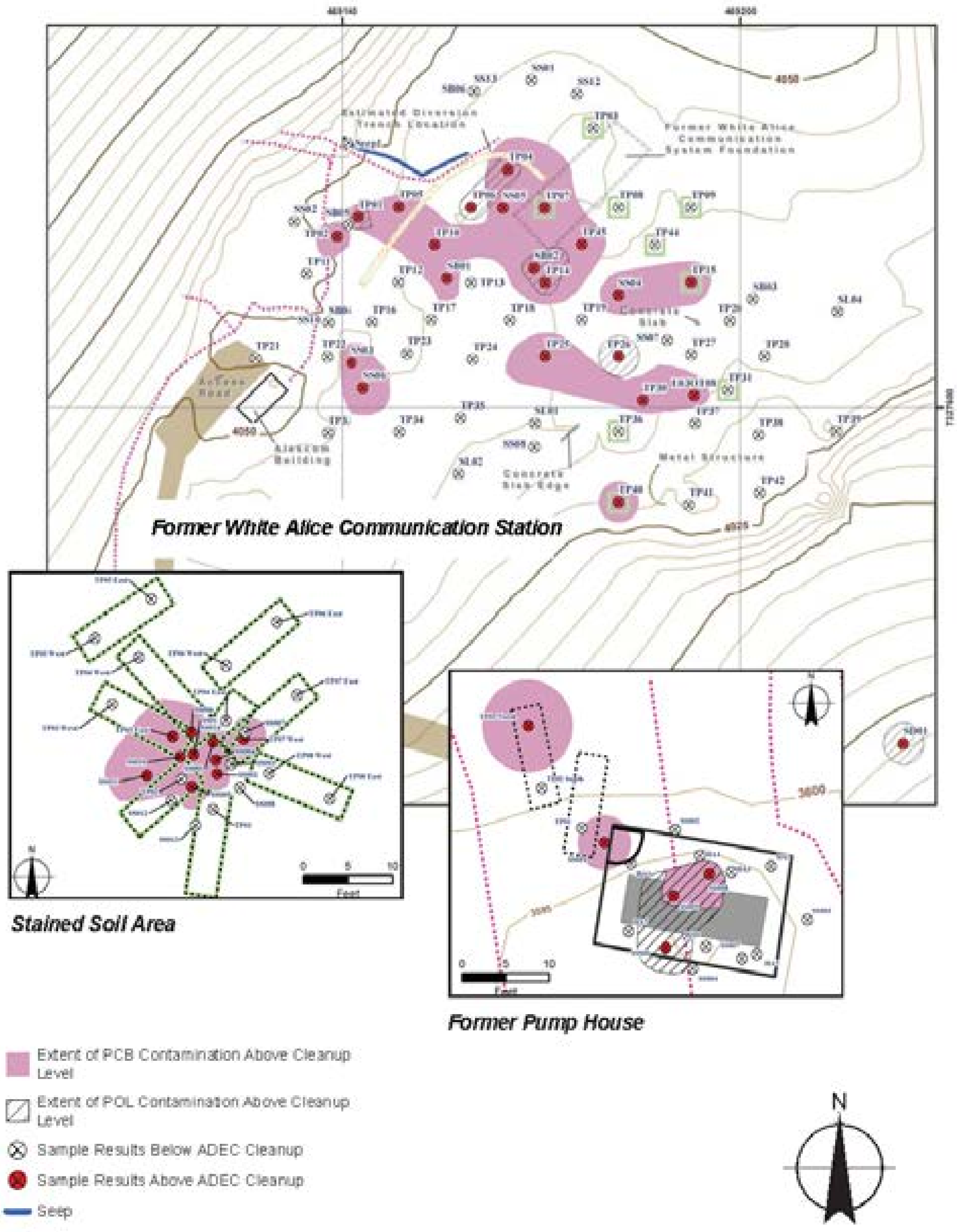



*Figure 2: Nature and Extent of Contamination*

gathering in the area may lead to a potential exposure, and the potential for contaminant migration to distant rivers does exist, including the Indian River, the Koyukuk River, Huntington Creek, Raven Creek, and Pocahontas Creek. Note that the migration to groundwater pathway at OT008 is considered incomplete, as no definitive groundwater has been observed at or near OT008 during any site investigation. Furthermore, the extent of contamination appears confined to relatively shallow depths. Although groundwater is not a current use or reasonably expected future source of drinking water at OT008, an official ADEC Groundwater Use Determination per Alaska Administrative Code (AAC) Chapter 18, §75.350 (18 AAC 75.350) has not been prepared or submitted for this site.

Potential receptors include commercial/industrial workers, construction workers, subsistence harvesters and consumers, site visitors, trespassers, and recreational users of the OT008 site. The local economy relies on salmon, freshwater fish, moose, black bear, rabbit, waterfowl, caribou, and berries for subsistence. However, OT008 is at a high elevation and is remote with no water or trees; it is not ideal for hunting, trapping, or fishing. Contamination of plants could occur through contaminant uptake in roots, and animals could be affected through contaminant migration to upland seeps, the consumption of plants that have been contaminated, and/or incidental exposure to fugitive dust while foraging or burrowing.

## REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAO) were developed based on state and federal regulations. The cleanup levels for OT008 were based on the concentrations established under ADEC Method Two (see information box, below); these cleanup levels are considered protective of human health and the environment anywhere in Alaska. RAOs for OT008 are as follows:

- Prevent direct contact of humans to soil containing PCBs in excess of 1 mg/kg.
- Prevent human exposure to soil containing DRO in excess of 10,250 mg/kg.
- Minimize or eliminate direct ecological exposure to PCBs and DRO above established ADEC Method Two cleanup levels.
- Reduce the potential for chemicals of concern to migrate from OT008 soil to any groundwater, surface water, and/or sediment where human receptors could be exposed.

Achievement of these criteria will be necessary to be protective of human health and the environment while allowing continued use of OT008 for the USAF mission at the Indian Mountain LRRS. These RAOs will also be protective of ecological receptors.

### CHEMICALS OF CONCERN

The Air Force and ADEC have identified two contaminants that pose potential risk to human health and the environment at this site:

***PCBs*** – PCBs have been shown to cause cancer and other adverse effects on the immune, reproductive, nervous, and endocrine systems. Symptoms of exposure include eye irritation, discoloration of nails and skin, and tissue inflammation and swelling. PCBs are unlikely to migrate or degrade over time. The maximum concentration found at OT008 was 6,320 mg/kg, which constitutes a principal threat waste. The ADEC direct contact/ingestion cleanup level for PCBs is 1 mg/kg.

***Fuels*** – POL exposure risks depend on the specific contaminant of concern; most affect the respiratory system, central nervous system, liver, and kidneys. Symptoms of exposure include exhaustion, dermatitis, blurred vision, dizziness, and confusion. The inhalation of DRO can result in irregular heartbeat, light-headedness, headache, and even death. POL will degrade naturally over time, and this natural degradation process can be enhanced through several remedial technologies. The maximum concentration found at OT008 was 34,500 mg/kg DRO. The ADEC direct contact/ingestion cleanup level for DRO is 10,250 mg/kg.

**For more information about the health effects of PCBs and fuels, visit** www.epa.gov.

**Table 1**
**Estimated Volume of In Situ Contamination by Location**

| Location | PCB / POL (≥ 1 mg/kg) | POL Only (≥ 10,250 mg/kg) | Est. Total Volume | Est. Total Area (square feet) |
|---|---|---|---|---|
| White Alice Communications System | 3,307 cy | 284 cy | 3,591 cy | 28,140 |
| Stained Soil Area | 13 cy | 0 cy | 13 cy | 134 |
| Former Pump House | 12 cy | 4 cy | 16 cy | 205 |
| Total | 3,332 cy | 288 cy | 3,620 cy | 28,479 |

**Notes:**
PCB/POL commingled also includes PCB-only soils.
cy = cubic yards

## SUMMARY OF ALTERNATIVES

No Action is listed as Alternative 1 for both PCB and POL remediation at OT008. No Action alternatives are retained as a baseline for comparison to other alternatives, and are unlikely to be selected. Under these alternatives, no activities would be undertaken to treat or remove the contamination present or to prevent exposure to the contamination. Potential for unacceptable human or environmental exposure to OT008 contaminants would remain for as long as contaminant concentrations remain above cleanup levels.

The No Action alternative does not include provisions for environmental monitoring, controlling the migration of contaminants, reducing contaminant concentrations, or preventing human or ecological exposure; therefore, the costs for implementing this alternative are minimal. However, the No Action alternative will not be selected because it fails to comply with the threshold criteria: it is neither protective of human health and the environment over the short or long term, nor does it comply with state and federal regulations. For these reasons, regulatory approval is also unlikely. PCBs do not break down easily and are relatively immobile; their concentrations are not expected to decrease significantly over a reasonable time without some type of remedial action. Petroleum products naturally degrade; however, this is a very slow process, especially in subsurface soils in a predominately cold environment.

Under §121 of CERCLA, five-year reviews are required when hazardous substances, pollutants, or contaminants remain onsite above levels that allow for unlimited use and unrestricted exposure; five-year reviews would be required for several of the alternatives retained for analysis, as described in the following pages.

### *ADEC Method Two Cleanup Levels*

ADEC Method Two soil cleanup levels may be applied at any contaminated site in Alaska and are considered protective of human health and the environment. The state of Alaska established cleanup levels in 18 AAC 75; *Oil and Hazardous Substances Pollution Control Regulations*.

Tabulated soil cleanup levels are provided in Method Two Tables B1 and B2 under 40-inch zone for three exposure pathways: migration to groundwater, outdoor inhalation, and direct contact, which encompasses both ingestion and dermal contact.

*Test pit excavation at the WACS (2011)*

## SUMMARY OF ALTERNATIVES FOR PCBs

Based on initial screening and site-specific conditions, the following alternatives were retained for detailed analysis for remediation of PCB-contaminated soils:

**PCB Alternative 1: No Action (baseline for comparison)**

**PCB Alternative 2: Offsite Disposal**

**PCB Alternative 3: Grain-Size Separation and Offsite Disposal**

**PCB Alternative 4: Grain-Size Separation and Onsite/Offsite Disposal**

**PCB Alternative 5: Onsite Capping and Offsite Disposal**

**PCB Alternative 6: Solidification/Capping and Limited Offsite Disposal**

**PCB Alternative 7: Onsite Consolidation and Capping**

**PCB Alternative 5, Onsite Capping and Offsite Disposal, and POL Alternative 3a, Onsite Landfarming, would rapidly and effectively eliminate the potential for human and environmental exposure to soil contaminants above acceptable limits.**

It is the Air Force's current judgment that the preferred alternatives identified in this Proposed Plan, or one of the other active measures considered in this Proposed Plan, are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. These preferred alternatives, and all alternatives retained for analysis in the 2015 Feasibility Study, are described in greater detail below.

### *PCB Alternative 2: Offsite Disposal*

PCB Alternative 2 includes excavation and offsite disposal of PCB-contaminated soil greater than 1 mg/kg (estimated at 3,997 cubic yards [cy] with bulk expansion factor) at a permitted landfill. PCB-contaminated soil would be containerized and transported via haul trucks, air charter, and barge to the contiguous U.S. and, upon arrival, a truck or train would complete the journey to the permitted PCB disposal facility. The estimated time to remedy completion is 108 days.

PCB-contaminated soil with concentrations greater than 50 mg/kg would be segregated, handled, and disposed of in accordance with the TSCA (see information box, Page 13) as bulk PCB remediation waste. Experienced, appropriately licensed, and trained workers using well-maintained, appropriately licensed, and inspected equipment and transportation vehicles would minimize transportation risks. All excavation and soil handling activities would be performed in ways that minimize the potential migration of PCB-contaminated soil and dust. Measures such as dust suppression, appropriate personal protective equipment, and temporary site controls would alleviate short-term risks to those working onsite.

In order to access all of the PCB-contaminated soil, existing utilities and concrete foundations would have to be relocated or removed. Confirmation soil samples would be collected from the excavation and analyzed to confirm that residual PCB concentrations in the remaining soils are less than the ADEC cleanup level of 1 mg/kg, allowing the RAOs to be met at project completion. The clean excavation would then be backfilled with clean local soil; therefore, no land-use controls (LUC) would be necessary.

The primary challenge involved with implementing this alternative would be handling and transporting the volume of soil with PCB contamination above 1 mg/kg. Containerization and transportation of these soils are federally regulated. The remoteness of the OT008 project site would require all soils to be transported offsite by air transport, which adds substantial logistics and costs. Alaska does not have disposal facilities that will accept PCB-contaminated soils; therefore, all soil removed would then have to be shipped to a regulated and permitted facility in the contiguous U.S., which adds to the environmental impact of remedy implementation through fuel consumption and the release of greenhouse gases. Due to the extreme climate at OT008, there is a limited season when excavation of these soils can occur, adding a critical timing component to implementation. The estimated cost for PCB Alternative 2 is $26.5 million.

### *PCB Alternative 3: Grain-Size Separation and Offsite Disposal*

PCB Alternative 3 would include excavation, as described in PCB Alternative 2, followed by the mechanical screening of all PCB-contaminated soil between 1 mg/kg and 25 mg/kg in order to minimize the waste quantity to be shipped offsite (currently estimated at 3,024 cy with bulk expansion factor). All soil contaminated with PCBs with a concentration of equal to or greater than 50 mg/kg would be excavated, handled, manifested, transported, treated, and disposed of in accordance with TSCA requirements.

The physical separation process would involve mechanical separation devices, such as stationary grizzly screens and powered vibratory screens. Rocks greater than approximately 2 inches, which have less PCB concentration per unit of mass, would be removed and sampled to ensure that total PCB concentrations are less than 1 mg/kg. Soil "clumps" larger than 2 inches and large, non-rock material, and all fine soils and sands contaminated with PCBs greater than 1 mg/kg and less than 50 mg/kg would be excavated, staged, tracked, and transported to an appropriately permitted offsite landfill for disposal. Once soil sample results from the excavation are also confirmed to be below cleanup levels, the larger screened materials would be used to backfill the excavation, as shown above. No LUCs would be necessary after project completion. The approximate time to remedy completion is 110 days.

This PCB alternative would provide a permanent remedy ensuring long-term protection of human health and the environment. Compared to complete offsite disposal (under PCB Alternative 2), the contaminated volume requiring offsite disposal would be decreased by an estimated 25 percent, and the amount of backfill required would also be minimized. As with Alternative 2, the large volume of soil and scheduling of the excavation, offsite air transport, and barge services out of Alaska would complicate logistics. The implementation cost of Alternative 3 is estimated at $20.4 million.

### PCB Alternative 4: Grain-Size Separation and Onsite/Offsite Disposal

In order to further reduce the volume of soil to be transported offsite, the grain-size separation process described for PCB Alternative 3 could be used along with a combination of onsite and offsite disposal. The soil would first be segregated into four stockpiles by concentration: 1 to 10 mg/kg, 10 to 25 mg/kg, 25 to 50 mg/kg, and more than 50 mg/kg.

The defining feature of PCB Alternative 4 is a permitted onsite PCB monofill with a protective cap to prevent human and ecological exposure, which would be developed as a long-term containment strategy to leave PCBs between 1 and 10 mg/kg onsite. This monofill would be located at the WACS, approximately 4 feet deep, and designed specifically for OT008 site conditions. Confirmation soil samples would be collected from the floor and sidewalls of the excavations to ensure that the cleanup level has been achieved prior to backfilling. The cap would be constructed with 2 feet of locally available gravel.

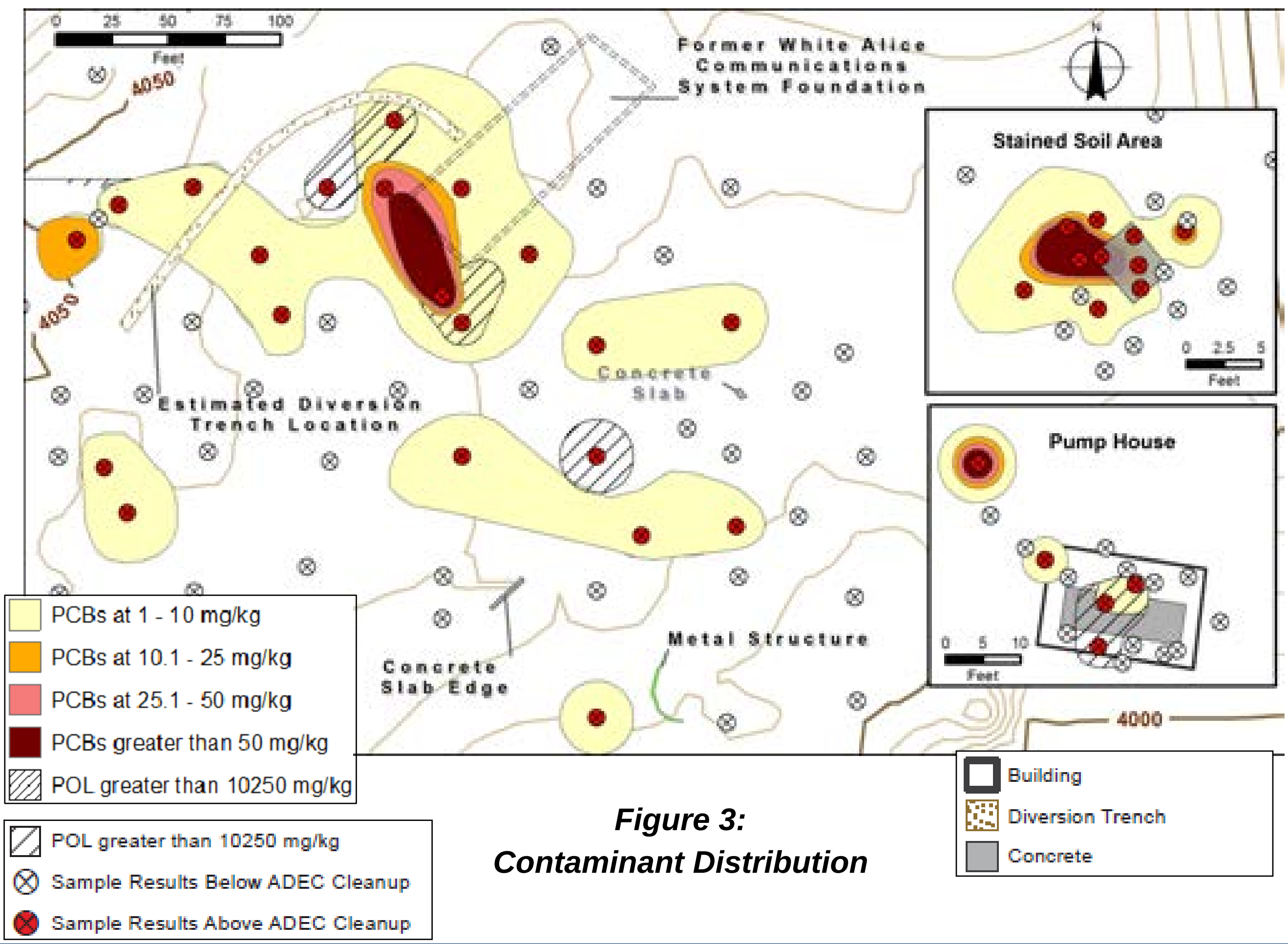
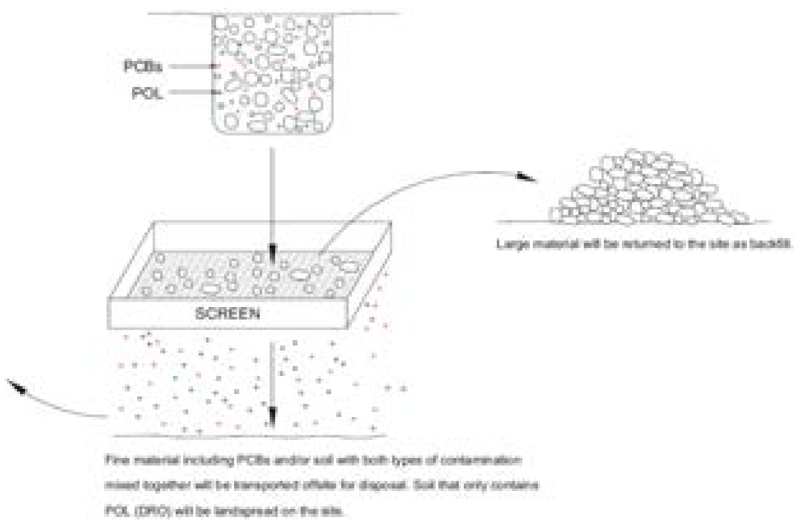



**Figure 3: Contaminant Distribution**

Once grain-size separation and monofill construction were complete, all remaining contaminated soil between 10 and 50 mg/kg would be transported for offsite treatment or disposal, as described in Alternative 2. All PCB-contaminated soil equal to or greater than 50 mg/kg would be excavated, handled, manifested, transported, treated, and disposed of in accordance with TSCA.

Including bulk expansion factor, the soil volume remaining onsite under PCB Alternative 4 is estimated at 2,781 cy (4,172 tons). Approximately 242 cy (363 tons), including 44 cy (66 tons) of TSCA waste, would be transported offsite for disposal. The residual human and ecological exposure risks would be controlled through a combination of capping, regular cap inspections and maintenance as needed, LUCs, and CERCLA five-year reviews. LUCs would include controlled access, dig restrictions, notices of contamination, and signage. This site would be incorporated into the USAF *Land-Use Control Management Plan*.




As with most of the alternatives, a high degree of logistical difficulty is inherent to mobilization of equipment and waste transportation to the appropriate disposal facilities. Although some PCB contamination would remain onsite above the ADEC cleanup level, and CERCLA five-year reviews would be required indefinitely, the volume for offsite disposal would be greatly reduced as compared to Alternatives 2 and 3, as would the project duration (92 days). The estimated overall cost would decrease accordingly ($6.8 million).

### *PCB Alternative 5: Onsite Capping and Offsite Disposal*

Under this alternative, only PCB-contaminated soil greater than 10 mg/kg would be removed and transported to an offsite disposal facility. The residual human and ecological exposure risks would be controlled through a combination of capping soils between 1 and 10 mg/kg; performing regular cap inspections and maintenance, as needed; implementing LUCs, such as controlled access, dig restrictions, notices of contamination, and signage; incorporating the site into the USAF *Land-Use Control Management Plan*; and conducting CERCLA five-year reviews.

Under this alternative, 3,090 cy (including bulk expansion factor) of soil between 1 and 10 mg/kg would remain onsite. The cap would be constructed over an approximately 52,107-square-foot area using a minimum 2 feet of locally available gravel. Any damage to the cap resulting in a substantive amount of material exposure to the environment would create a need to re-evaluate the remedy.

The reduced volume of soil to be disposed of offsite (approximately 289 cy [434 tons] with bulk expansion) drastically lowers the remediation costs associated with transportation and disposal and the short-term exposure risks involved in handling, packaging, and shipping PCB-contaminated soil over an approximate duration of 63 days. While utilities may need to be temporarily relocated or removed at the WACS and the former Pump House, most of the existing foundations can remain in place under Alternative 5 and would only be demolished where they interfere with waste removal above 10 mg/kg (at the WACS and Stained Soil Area). The approximate implementation cost of PCB Alternative 5 is $5.9 million.

## Toxic Substances Control Act

TSCA (1976) authorized the U.S. Environmental Protection Agency to secure information on all new and existing chemical substances and control any of the substances that were determined to cause unacceptable risk to public health or the environment.

This includes provisions for testing, regulations, reporting and record-keeping requirements, and management of imminent hazards associated with regulated chemical substances. PCBs at the Indian Mountain LRRS are considered regulated wastes when concentrations are equal to or exceed 50 mg/kg. These soils are subject to more stringent storage, transportation, and disposal requirements, and will be segregated from other waste soils for that reason.

Approximately 44 cy of soil contamination is TSCA-regulated at OT008.

### *PCB Alternative 6: Solidification/Capping and Limited Offsite Disposal*

As with Alternatives 2, 3, 4, and 5, PCB-contaminated soil equal to or greater than 50 mg/kg would be excavated, handled, manifested, transported, treated, and disposed of in accordance with TSCA. Under PCB Alternative 6, contaminated soil between 25 and 50 mg/kg would be transported for offsite treatment or disposal, as described in Alternative 2.

Soil with PCB concentrations between 1 and 25 mg/kg would be solidified as backfill in the (larger, relative to the other sites) excavation at the WACS once confirmation soil sample results from the floor and sidewalls of the excavations meet the cleanup levels. To solidify the PCB-contaminated soils, they would be mixed with materials, such as Portland cement, and watered. Batches of solidified PCB-contaminated soil would initially be poured into trenches with the WACS excavation and cured. Following backfilling activities, a clean cap approximately 2 feet thick would be placed over the excavation. The cap, constructed of a material designed to prevent exposure of humans and the environment to PCBs, would be suitable for re-vegetation and designed with sufficient strength and the durability to withstand environmental exposure.

As with PCB Alternatives 4, 5, and 7, ongoing maintenance, LUCs, cap maintenance, and CERCLA five-year reviews would be required to ensure that the remedy remains effective. Any damage to the cap resulting in a substantive amount of solidified material exposure to the environment would necessitate re-evaluation of the selected remedy. The long-term stability of the solidified monolithic structure can be uncertain, although a pilot or treatability study would be performed that optimizes the process to improve confidence in its implementability and long-term performance.

If implemented, this alternative would rapidly obtain the RAOs (81 days) and require no additional action for PCB-contaminated soil. The solidification of PCB-contaminated soils with PCB concentrations less than 25 mg/kg would reduce the volume of soil requiring offsite disposal by approximately 90 percent, which would substantially reduce the cost of this alternative (currently estimated at $7.4 million). However, solidification does not significantly destroy PCB contamination, but rather minimizes the potential for exposure. The solidified PCB contamination would be a permanent subsurface feature that limits future potential site use at OT008, and the addition of the cementitious admixture (combined with bulk expansion) actually increases the overall volume of contamination left onsite from 3,332 cy (Table 3) to 4,480 cy. LUCs would include controlled access, dig restrictions, notices of contamination, and signage. This site would be incorporated into the USAF *Land-Use Control Management Plan*. CERCLA five-year reviews would be necessary to ensure that this remedy remains protective over the long term.

### *PCB Alternative 7: Onsite Consolidation and Capping*


*Survey at the Stained Soil Area (2011)*

Under this alternative, 217 cy (326 tons) of PCB-contaminated soil would be relocated from the Stained Soil Area, former Pump House, and outlying areas at the WACS to be consolidated and capped with existing in situ contamination. The cap would be constructed over an approximately 52,107-square-foot area using a minimum 2 feet of locally available gravel. Utilities would need to be temporarily relocated or removed at the Stained Soil Area and the former Pump House, but the foundation at the WACS can remain in place.

As with PCB Alternatives 4, 5, and 6, ongoing maintenance, LUCs, cap maintenance, and CERCLA five-year reviews would be required to ensure that the remedy remains effective. Any damage to the cap resulting in a substantive amount of material exposure to the environment would necessitate re-evaluation of the selected remedy. Eliminating the offsite transportation and disposal of PCB-contaminated soil drastically reduces remediation costs ($4 million) relative to complete and partial offsite disposal alternatives and time to completion (56 days). The short-term exposure risks involved in handling, packaging, and shipping PCB-contaminated soil are also greatly reduced. The biggest challenges are related to obtaining regulatory approval for PCB concentrations above cleanup levels to remain onsite, and then ensuring adequate maintenance and enforcement of LUCs. The remote site location and unlikely change in site use further reduce the likelihood of incidental exposure.

Due to the remote site location, high volume and associated cost, the additional risk inherent with offsite transportation and disposal options, and the lack of viable treatment options, PCB Alternative 7 will not satisfy the statutory preference for treatment and will require a TI waiver to leave contamination onsite above TSCA allowable limits. If selected, a TI Evaluation section to justify the need for this waiver and more fully describe the protectiveness of this alternative will be incorporated into the Record of Decision for OT008.

## SUMMARY OF ALTERNATIVES FOR POL

Based on initial technology identification and screening and site-specific conditions, the following alternatives were retained for detailed analysis for POL contaminated soils:

**POL Alternative 1: No Action (baseline for comparison)**

**POL Alternative 2: Land-Use Controls**

**POL Alternative 3a: Onsite Landfarming**

**POL Alternative 3b: Grain-Size Separation and Onsite Landfarming**

**POL Alternative 4a: Offsite Disposal**

**POL Alternative 4b: Grain-Size Separation and Offsite Disposal**

*Site work at the White Alice Communication Station, view southwest (2011)*

### *POL Alternative 2: Land-Use Controls*

POL Alternative 2 includes LUCs to prevent exposure to POL contamination at OT008. POL-contaminated soil, estimated at 288 cy in situ, would remain onsite, and no treatment would be conducted to reduce its toxicity, mobility, or volume. The approximate area of contamination is 2,210 square feet at the WACS and 57 square feet at the former Pump House. LUCs would include controlled access, dig restrictions, a notice of contamination, regular inspections, and signage. The LUCs would be incorporated into the USAF *Land-Use Control Management Plan*. Non-CERCLA periodic reviews would be conducted indefinitely to ensure that the LUCs remain effective, or until cleanup levels have been achieved through natural attenuation.

If implemented, this alternative would meet the RAOs through a combination of site controls and engineering controls. Volatilization and natural attenuation would take place, although at a much slower rate than the more active landfarming proposed under POL Alternatives 3a and 3b. The biggest challenges are related to adequate maintenance and enforcement of LUCs. However, the remote site location and unlikely change in site use reduce the likelihood of incidental exposure. No POL-contaminated soil would be removed from OT008, hence reducing costs relative to POL Alternatives 4a and 4b, which include transportation and offsite treatment/disposal. Costs for POL Alternative 2 are estimated at $0.29 million.

### *POL Alternative 3a: Onsite Landfarming*

POL Alternative 3a includes the onsite landfarming of all POL-contaminated soil (346 cy including expansion factor, or 519 tons) above the ingestion criteria to a depth of approximately 10 inches. Mechanical mixing would be performed after initial placement of the soil and tilled twice per year thereafter until the cleanup level has been achieved. An 11,110-square-foot area (105 by 105 feet) with 3.33 percent grade was selected for the landfarming treatment area. An earthen berm 6 feet wide by 3 feet high using native soils would be placed on

*Former transformer pit at the Stained Soil Area (2011)*

all four sides to minimize the risk of erosion of the contaminated soil and runoff of sediments to adjacent undisturbed areas. Engineering controls, such as a temporary snow fence and signs, would be erected around the landspreading area to prevent incidental contact by workers periodically visiting the Upper Camp.

It is estimated that POL in these soils would decrease below the cleanup level within two years and three months. Therefore, confirmation soil samples would be collected at the beginning of the third season. If cleanup levels have been achieved, the snow fence and signs would be removed and the area allowed to naturally re-vegetate. The small berms would remain to minimize erosion. If implemented, this alternative would meet the RAOs and require minimal additional follow-up action for POL-contaminated soil after the initial 18 days. Landfarming of contaminated soil would allow for volatilization and natural attenuation to take place at an accelerated rate. The biggest challenges are related to mobilizing of equipment for excavation and landfarming. No POL-contaminated soil would be removed from OT008, hence reducing costs relative to POL Alternatives 4a and 4b, which include transportation and offsite treatment/disposal.

Once analytical samples confirm contaminant levels are below the cleanup level for DRO, no LUCs, monitoring/inspections, or periodic reviews would be required under this alternative. The approximate cost for POL Alternative 3a remedy implementation is $1.3 million.

### *POL Alternative 3b: Grain-Size Separation and Onsite Landfarming*

POL Alternative 3b includes screening all POL-contaminated soil above the ingestion criteria for a variety of grain sizes using the same mechanical separation equipment and process described for the PCB-contaminated soil under PCB Alternative 3. Once screening is complete, oversized soil material would be left onsite to be used as backfill for the excavation, and all sands, fine soils, and porous materials would be landfarmed onsite to a depth of approximately 10 inches, as described for POL Alternative 3a.

Of the 346 cy (519 tons) of POL-contaminated soil excavated under POL Alternative 3a, approximately 260 cy (390 tons) would be landspread over an area of 8,330 square feet (91 by 91 feet) under POL Alternative 3b. Construction, maintenance, and confirmation sampling would occur as stated above for POL Alternative 3a; grain-size separation would add an additional day of site work (19 days total).

If implemented, this alternative would meet the RAOs and require minimal additional follow-up action for POL-contaminated soil. Landfarming of contaminated soil would allow for volatilization and natural attenuation to take place at an accelerated rate. Grain-size separation is an effective way of reducing the overall soil volume to be landspread and providing acceptable material for use as backfill. The approximate reduction, which is assumed to be 25 percent, is based on an estimation of rocks larger than 2 inches, as documented during the 2011 Remedial Investigation sampling, and based on a similar operation at Anvil Mountain near Nome, Alaska.

No POL-contaminated soil would be removed from OT008, hence reducing costs relative to POL Alternatives 4a and 4b, which include transportation and offsite treatment and disposal. The biggest challenge is the mobilization of equipment for excavation, screening, and landfarming. However, with Alternative 3b the volume of soil to be landspread is reduced 25 percent by grain-size separation relative to POL Alternative 3a, and the amount of backfill needed would also be reduced. Once analytical samples confirm that contaminant levels are below the ingestion criterion for DRO, estimated at two years and three months, neither LUCs, monitoring/inspections, nor periodic reviews would be required under this alternative. The approximate cost for Alternative 3b remedy implementation is $1.5 million.


*Excavating debris from Test Pit 2 at the Stained Soil Area (2011)*

### *POL Alternative 4a: Offsite Treatment and Disposal*

Under POL Alternative 4a, all 288 cy of POL-contaminated soil above the ADEC cleanup criterion for ingestion (10,250 mg/kg), resulting in 346 cy (519 tons) with expansion factor, would be excavated, containerized, and transported from OT008 to an appropriately permitted treatment, storage, and disposal facility in Anchorage, Alaska. Confirmation samples would be collected from the floor and sidewalls of the excavations to ensure that the cleanup criterion had been achieved. Clean fill would be obtained locally to backfill the excavations. If implemented, this alternative would meet the RAOs and require no additional action for POL-contaminated soil. Removing the volume of soil above the ingestion cleanup level from the site is the primary challenge involved with implementing this alternative due to the remote location of the site.

This alternative would require increased logistics for scheduling the offsite air and ground transport and then treatment and disposal of the soils. In addition, the offsite transportation of contaminated materials increases the amount of greenhouse gases released to the environment. No LUCs, monitoring/inspections, or periodic reviews would be required under this alternative, as all contamination above acceptable limits will have been removed. The approximate cost of POL Alternative 4a remedy implementation is $3.3 million, and the duration is estimated at 16 days.

### *POL Alternative 4b: Grain-Size Separation and Offsite Treatment and Disposal*

POL Alternative 4b would include screening of all POL-contaminated soil above the cleanup level for separation of grain sizes, as discussed in PCB Alternative 3 and POL Alternative 3b. Once screening is complete, oversized soil material would be suitable for use as backfill, while the finer-grain contaminated soils, which contain a higher concentration of POL by volume, would be containerized and transported for offsite disposal.

*View west from the Stained Soil Area (2011)*

As indicated for POL Alternative 3b, grain-size separation is an effective way of reducing soil volume while removing soil contamination greater than the cleanup level. Compared to the complete offsite disposal proposed under POL Alternative 4a, the contaminated volume would be reduced from 346 cy (519 tons) to 260 cy (390 tons), approximately 25 percent, and the amount of backfill required would be reduced. The estimated duration is the same (16 days) as POL Alternative 4a.

*Field screening at the White Alice Communication Station (2011)*

If implemented, this alternative would meet the RAOs and require no additional action for POL-contaminated soil. Although reduced, removing the volume of soil above the ingestion level from the site is still the primary challenge involved with implementing this alternative due to the remote location of the site. In addition, the offsite transportation of contaminated materials increases the amount of greenhouse gases released to the environment. No LUCs, monitoring/inspections, or periodic reviews would be required under this alternative, as all contamination above acceptable limits will have been removed. The approximate cost of POL Alternative 4b remedy implementation is $3.1 million.

## EVALUATION OF ALTERNATIVES

Selected technologies were used as the building blocks to develop remedial alternatives for OT008.

### *Threshold Criteria*

Each alternative that passed the threshold criteria listed below was subjected to detailed analysis:

- Overall protection of human health and the environment
- Compliance with ARARs

ARARs are state and federal regulations that apply to certain chemicals, locations, or actions. An example of a chemical-specific requirement applicable to OT008 is TSCA, which regulates disposal of PCB-contaminated waste at concentrations above 50 mg/kg (see information box, Page 13). An example of a location-specific requirement is the National Historic Preservation Act; while no historic artifacts are known to be present at OT008, this legislation ensures that, if identified, they are protected and their preservation is coordinated with the appropriate authorities. Department of Transportation regulations are action-specific; they govern the packaging, labeling, and transport of hazardous waste.

With the exception of the No Action alternatives (PCB Alternative 1 and POL Alternative 1) and PCB Alternative 7, all alternatives comply with the location-, action-, and chemical-specific regulations identified for this project. A complete list of ARARs is available in the 2015 Feasibility Study.

## *Primary Balancing Criteria*

In accordance with CERCLA guidance, a range of alternatives was developed to include a No Action alternative, alternatives that focus on reducing risk by preventing exposure to contaminated soil, and alternatives that focus on the treatment of contaminated soil. Each alternative that passed the threshold criteria was subjected to detailed analysis based on the five primary balancing criteria established under CERCLA. The primary balancing criteria are:

- **Long-term effectiveness** addresses the level of residual risk and the adequacy and reliability of site controls that mitigate residual risk. With the exception of No Action, all of the remedies retained for analysis are effective, but because PCB contamination would remain onsite under PCB Alternatives 4, 5, 6, and 7, they are less permanent solutions than PCB Alternatives 2 or 3. Because POL contamination would remain onsite under POL Alternative 2, it is less permanent than POL Alternatives 3a, 3b, 4a, and 4b.
- CERCLA has a statutory preference for any remedy that has the ability to **reduce the toxicity, mobility, and volume** of contamination through treatment. At OT008, the alternatives that involve treatment as a key component are PCB Alternatives 3 and 4 for grain-size separation, PCB Alternative 6 for solidification, POL Alternatives 3b and 4b for grain-size separation, and POL Alternatives 3a and 3b, for landfarming soils to increase the rate at which POL contamination will degrade naturally. Only POL Alternative 3b employs a combination of treatment technologies to reduce both volume and toxicity.
- **Short-term effectiveness** considers risk to site workers, the community, and the environment while remedy implementation is in progress, as well as the project duration until RAOs have been achieved. For this criterion, PCB alternatives that allow contamination to remain onsite are preferred, and PCB Alternative 7 is most preferable, as it requires minimal soil handling and takes only 56 days to complete. POL Alternative 2 is most effective in the short term, but depends upon the adequate design and enforcement of LUCs to manage residual risk. The treatment and disposal options for POL (4a and 4b) are preferred over landfarming under this criterion, since RAOs would be met upon remedy implementation without the need for continued maintenance and monitoring; of those, POL Alternative 4a does not require the grain-size separation process, which increases risk to site workers.
- Due to the remote location of the Indian Mountain LRRS, technical and logistical aspects of **implementability** are particularly important. The need dispose of large quantities of contaminated soil offsite greatly affects the implementability of a technology or alternative. The process of grain-size separation, which decreases the volume of soil required to be sent offsite, makes some of the PCB and POL alternatives much more implementable than they otherwise would be but still entails the mobilization of large pieces of equipment by air. Thus, alternatives that leave the most contamination onsite—PCB Alternative 7, followed closely by PCB Alternative 5, and POL Alternative 2—are the most easily implemented alternatives.
- **Costs** for each option are provided for comparative purposes during screening in Table 2. Technologies were not eliminated from further consideration purely on the basis of cost factors, which are only rough order-of-magnitude estimates at this stage in the CERCLA process. Table 3 presents a comparison of the alternatives with respect to the threshold and balancing criteria. Modifying criteria are discussed below.

## *Modifying Criteria*

In addition to the threshold and balancing criteria, there are two **modifying criteria**: **state acceptance** and **community acceptance**. State acceptance evaluates the technical and administrative issues associated with the proposed alternatives and ADEC concerns. Community acceptance evaluates the issues and concerns that the public may have regarding each of the alternatives. The evaluation of these modifying criteria will be presented in a Record of Decision for OT008.

## COMPARATIVE ANALYSIS

While no contamination would be left onsite above ADEC cleanup criteria under PCB Alternative 2 and POL Alternative 4a, thereby achieving RAOs upon completion, these alternatives present the greatest implementability challenges. The nearest treatment or disposal facilities can only be reached via a combination of plane, truck, train, and/or barge. Although grain-size separation could be used to minimize the quantity of waste to be shipped offsite under PCB Alternative 3 and POL Alternative 4b, the mobilization of heavy equipment and time required to complete this process increases project duration, which then increases short-term risk to site workers. Grain-size separation also decreases the disposal volume and increases project duration under PCB Alternative 4; duration is even further increased through the construction of an onsite monofill. Grain-size separation under POL Alternative 3b does not significantly increase project duration, but due to costs, this alternative would only be chosen if a PCB alternative was selected that also employed this remedial technology.

To varying degrees, PCB Alternatives 3, 4, and 6 and POL Alternatives 3a, 3b, 4a, and 4b meet the statutory preference under CERCLA for treatment of contamination, but even the PCB treatment options that were retained for detailed analysis are limited by the remote site location, short field season, and subarctic climate. POL Alternative 3a is more viable than 3b for this reason, and POL Alternative 3a is also preferred over the LUCs proposed under POL Alternative 2 because it is more permanent.

**Table 2**
**OT008 PCB and POL Alternatives Cost Summary**

| Alternative | Capital | Operation & Maintenance [1] | Total Present Worth Cost [2] |
|---|---|---|---|
| **PCB Alternatives** | | | |
| Alternative 1 | $ 0 | $ 0 | $ 0 |
| Alternative 2 | $ 26.5 M | $ 0 K | $ 26.5 M |
| Alternative 3 | $ 20.4 M | $ 0 K | $ 20.4 M |
| Alternative 4 | $ 6.68 M | $ 126,487 K | $ 6.8 M |
| Alternative 5 | $ 5.71 M | $ 142,918 K | $ 5.9 M |
| Alternative 6 | $ 7.25 M | $ 128,736 K | $ 7.4 M |
| Alternative 7 | $ 3.81 M | $ 142,918 K | $ 4 M |
| **POL Alternatives** | | | |
| Alternative 1 | $ 0 | $ 0 | $ 0 |
| Alternative 2 | $ 0.24 M | $ 45,224 K | $ 0.29 M |
| Alternative 3a | $ 1.24 M | $ 18,427 K | $ 1.3 M |
| Alternative 3b | $ 1.45 M | $ 18,427 K | $ 1.5 M |
| Alternative 4a | $ 3.3 M | $ 0 K | $ 3.3 M |
| Alternative 4b | $ 3.1 M | $ 0 K | $ 3.1 M |

**Notes:**
[1] Operations and Maintenance estimates include CERCLA reviews conducted every five years for 30 years and cap maintenance for PCB Alternatives 4, 5, 6, and 7 and a periodic review for POL Alternative 2. POL Alternatives 3a and 3b include tilling the soil twice per year for approximately two years and confirmation sampling once the cleanup level is expected to have been met.
[2] Costs estimated with +50% / -30% accuracy based on subcontractor quotes, construction drawings, and engineering estimates.
K = thousand, M = million

PCB Alternative 7 is preferred over PCB Alternatives 5 and 6 because although all three reduce exposure risk through capping, both of the latter alternatives include a risky and logistically difficult disposal component. However, under PCB Alternative 7, a TI waiver would be required, and may be difficult to obtain, for the onsite disposal of PCB-contaminated soil above allowable limits. Exposure to contamination left onsite can be controlled under the current industrial use scenario, which is not expected to change.

## PREFERRED ALTERNATIVE

Due to the remote location of OT008 where air transportation is the only viable option to access the site and mobilize personnel, equipment, and materials, ADEC concurs that alternatives that enable contaminated soil to remain onsite are preferred over alternatives that involve excavating, handling, and shipping large quantities of soil. Based on the information currently available, it is the USAF's current judgment that PCB Alternative 5: Onsite Capping and Offsite Disposal and POL Alternative 3a: Onsite Landfarming represent the best combination of alternatives for remediation of PCB- and POL-contaminated soil, respectively. While contamination between 1 and 10 mg/kg would remain onsite under PCB Alternative 5, PCB contamination above 10 mg/kg would be shipped offsite for proper treatment or disposal, and residual risk would be mitigated with the implementation of LUCs and evaluated in five-year reviews. If properly implemented, the combination of these two alternatives would be protective of human health and the environment and provide the best balance of trade-offs among the other proposed alternatives, with respect to the balancing and modifying criteria. These alternatives are recommended because they will achieve substantial risk reduction by preventing exposure to PCB contamination, including concentrations that constitute principal threat wastes (PCB Alternative 5) and treating POL contamination (POL Alternative 3a) above ADEC Method Two cleanup levels. However, **a final remedial action will not be chosen until the public has had an opportunity to comment on this Proposed Plan, and all substantive comments have been considered.**

The USAF expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs (or justify a waiver); 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element (or justify not doing so).

**Table 3**
**OT008 PCB and POL Alternatives Cost Summary**

| Remedial Alternative | Threshold Criteria | | Primary Balancing Criteria | | | | |
|---|---|---|---|---|---|---|---|
| | 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 |
| **PCB Alternatives** | | | | | | | |
| PCB 1: No Action | Fail | Fail | ○ | ○ | ○ | ● | $ 0 |
| PCB 2: Offsite Disposal | Pass | Pass | ● | ○ | ◐ | ◐ | $ 26.5 M |
| PCB 3: Grain-Size Separation and Offsite Disposal | Pass | Pass | ● | ◐ | ◐ | ◐ | $ 20.4 M |
| PCB 4: Grain-Size Separation and Onsite/Offsite Disposal | Pass | Pass | ◐ | ◐ | ◐ | ◐ | $ 6.8 M |
| PCB 5: Onsite Capping and Offsite Disposal | Pass | Pass | ◐ | ○ | ◐ | ● | $ 5.9 M |
| PCB 6: Solidification/Capping, and Offsite Disposal | Pass | Pass | ◐ | ◐ | ◐ | ◐ | $ 7.4 M |
| PCB 7: Onsite Consolidation and Capping | Pass | Fail* | ◐ | ○ | ● | ● | $ 4 M |
| **POL Alternatives** | | | | | | | |
| POL 1: No Action | Fail | Fail | ○ | ○ | ○ | ● | $ 0 |
| POL 2: Land-Use Controls | Pass | Pass | ◐ | ○ | ● | ● | $ 0.29 M |
| POL 3a: Onsite Landfarming | Pass | Pass | ◐ | ◐ | ◐ | ◐ | $ 1.3 M |
| POL 3b: Grain-Size Screening and Onsite Landfarming | Pass | Pass | ◐ | ◐ | ◐ | ◐ | $ 1.5 M |
| POL 4a: Offsite Treatment and Disposal | Pass | Pass | ● | ◐ | ◐ | ◐ | $ 3.3 M |
| POL 4b: Grain-Size Screening and Offsite Treatment and Disposal | Pass | Pass | ● | ◐ | ◐ | ◐ | $ 3.1 M |

**Notes:**
● Highly effective, easy to implement, or low cost
◑ Somewhat effective, difficult to implement, or moderate cost
○ Not effective, very difficult to implement, or high cost
* PCB Alternative 7 would require a TI waiver since TSCA–regulated soil would remain onsite.

## COMMUNITY PARTICIPATION

The final remedy for OT008 will be selected for the site after consideration of comments from the community. The USAF encourages the public to gain a more comprehensive understanding of the remedial activities that have been conducted at OT008. Information will be provided in the Administrative Record, and an announcement will appear in the *Alaska Dispatch News* and the *Fairbanks Daily News-Miner*. The public comment period will span 30 days starting on 7 December 2015 and ending on 7 January 2016.

A public meeting date will be scheduled in Hughes, Alaska. Verbal comments can be provided by calling and leaving a message at 1-800-222-4137 or contacting the USAF Remedial Project Manager, Robert Johnston, at 907-552-7193.

Following receipt of comments on the Proposed Plan for OT008, the alternatives will be further evaluated based on the modifying criteria: state/support agency acceptance and community acceptance. The final remedial action alternative will be presented in a Record of Decision for OT008.

A summary of significant comments will be provided in the Record of Decision, which will be completed following the acceptance of a proposed alternative for OT008.

For further information on OT008, please contact:

Robert Johnston, USAF Remedial Project Manager
USAF AFCEC/CZOP
10471 20th Street, Suite 343
JBER, Alaska 99506
(907) 552-7193
robert.johnston.17@us.af.mil

## Thank You for Your Comments on the Proposed Plan for the OT008 Site — Indian Mountain LRRS

Your input on the response action alternative discussed in this Proposed Plan is important to the U.S. Air Force. Comments provided by the public are valuable in helping us select a remedy. Use the space below to prepare your comments. When you are finished, please fold and mail. A return address has been provided on the back of this page for your convenience. Comments must be postmarked by 7 January 2016.

Alternatively, if you would prefer to leave your comments by telephone, please call 1-800-222-4137 and leave a voice mail message. You may also email your comments to robert.johnston.17@us.af.mil. You may leave an anonymous message, or provide contact information if you prefer to receive a response. If you have questions about the comment process, please contact Robert Johnston at 907-552-7193.

Name:

Address:

City, State, Zip:

Email and/or Phone:

## Comments on Proposed Plan for
## OT008 Indian Mountain LRRS, Alaska

Return Address

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____________________________________

Robert Johnston
Remedial Project Manager
10471 20th Street, Suite 343
Joint Base Elmendorf-Richardson, Alaska 99506

# GLOSSARY

**Alaska Department of Environmental Conservation (ADEC)** – the regulatory body that monitors the enforcement of Alaska's environmental standards.

**Applicable or Relevant and Appropriate Requirements (ARAR)** – federal, state, and local standards, requirements, criteria, or limitations that are legally applicable or relevant and appropriate to the site; they can be chemical-specific, action-specific, or location-specific.

**Bioaccumulation** – the accumulation that occurs when an organism absorbs a toxic substance at a rate greater than at which the substance is lost.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** – a U.S. federal law designed to clean up sites contaminated with hazardous substances.

**Contaminant of potential concern** – chemicals, compounds, or materials that may cause adverse effects on human health or the environment.

**Defense Environmental Restoration Account (DERA)** – legislation enacted to (1) identify, investigate, research, and clean up contamination from hazardous substances, pollutants, and contaminants; (2) correct environmental damage that creates an imminent and substantial endangerment to public health, welfare, or the environment; and (3) demolish unsafe buildings and structures (U.S. Code, Title 10, Chapter 160, §2701)

**Feasibility Study** – a public document required under CERCLA to investigate the potential options available to remediate contamination.

**Land-use controls (LUC)** – structural or legal mechanisms that protect property users and the public from existing site contamination (e.g. notices of contamination, permitting requirements).

**Long-Range Radar Site (LRRS)** – a minimally attended radar station that reports surveillance data.

**Natural attenuation** – a gradual decline in contaminant concentration over time.

**Polychlorinated biphenyls (PCB)** – a group of toxic, persistent chemicals used in transformers and capacitors for insulating purposes and in gas pipeline systems as a lubricant. PCBs are considered a hazardous substance under CERCLA.

**Petroleum, oil, and lubricants (POL)** - Both DRO and residual-range organic compounds fall this category; they have limited solubility but can be diluted or dispersed by groundwater or surface water. POLs are not considered hazardous substances under CERCLA, but are regulated by ADEC.

**Remedial Action Objectives (RAO)** - parameters developed after site characterization specifying the area of concern, the time frame for restoration, and cleanup levels

**Record of Decision (ROD)** – a public document that explains which alternative or action will be used to clean up a contaminated CERCLA site, why it was selected, and how it will be implemented. This document also summarizes all substantive public comments considered as part of the remedy selection process.

**Site controls** – physical markers or barriers that protect property users and the public from existing contamination (e.g. signs, fences).

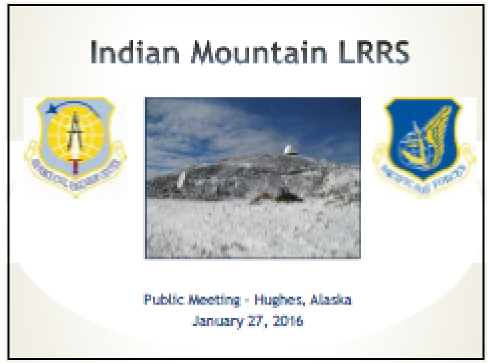
**Technical impracticability waiver** – regulatory approval for a remedial alternative that does not meet ARARs if compliance is technically impracticable from an engineering perspective.

**Robert Johnston**
**Remedial Project Manager**
**10471 20th Street, Suite 343**
**Joint Base Elmendorf-Richardson, Alaska 99506**

# APPENDIX D

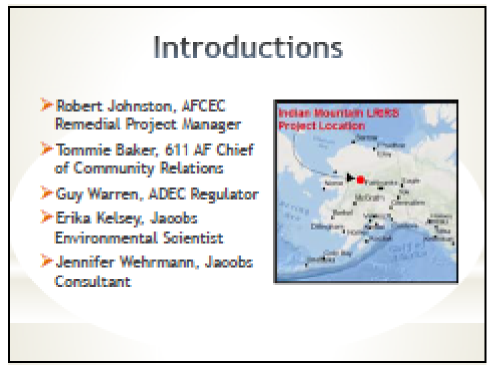
# Community Participation

# Public Meeting Transcript
Indian Mountain LRRS
OT008 & AB938/SR937
Proposed Plans
Hughes, Alaska – 27 January 2016



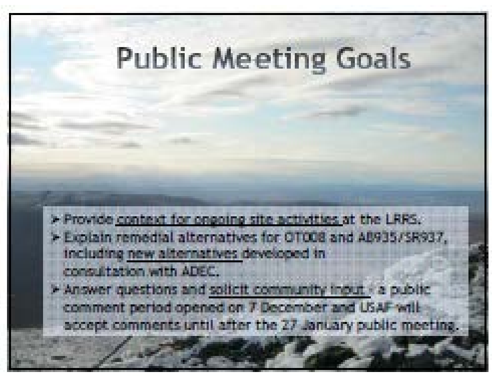

**[Meeting commences following 5 pm potluck supper]**

Has everybody gotten enough food and is ready to start? Yes? Okay. Thank you. Again, my name is Erika. I'm an environmental scientist with Jacobs Engineering. I've been doing environmental work in Alaska for six years now. I just want to say thank you so much for welcoming us here and for everyone here who's helped to make our stay really happy so far.

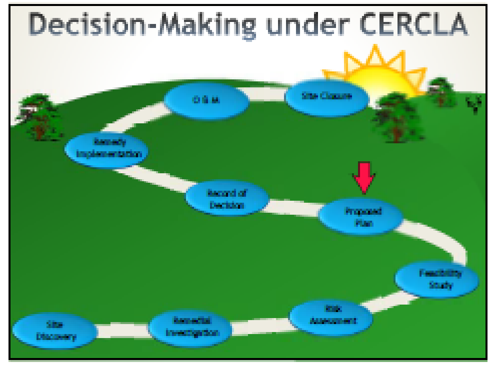



Thanks to all of the elders who are here tonight and to everyone who has traveled here tonight. We really appreciate you being here tonight, so thank you very much. This is probably my most favorite part of my job because I spend a lot of time in an office writing reports and once and a while, I get to go out and see the places where we do this work and meet the people that it affects. I'm really happy to be here and thank you for being here also.

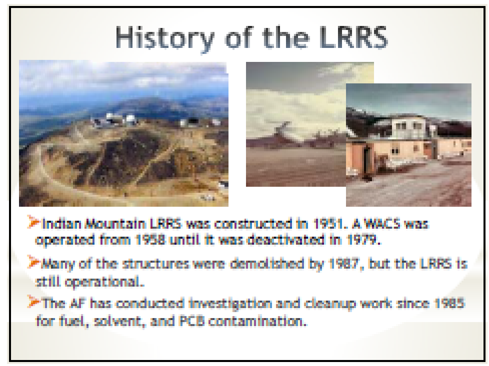
We're going to talk to you tonight about something I think my team has talked to you about before, and that's the radar station at Indian Mountain and some ongoing remediation work happening there. We introduced ourselves earlier, but just so you know, the most important part of what we're doing here is providing more information about the Indian Mountain [site] and the contamination there, and we're here to ask you for your comments and your questions. So we have a lot of people here who are resources for you and I hope that you'll utilize them while we're here in town. I'll talk for a little while and then there'll be plenty of time for you to ask questions and provide comments. If you would just say your name before you ask a question, that would be really helpful for us, and if you prefer to write down your thoughts and your comments, there are a whole bunch of comment forms and extra Proposed Plans over there on the table.



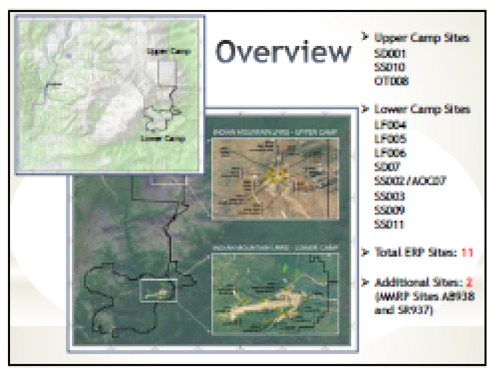

The goals for tonight are to provide the context for ongoing site activities, to talk about some new alternatives, and to answer questions and solicit community input. We had a public comment period that opened in the beginning of December, and technically it ended January 7 but we're more than willing to accept comments on these Proposed Plans until after this meeting. The new alternatives that I'm talking about, I mean we actually started this process and made it almost all the way through for one of our sites, OT008, in 2012. At the time, we had I think five alternatives and we have now seven for one of the contaminants, and we had three alternatives and we have now five or six, so we just wanted to talk about more ideas for what we could do and greater possibilities.



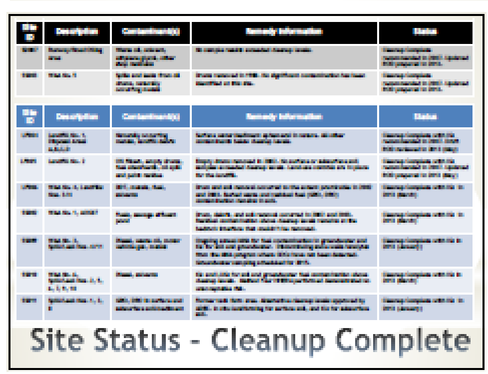

This is where we are in the decision-making process under CERCLA. I can tell you a little bit about CERCLA, it's the Comprehensive Environmental Response, Compensation, and Liability Act. It's also called Superfund. It's also known as cradle-to-grave, that means when you have toxic contaminants that they're tracked and disposed of properly from their inception until they're disposed of at the end. It's also called "polluter pays;" that means the person, the entity whether it's the government or a private corporation, no matter who it is, that created this pollution is responsible for cleaning it up.



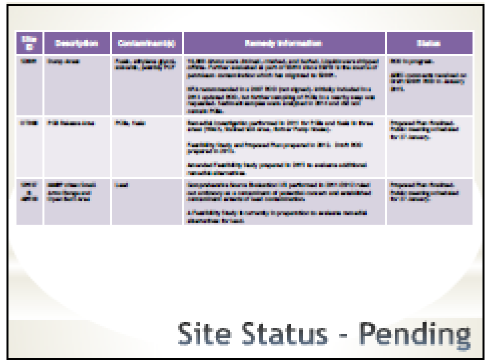

We are now at the proposed plan stage of the process, and all of these documents that have led us to here are available on the AF Administrative Record website. The most important plan process is getting your input, hearing your comments, hearing your thoughts. The CERCLA program actually started in NY State where I'm originally from in a place called Love Canal where there was a toxic waste site that leaked into the groundwater and made people really sick. So this program, CERCLA, that was in the 1970s and this program exists to make sure things like that don't happen again and to make sure that the community and the entities involved are all talking to each other and everybody understands what's going on.




History of the radar station: you guys probably know better than I do, but what it comes down to is a lot of the activities there that were related to that site have led to some contamination that is still there. There are a whole bunch of different areas that have been separated by the type of contamination or the function of that area, and most of these have been dealt with separately. We're going to talk about one site, OT008, which is a little bit different, and we're going to talk about two sites together that fall into the MMRP program – I'll show you a slide about that.




This is just a list of the status of all of the sites that you've seen. The only thing that has changed for any of you who were here in May is what we're going to talk about tonight. Those two sites on top, they're in black because they're closed. Either there was no contamination there, and it's been examined, or the contamination has been completely cleaned up. All of these sites in blue, they still have some form of institutional control on them. That means that the AF is monitoring them, that means there may be land-use controls like signs and like restrictions on digging there or maybe some fencing around the site, that kind of thing.




These are the pending sites, and the bottom two are the ones we're going to talk about today. Is everybody with me so far? Okay. These sites are part of the Environmental Restoration Program. This is the Department of Defense's program for cleaning up contaminated sites. This is the first site we'll talk about, this is OT008. It's at the Upper Camp at Indian Mountain.

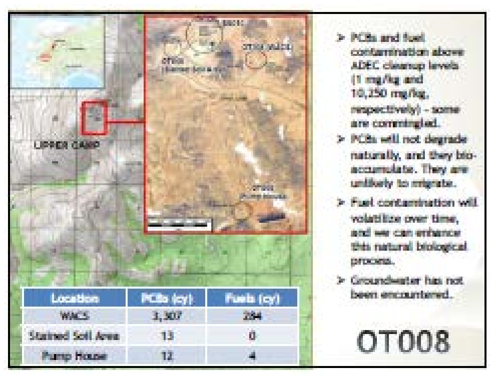

It's way up there, and this site has both PCBs in the soil and fuels in the soil. Something to note about CERCLA sites, is that they don't cover fuels in the soil. That's covered under State of Alaska.

[COMMUNITY]: Fuel and what did you say?

[EK, JACOBS]: Fuel and PCBs.

I should probably say that we use a couple of different words for fuel. You might see them in your Proposed Plan or even in this presentation. Sometimes we say fuel, sometimes we say POL; it's petroleum, oil, and lubricants; that's what that means. Sometimes we just say DRO, it's diesel-range organics and that is what we test for when we're looking for fuels. So if you see a concentration or a cleanup level, and it's DRO, what I'm talking about is fuels.

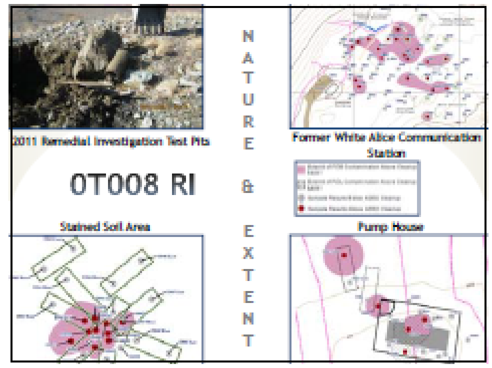
Some things about PCBs and fuels: these are the DEC cleanup levels that we're using. These cleanup levels are risk-based in order to protect human health. When you do a risk assessment under ADEC guidelines, we're talking about these levels are protective if you are exposed 270 days out of the year.




PCBs do not degrade naturally and they are unlikely to migrate from a site. They actually bind to the soil particles. Fuel contamination actually kind of evaporates over time into the air and we can actually enhance this process using nutrients and by tilling the soil. Those are just some properties of the contaminants that we have onsite. No groundwater at OT008. It's way up at the top of the mountain. These are the volumes of soil that we've come up with and this is how we kind of calculate …

[COMMUNITY]: Can't PCBs be used as a lubricant?

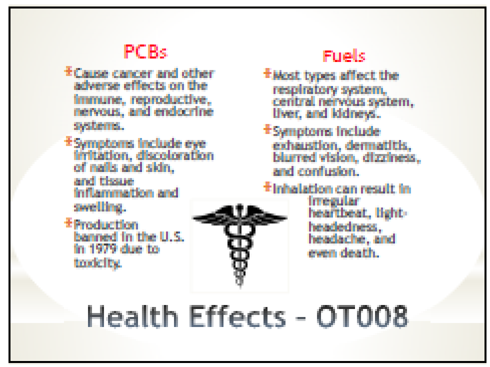
[EK, JACOBS]: I guess you can. That's one of the functions of PCBs. There's PCB-contaminated oil sometimes, sometimes it's used to oil roads, it was used in the transformers probably at the radar station. You find it in light fixtures. Sometimes, well, the other thing about PCBs is that they were used up until the 1970s, and they actually coated furniture in it because it's a fire retardant. It's a pretty pervasive chemical. It's all over the place, but yes, I believe it can be used in a lubricant.




So these are the volume estimates that we used, essentially to come up with how long would it take to push this soil around, and how much would it cost to move it. The way that we come up with these estimates is kind of like this: we just sink borings into the ground, we send the soils away to a laboratory to analyze them, and we go out and out and out until we hit a clean boundary. So that's what is shown on these figures here, the clean boundaries we used to estimate the contaminated soil that might be there.

[COMMUNITY]: What are you talking about?

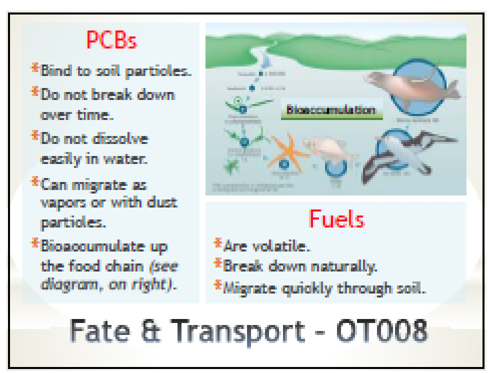
[EK, JACOBS]: I'm talking about some contamination that's up on Indian Mountain.




These are some health effects of PCBs and fuels, their effect on human health. The reason that I'm putting these up here is not to scare you, it's just so you know that these chemicals can be harmful to you and if you see a sign or a fence or something that says contamination exists, these are the kinds of things that could happen if people are exposed to it.

[COMMUNITY]: You mentioned cradle-to-grave. Is that from the manufacturer?

[EK, JACOBS]: I believe … I am going to let these guys correct me if I'm wrong. I appreciate your question; it's a good one. I believe it is whoever dumped it into the environment. That is the cradle-to-grave. Sometimes that is the manufacturer. Sometimes these manufacturing plants for chemicals are responsible for a lot of contamination. But in the case of a spill, it's the person who spilled it who's responsible for cleaning it up. Does that answer your question?

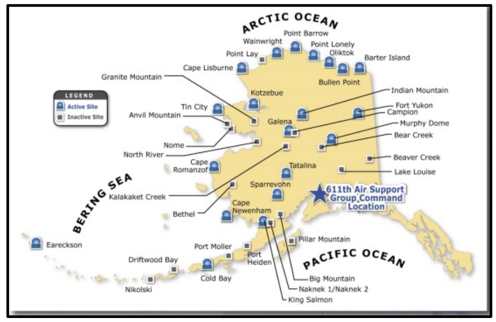



[COMMUNITY]: Is there a time limit?

[EK, JACOBS]: No, but there's kind of a prioritization that happens.

So these are just more properties about the chemicals themselves. One thing I wanted to say about PCBs in particular is that they bioaccumulate. That's why I have this little diagram here to show you that your body doesn't process them through. That means they build up in the body. Larger organisms, for example, this is a marine mammal diagram. I don't have one for interior Alaska, but you might say if there's PCBs in some lichen, and some caribou eat the lichen, then the caribou will have more PCBs than the lichen. If you eat the caribou, that's been eating the lichen, that has PCBs, you will have more than the caribou who has more than the lichen. The concentration goes up with the larger the organism and the higher up it is on the food chain.

[COMMUNITY]: I have a question about these sites. I know there's many of them around Alaska. I know they cleaned up Fort Yukon, Tanana …



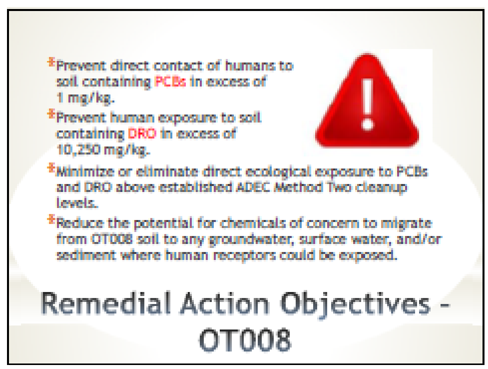

[EK, JACOBS]: I actually have a map that I can show you about that. I bet you recognize some of those sites. [TO AF] What would you guys say about the prioritization of sites?

[RJ, USAF]: You're trying to deal with contamination that's close to the population first.

[COMMUNITY]: How many sites are around Alaska?

[EK, JACOBS]: These aren't all of them, I just printed this out because these are very similar. They are old radar stations. I think you said there were 37 of them, Tommy?

[TB, USAF]: There are 37 old radar sites. Right now there's only 15 of them are still standing and still manned. Otherwise they've been torn down. We've gone in and done soil remediation. Sometimes we still find little pockets. But again, what that picture depicts is just what the AF has. You still have FUDS sites, which are Formerly Used Defense Sites, which could have been army. Some of the coastal ones are navy. FAA had a bunch of them. So there are more than 37. The closer that a site was to the community, the higher the priority of the cleanup because you've got more people around it that have the possibility of getting the dangers from that site. The further you are, the less priority it has.

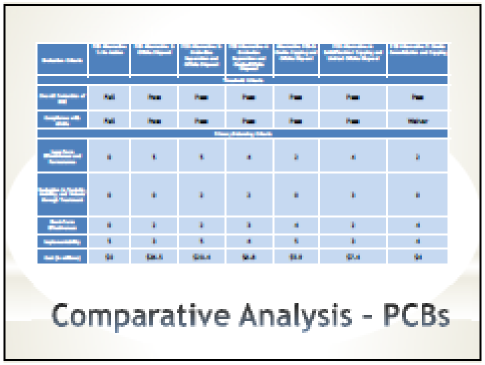



[COMMUNITY]: Are you guys going to clean up the Indian Site? No BS.

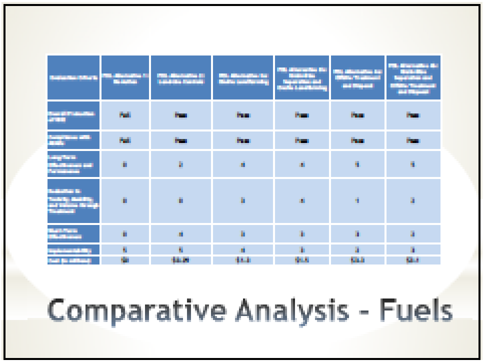
[TB, USAF]: That's what we're here talking to you about.


These are the remedial action objectives. You can find them in your Proposed Plan, and they are protecting you from touching, eating, or inhaling any sort of chemicals that could be bad for you. Again, it's the cleanup levels that are risk-based from DEC, and also the potential for chemicals to migrate from the soil. Here are the alternatives that you'll see [in your Proposed Plans]. The ones that are bolded [in the presentation] are the preferred alternatives based on an evaluation that I will explain. They're not selected alternatives, they're just preferred.
We'll explain to you why and we're happy to take comments and questions about them.

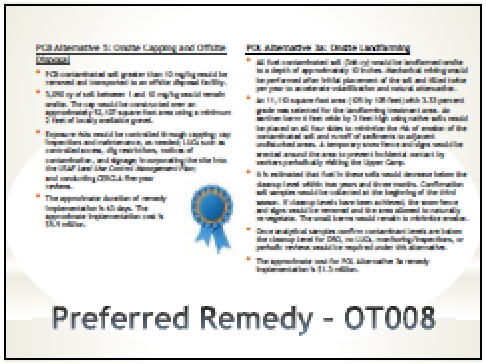
I think I could also mention that a couple of these alternatives involve a process called grain-size separation. Essentially what that means is taking the rocks out. Like I said, the PCBs, they bind to the soil so they bind a lot more to sand than they would to a big rock. What we're doing when we say grain-size separation is just running everything through a big screen and chucking the rocks out.




This is the evaluation criteria that we use when we create the feasibility study. Like I said, I wrote these feasibility studies. I read a lot about Indian Mountain. I read a the different technical and guidance documents out there. I also looked at things that have been done at these other sites [points to map] and things that have been successful and things that haven't been successful. One of the things that's really hard – of these criteria – at these really remote sites is transporting large amounts of soil offsite. It's really expensive. It creates a large short-term risk to the people who are working with the contaminated soil. We also consider the greenhouse gases and their effect on the environment and how that balances out.




Same thing [type of slide] for fuels. We have to treat them a little differently because like I said, they're very different contaminants. Nothing, no alternative, was removed from this list because of cost, but you can see that the cost ranges from differences into the millions. I'll get the PCB one [slide] back and show you again. Up to, I think, the most expensive alternative being $26.5 million, which of course reflects the difficulty in getting huge HERC planes in here and shipping large amounts of soil out. PCB-contaminated soil can't be disposed of in Alaska. It's got to be shipped Outside [to the Lower 48 states].




The preferred alternative is PCB Alternative 5. You can follow along in your Proposed Plan if you have one. I won't read it all out. It's just a general description. It's almost exactly what you have, but, onsite capping and offsite disposal means that we would scrape everything off down to 10 mg/kg. So remember I said the cleanup level is 1 mg/kg.

DEC has a regulation that says you can leave up to 10 mg/kg onsite, but it has to have a 2-foot cap over the top to protect people and to protect animals from coming into contact with it.

[COMMUNITY]: Where is OT008, Top Camp, or Bottom Camp?

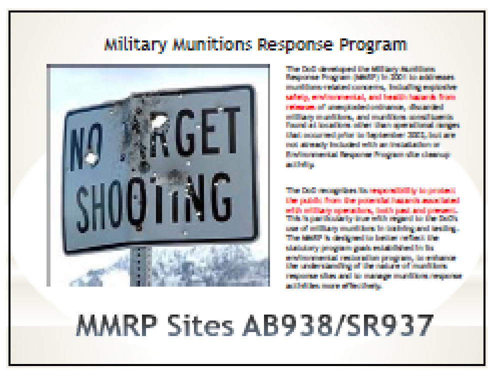
[EK, JACOBS]: Top camp. It's three sites up there, one is the White Alice Communication Station itself, the other one is called the Pump House, and there's another Stained Soil Area. They're all in pretty close proximity to each other on top of the mountain.

The landfarming is something that I mentioned a little bit earlier, and it's that natural process where we can get these fuels – or POL, or DRO, or whatever you want to call them – we can get them to naturally degrade by adding nutrients, adding moisture, and tilling the soil. Under this alternative, all of the fuel that's there would dissipate in a little over two years I think. So that's what that alternative entails.

[COMMUNITY]: The last proposed plan, on the PCBs at the WACs, there was approximately 2,100 yards. I see now that it's increased to 3,307 yards. So, there's more testing done, or?

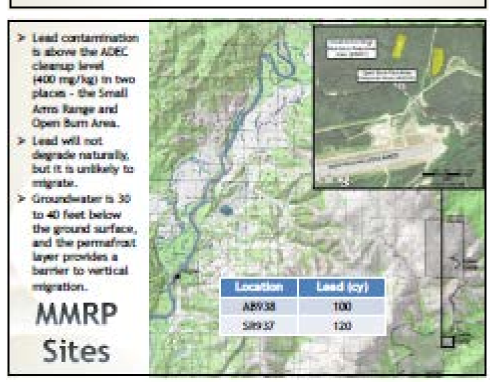
[EK, JACOBS]: Yes. That's a really good question and I can tell you what happened. When we looked at that map, remember I showed you the boreholes that were there and we saw where was clean and where was dirty? Right? So we made a big pink bubble around it. We decided and ADEC decided that [to make these estimates] you have to go halfway between the clean and the dirty ones. That's why it got bigger. [TO USAF] did I explain that well? Could you guys explain it better? For why the volume estimate went up.

[GW, ADEC]: Every time you do one of these projects, and we go out there with a number, and you put the excavator into the ground, you wind up with a lot more. So how you estimate volume, you can either estimate conservatively like Erika was saying, just draw your bubble just outside your hot sample points, or if you have two points and one's hot but one isn't, you don't know whether it [gets clean] halfway, or three-quarters of the way. How you make that estimate greatly affects the volume of material that's got to come out of the ground, so I think my comment was that we should be less conservative and re-evaluate the area to make sure that our number is actually going to be close to what it is at the end. We have a lot of problems with the initial contract or deal for 2,000 yards of dirt, and then you get out there and find 3,000 or 4,000 you've got to deal with. It just causes huge problems, so we all felt that it was better to get it a little higher so it would be more realistic.

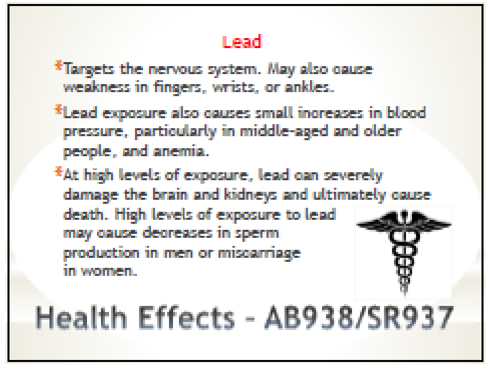



[JW, CONSULTANT]: And then they won't really know for sure until they are out there digging. It's still an estimate until they start digging and doing the removal action nobody really knows.

So, this is a separate program, and it deals with just military munitions response sites. The reason these get their own program is that they're all similar. They're all similar and there are lots of them with the same types of contaminants. We're going to talk about two of them, we call it the open burn area, and the other is a small arms firing range. The contaminants that are specific to these sites are usually lead and antimony. They're metals.

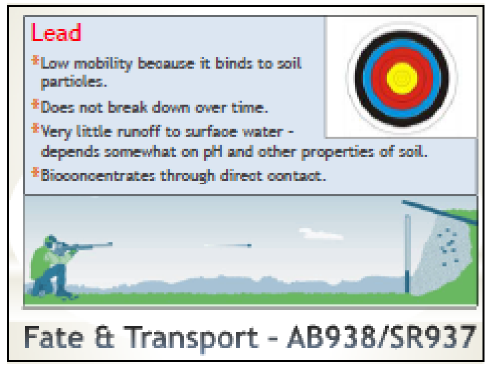



Here's our MMRP sites, and same question as before, is this at the top or at the bottom? This site is at the lower camp. Both of these sites are down at the lower camp. Lead is above the cleanup level; the DEC cleanup level is 400 [mg/kg]. It does not degrade naturally, like PCBs, and also like PCBs it doesn't really migrate either.




We do have groundwater here; it's about 30 to 40 feet below the surface. That's pretty deep. Again, here's our volume estimate. Here's some health effects information about lead. If anybody's following what's happening in Flint, Michigan you'll see a lot about this in the news right now. Lead especially causes developmental effects.

Lead does not break down over time. Very little runoff [occurs]. Same as with PCBs, it bioconcentrates in the body.

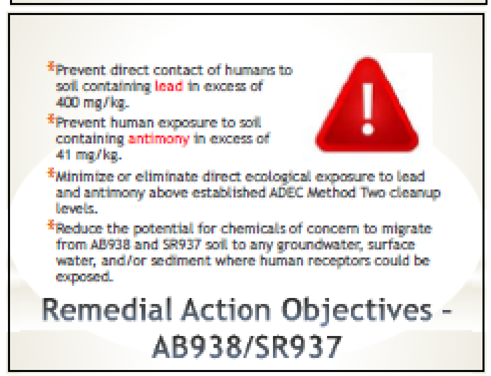



Here are our RAOs, you'll see our DEC cleanup levels again. Antimony is in there because it was a contaminant of potential concern. Antimony has not been identified at this site above the cleanup level.

[COMMUNITY]: What is antimony? Is it a metal?

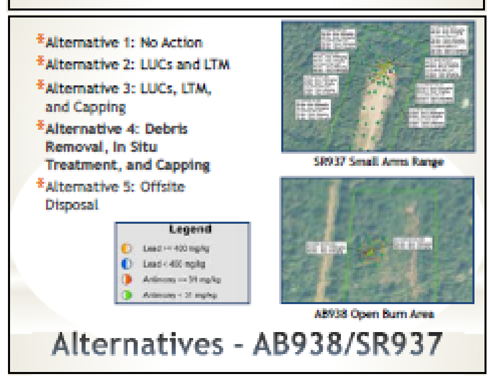
[EK, JACOBS]: It's a metal. Yes. It sometimes occurs naturally in the soil, just not …

[COMMUNITY]: What do you guys suspect they used antimony for at the site?




[EK, JACOBS]: It's in the bullets, in the shells.

[GW, ADEC]: Yes, it's a very small percentage of the composition of the munitions, but I don't believe it was detected at this site. Sometimes when you're dealing with small arms, lead is the primary concern but there's copper from the copper jackets and sometimes very small percentages of other metals.




[EK, JACOBS]: Here's our lead alternative that's preferred: in situ treatment, debris removal, and onsite disposal. I'll just talk to you a little bit about the in situ treatment. This is based on something that, the alternative that I developed is based on a project that my company did in Driftwood Bay and it was very successful. We took a topical application of a chemical called EcoBond. They put it all over the soil and that binds the lead really strongly to the soil. It makes it nonhazardous. So, you put this EcoBond onto the soil and then under this alternative we would scrape off all the debris and dispose of it, we would make all of the lead nonhazardous, and then we would scoop it out and put it into a controlled landfill onsite. One that already exists, I should say.

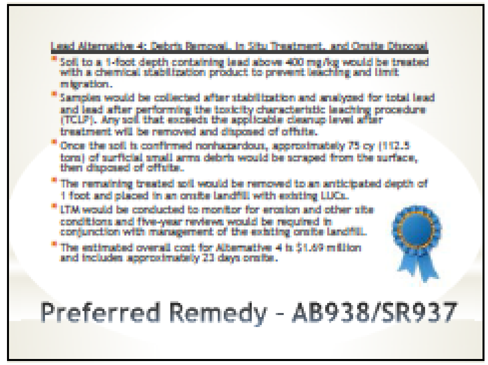
[COMMUNITY]: So that's at the bottom camp.

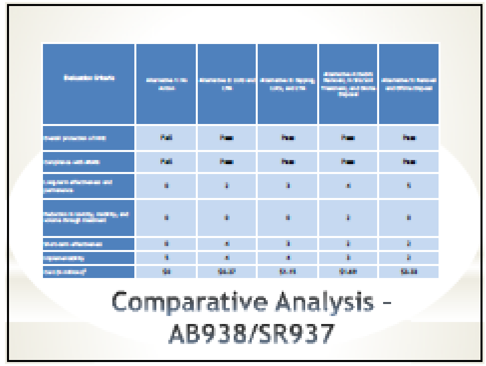
[EK, JACOBS]: Yes.

[COMMUNITY]: WHAT ABOUT THE OLD LANDFILL THAT'S FURTHER UP THE CREEK? ARE YOU JUST MONITORING IT EVERY YEAR?

[RJ, USAF]: YES.

This is pretty much the conclusion of what I'll say. I'm going to drop down and take some notes as you guys ask questions. I'll pipe in. They'll pipe in. Please ask questions. It's why we're here. Thank you for listening and thank you for dinner.





[COMMUNITY]: My name is Margaret Williams. I sit on the city council. Back in the day when this first started, my grandpa gave me this, he showed me a whole bunch of sites up at Indian Mountain where equipment and barrels of god-knows-what were buried. There was this map that we were working with back in'83 or '82 maybe.

I was out there working with him and he showed me where all this stuff was buried, where they all buried all this stuff. Unfortunately, [something happened to the map]. I never got it back. Years later it came back out because they had to clean it up. Half of the sites that were on the first map that Grandpa Joe had showed me were gone. Grandpa told me that they buried equipment, they buried trucks, they buried whole barrels of god-knows-what then. I wonder if they ever, at one of those pits that they had had, did they ever take all that out? Safely, do you know?

[EK, JACOBS] [To USAF]: Do you know? Any of those landfill sites if they've removed trucks?

[GW, ADEC]: Well, isn't there, SD01 was a drum storage area on the top of the mountain, and back in I believe in the late 80s there was a pretty big effort to go out and drain all those drums and crush them and they reburied [can't make this out]… and there have been some other drum removal efforts at the lower camp over the years.

[EK, JACOBS]: This SD01 that you're talking about, I certainly read that they removed 10,000 drums. That's a big number.

[COMMUNITY]: Down the hill there, there's a lake. In the late '50s, my father told me they had a bunker dug in there. In the summer we had a big fire. I had the boat out and I hauled crews out to the 8-mile camp. When the fire was burning, we heard a whole bunch of explosions. They think it was busting drums or something. They were big explosions. There were a whole bunch. It made me think they might have stored stuff away from the site.

[GW, ADEC]: The way we start a lot of these investigations is you look at all the as-builts and site maps that the army has on record and we also get historic aerial photos. Those are photos taken from planes that fly at a set path over the land, and they do this throughout Alaska on a regular basis. You can actually look at a picture of what the ground looked like back in the '50s, and the '60s, and the '70s, so the way we start a lot of our investigations is we pull all those photos and that will show you, you know, where they ran roads off the installation and where there were trees and the trees got cleared and now there's a mound of dirt, which basically tells you they buried something there. So that's typically how we start our investigation. You can't explain everything but typically if there's a waste disposal issue associated with a site, you're going to see some evidence of it. That's how we came up with the list of sites we're investigating.

[COMMUNITY]: Are you aware of a bunker?

[RJ, USAF]: No.

[COMMUNITY] [to elder]: Dad, do you remember where that cache of c-rations was that Grandpa Levine saw outside Indian Mountain?

[COMMUNITY] [elder]: I don't know.

[COMMUNITY]: How come they don't just try to haul it out of Indian Mountain through Lynden Transport? Why are they trying to bring it through us? Wouldn't picking it up and then moving it down here and then trying to get it out of here, wouldn't that be more dangerous?

[COMMUNITY]: That's just what I was going to ask now that we know what the different alternatives are to remove this contaminated soil, I haven't had a chance to read this, but just asking have you guys come up with the cheapest or the easiest way to close up there?

[RJ, USAF]: The easiest way is to leave it onsite and cap it there. So we're out here trying to get everybody's opinion on what they want to do.

[COMMUNITY]: I say it should be removed.

[COMMUNITY]: You said to cap it?

[RJ, USAF]: We can. It's one of the alternatives.

[COMMUNITY]: And the lady said to put soil on top of it?

[EK, JACOBS]: At least 2 feet.

[COMMUNITY]: I don't think that's the safest way for us, just to cap it and have it be there. If we can get it out of there, and I know it's not going to be cheap, but I don't think that's the point though. I think to remove it would be the safest thing for those of us who live down here.

[COMMUNITY]: I'm not too keen on moving it going through hughes because, you guys know this, we've got lots of cancer here. We don't know how. The military has not been up front with us and we haven't had a good government relationship since the '50s. We no longer trusted them anyway and I don't know that moving it through hughes would be a good thing for the people of hughes. I think it would be dangerous [cause] harm.

[GW, ADEC]: We don't have any plans to bring it through hughes.

[COMMUNITY]: I see on this page 11 here, on this proposed plan for AB938 and SR937, that they bag them [the contamination]. Have you guys come up with an estimate of how much material would fit in one of these bags and how [many] bags you could get up on a plane?

[JW, CONSULTANT]: When we created the feasibility study, all of that information [was included]. So you start with your volume, and you look at your bag size, and you research about how much you can fit on an airplane. So all that information went into the Feasibility Study. Depending on which alternative you are looking at, depended on how many bags we needed and how many trips you needed. At one point, I think we were looking at over 200 or 300 trips because the aircraft can only hold so much. I think the flight went to Fairbanks, I can't remember how we researched it. Like Erika mentioned, you can't dispose of PCBs in Alaska. Once you excavate it, it's got to go all the way to Oregon.

[COMMUNITY]: The PCBs, you say it's in the soil up there on Indian Mountain. It's windy country. Can it migrate by the wind blowing stuff around? If we just leave it sitting there, eventually it's going to go all over, even into the Indian River.

[EK, JACOBS]: Yes. That's a really smart point [about wind transport].

[COMMUNITY]: We should ask that they do a bit of sampling on the fish in the Indian River.

[EK, JACOBS]: There was a study on the Indian River a while ago and it was for pesticides. They detected some pesticides in the Indian River but they were really low, way below the cleanup level. They also did the Koyukuk River, and they didn't detect any there. I don't believe that PCBs have been sampled in the Indian River, but I don't think you would anticipate them. They're not soluble in water.

[COMMUNITY]: Was it just one round of sampling and that's it?

[EK, JACOBS]: They did a series of fish sampling. They did several years of fish sampling. I read the report.

[COMMUNITY]: With all those contaminants sitting up there blowing in the wind, you can't just do one sample and say this is good enough. As long as there are contaminants there, you have to continue the sampling.

[EK, JACOBS]: Yes. You're absolutely right. The contaminants at the top of the mountain are going to be addressed. It's just a question of how, and when we address the contaminants up there, they will be sampled again for sure, lots and lots.

[COMMUNITY]: When you were testing for pesticides and contaminants out there, was any sampling done on a tributary off of the Indian River upriver of us?

[EK, JACOBS] [to USAF]: Do you guys know? I don't have a good map in front of me.

[GW, ADEC]: The river comes off the north side of the mountain. I believe lower camp is all on the Indian River side.

[COMMUNITY]: There were some mines in between the north and the south in that area around Indian Mountain.

[COMMUNITY]: And when you guys test for contaminants, how do you go about doing it? Do you just test the water, the soil? Can you test animals and plants?

[GW, ADEC]: It depends on the contaminant and the situation. Typically, what we'll do is called a conceptual site model where you kind of look at where the contaminant is, how it's distributed, and then you try to imagine how your downstream effect could be. So for example, if you've got an oil spill and 200 yards downgradient of that you've got a drinking water well, then clearly you get your conceptual site model to tell you, you need to sample that well. You start sampling where the contaminants are, and based on those concentrations and what the contaminants are, how they interact with the environment, then we'll make a determination of do we need to sample groundwater, do we need to look at surface water, is sediment sampling appropriate? Based on that we may have enough evidence to say yeah, we need to go ahead and sample the fish.

[COMMUNITY]: How long does it take? How old is this site?

[GW, ADEC]: It can take … it was constructed in the '50s, like 1951. It just depends. You work with the federal government. They have budgetary constraints, and you take [into account] how much work you can get done in one year. Typically we'll come up with a plan, and it can be a couple of years in some cases. It also depends on where your downgradient receptors are. If you've got a well right there, and you know you've got a spill, and you know people are drinking out of that well, then you probably want to go sample it right away.

[JW, consultant]: And the process itself can be a couple of years, too.

[RJ, USAF]: [This project] will probably start being designed next year, so it will be about a year and a half.

**[short break /at approximately 41 minutes/]**

[COMMUNITY]: You've got to fly it all out to dispose of it? Are you going to have a contractor do it?

[RJ, USAF]: Yes

[COMMUNITY]: So if you guys do decide to get a contractor up there, we would like to be involved. We've got a lot of guys here who would be willing to work. The last time we had our HAZWOPER training was last year. At that time there [were] 11 people with HAZWOPER training.

[TB, USAF]: That's good because usually when we come out to the communities and stuff, that is one thing is make sure that your HAZWOPERs are up to date because if your HAZWOPER is not up to date it doesn't do any good if we come looking and saying 'who can do some work?' so everybody make sure that you get your HAZWOPERs up to date.

[COMMUNITY]: So once you guys decide to get a contractor and decide how it's going to be disposed of, do you meet with the contractor here in Hughes?

[RJ, USAF] [to TB, USAF]: We'll put that in the contract.

[COMMUNITY]: That would be nice. Here in Hughes, a lot of our projects here in town we do pretty much on our own. We have all our own equipment; we do all our own labor. We've built houses. We've built roads. We have builders, operators, and truck drivers. We would like to be involved for actual construction. We did a whole subdivision down there for the BIA transportation department. They asked us if we wanted a contractor but we told them no. They said we would have to hire a supervisor, so we hired one supervisor but we built the whole thing on our own. We have administrators; we do our own payroll and all that. During the winter especially, nobody works. We just have mostly seasonally summer jobs and the school and the city office and tribal office. Unemployment rate is pretty high especially in winter.

[RJ, USAF]: Would you like to extent the public review period? So I can get more comments from everybody?

[COMMUNITY]: Sure, it says today was the deadline? How about the 7$^{th}$? I think that would give everybody a chance to read it. Anybody have any questions, you can just bring them to the tribal office. Would that be fine Janet?

[COMMUNITY]: When will this decision be made?

[RJ, USAF]: Well, we have to get the input, if anybody has any questions, we have to answer all the questions first.

[GW, ADEC]: The air force issues the proposed plan, which is basically the public notice of what the options are, and the preferred alternative. Then they receive input from the public as well as the state, and then we do a Record of Decision, which is a document that formally selects one of the alternatives for implementation. That should happen this summer.

[RJ, USAF]: So you want me to extend the comment period 30 more days?

[COMMUNITY]: 30 more days would be fine.

[KB, TTC]: My name is Katie Banti, and I work for TTC office of environmental health. Sometimes I do have other stakeholders in the site than live in Hughes like other folks who recreate in this region. PJ Simon, yes. How do people find this if they want to make comment on it and they aren't here at this meeting?

[RJ, USAF]: If you have access to the website, it's right on the back page.

[COMMUNITY] [to KB, TTC]: Maybe you could bring this back to the TTC department and let them know that we have 30 extra days to comment on this and if they do have any questions, they could contact us here. Maybe you could let Victor or PJ know. And any of the environmental office, who else works there besides Jerry and you?

[KB, TTC]: Absolutely. Well, Jerry is the solid waste technician and there are three people in my position; I'm an environmental health specialist so there's two others, Kyle wright and there's another lady named Rachel Lee. I cover Hughes, Huslia, Allakaket, and Alatna. We just split all the villages up. I'm assigned to you guys.

[COMMUNITY]: I think the people of Huslia especially should know about this.

[COMMUNITY]: Yeah, they're downriver. I'm always concerned about downriver. That's the way the river runs, and that's the way the wind blows. We've had a pretty bad winter in wind. It gets to 40 or 50 miles an hour off the mountain.

[KB, TTC]: Well, I am going in the morning. If I have an extra copy or two I could definitely take them.

[COMMUNITY]: Well, it's the second time going around. Hopefully it works this time. Does the AF say 'we can only give you this much money'? Is this a big pot of money?

[RJ, USAF]: Congress appropriates the money once a year to us. We haven't got our appropriation yet this year. We're under restrictions right now. Every state or every area gets so much money, then we appropriate it to the projects. We plan these projects out for so many years and then with the money that we get we try to award those to certain contracts. We'll finish the ROD probably this year, probably June, and then we'll start into the design phase so probably not this coming summer, but maybe toward the end of next summer, 2017, we'll be looking for a contractor.

**[END / approximately 9 additional minutes post-break for a total duration of 50 minutes/]**

1-27-2016

Sign In Cal J.

Hughes Community Meeting

Eileen Jackson | Lester Sam
CLARENCE OLDMAN | ~~Hugh Bifelt~~
Kyle Beetus | ~~[illegible]~~
Ella Sam | Maggie Ambrose
Lester Sam | Gabrielle Ambrose
Jean Ann K | Janet Bifelt
Jonah Tritt | HUGH Bifelt
Sophie Beetus | Jean Ann Linus
Amanda Oldman-Tritt | Erika Kelsey, Jacobs
Holly Tritt | Jennifer Wehrmann, BSNC
Alexander Tritt | Guy Warren, ANEC
Royce Tritt | Robert Johnston Air Force
KATIE BATTU, TCC-OEH | Tommie BAKER Air Force
Calvin [illegible] | Gordon D. Cleveland
Bill L. Williams | Helen Attla

Brandon Beetus
Wilmer Beetus
Margaret Williams
Crystale SAM
Dymond SAM
Sigwien Cleveland
Lewis Williams
Rita Koyukuk
Melanie Burtis
Caleb Koyukuk
Claudia Koyukuk
Jessica Davidson
Jolene Kunsland
Mona Williams
Carlson KOYUKUK

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# PUBLIC MEETING NOTICE

## ENVIRONMENTAL REMEDIATION AT THE INDIAN MOUNTAIN LRRS
## COMMUNITY HALL - HUGHES, ALASKA
## 7 P.M. ON 27 JANUARY 2015

*View from the OT008 White Alice Communication Station*

## PROJECT SUMMARY

The U.S. Air Force Pacific Air Forces Regional Support Group, as the lead agency, has conducted remediation work at the LRRS since 1985 for fuel (POL), solvent, and polychlorinated biphenyl (PCB) contamination. The Air Force has prepared two feasibility studies and two proposed plans—one for PCB- and POL-contaminated soil at OT008, and another for lead-contaminated soil at AB938 and SR937. Public input is being sought as part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The regulator for these sites is the Alaska Department of Environmental Conservation (ADEC). The purpose of this cleanup is to protect human health and the environment from exposure to hazardous substances or pollutants resulting from prior site use, and to comply with cleanup regulations.

## OT008

PCBs and POLs were discovered at OT008, which consists of the White Alice Communications Station, a pump house, and a stained soil site. Contamination exists above the ADEC Method Two cleanup levels that are considered protective or human health and the environment. The preferred remedial alternative is onsite capping and offsite disposal for PCB-contaminated soil and onsite landfarming for POL-contaminated soil.

## MMRP SITES

Lead and antimony were investigated in 2012 at AB938, an open burn area, and SR937, a former firing range, both located at the Lower Camp near the confluence of Indian River and Utopia Creek. A 2012 investigation determined that only lead is present at concentrations with the potential to affect human health. The preferred remedial action for these sites is a debris removal, in situ treatment, and onsite disposal in an existing landfill.

## PUBLIC COMMENTS

The chosen remediation activities for these sites will be discussed during the public meeting. Proposed Plans for OT008 and AB938/SR937 are open to a 30-day public and regulatory agency review period. Interested individuals and agencies are encouraged to provide feedback, comments, and suggestions. All substantive comments submitted during the comment period (12/4-1/4) or at the public meeting (1/27) will be addressed in the Records of Decision.

*Debris at the Stained Soil Area*

## PUBLIC MEETING

The Air Force is hosting a public meeting to discuss the cleanup progress and plans to address contaminated sites at the Indian Mountain LRRS. Discussions will include proposed remedial alternatives for Environmental Restoration Program Site OT008 and Military Munitions Response Program Sites AB938 and SR937. The meeting will take place at 7 P.M. January 27th at the Community Hall in Hughes. We strongly encourage members of the community to attend.

## INFORMATION AVAILABLE

The Air Force also encourages the public to review the Administrative Record for the Indian Mountain LRRS at: http://afcec.publicadmin-record.us.af.mil/. This site provides historic context that will enable the public to gain a more comprehensive understanding of the remedial activities that have been conducted at Indian Mountain LRRS. Please direct any questions or comments to:

**Robert Johnston,**
**Remedial Project Manager**
**10471 20th St, Ste 343**
**JBER, AK 99506**
**907-552-7193 or**

**800-222-4137**
robert.johnston.17@us.af.mil

# Indian Mountain LRRS

# Public Meeting Notice

The Air Force invites interested parties to participate in a Public Meeting concerning the status of the environmental restoration of the Indian Mountain Long-Range Radar Site. The meeting will be held at the community hall in Hughes, Alaska. The purpose of this meeting is to discuss the CERCLA decision-making process for Environmental Restoration Program site OT008 and Military Munitions Response Program sites AB938 and SR937.

The Air Force has developed documents that explain the history of these sites, which are available on the Air Force administrative record site (http://afcec.publicadminrecord.us.af.mil/). On 3 December, the Air Force released two Proposed Plans for public comment; copies of these documents were mailed to the City of Hughes and Hughes Village offices, and will be made available at the meeting. In addition, a notice announcing the 30-day public comment period was published in the *Fairbanks Daily News-Miner* for both of the proposed plans on 6 December 2015.

Questions or comments regarding the status of these sites may be submitted to Robert Johnston the Air Force Remedial Project Manager, at Robert.Johnston.17@us.af.mil or via telephone at 907-552-7193 or at 800-222-4137.

The meeting is scheduled for:
**Wednesday, 27 January 2016 @7 p.m.**
**Hughes Community Hall**
**Hughes, Alaska**

AFFP

Indian Mountain LRRS Public Me

# Affidavit of Publication

UNITED STATES OF AMERICA
STATE OF ALASKA } SS.
FOURTH DISTRICT

Before me, the undersigned, a notary public, this day personally appeared Magdalena Ibarra, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):

January 24, 2016, January 25, 2016, January 26, 2016

and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.

Advertising Clerk

Subscribed to and sworn to me this 26th day of January 2016.

Marena Burnell, Notary Public in and for the State Alaska.

My commission expires: December 07, 2017

00002732 00033189

JACOBS ENGINEERING GROUP
4300 B ST STE 600
ANCHORAGE, AK 99503

NOTARY PUBLIC
M. BURNELL
STATE OF ALASKA
My commission Expires December 7, 20____

Indian Mountain LRRS
Public Meeting Notice

The Air Force invites interested parties to participate in a Public Meeting concerning the status of the environmental restoration of the Indian Mountain Long-Range Radar Site. The meeting will be held at the community hall in Hughes, Alaska. The purpose of this meeting is to discuss the CERCLA decision-making process for Environmental Restoration Program site OT008 and Military Munitions Response Program sites AB938 and SR937.

The Air Force has developed documents to discuss the status of these sites, which are available on the Air Force administrative record site (http://afcec.publicadminrecord.us.af.mil/). On 3 December, the Air Force released two Proposed Plans for public comment; copies of these documents were mailed to the City of Hughes and Hughes Village offices. In addition, a notice announcing the 30-day public comment period was published in the Fairbanks Daily News-Miner for both of the proposed plans on 6 December 2015.

Questions or comments regarding the status of these sites may be submitted to Robert Johnston the Air Force Remedial Project Manager, at Robert.Johnston.17@us.af.mil or via telephone at 907-552-7193 or at 800-222-4137.

The meeting is scheduled for:
Wednesday, 27 January 2016 @7 p.m.
Hughes Community Hall
Hughes, Alaska

# Indian Mountain LRRS

# Public Comment Period Notice
# Proposed Plan for ERP Site OT008

The Air Force invites interested parties to participate in a Public Comment period concerning the status of the environmental restoration of the Indian Mountain Long-Range Radar Site. The purpose of the Proposed Plan is to discuss remedial options for ERP site OT008, which encompasses the former White Alice Communications Station, Stained Soil Area, and Pump House. The Proposed Plan discusses remediation options and the preferred action for polychlorinated biphenyl (PCB) and fuel (POL) contaminated soil. A public meeting will be held at the community center in Hughes, Alaska on a date TBD to discuss the preferred alternative for PCB and POL- contaminated soil.

Copies of the document are available on the Air Force administrative record site (http://afcec.publicadminrecord.us.af.mil/). Copies have also been mailed to the City of Hughes and Hughes Village offices.

Questions or comments regarding the status of this site may be submitted to Robert Johnston the Air Force Remedial Project Manager, at Robert.Johnston.17@us.af.mil or via telephone at 907-552-7193 or at 800-222-4137. Comments can be submitted during the comment period or during the public meeting.

The public comment period for the Proposed Plan is:
**Monday, December 7, 2015 through Thursday, January 7, 2016**

# AFFIDAVIT OF PUBLICATION

UNITED STATES OF AMERICA
STATE OF ALASKA } SS.
FOURTH DISTRICT

Before me, the undersigned, a notary public, this day personally appeared Jenny Nance, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):

December 6, 2015

JACOBS ENGINEERING

AD # 40500095

ACCT # 232929

PUBLIC NOTICE — 1 OF 1 PUBLIC NOTICE

8" DISPLAY AD

and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.

Subscribed and sworn to before me on this 11 day of MARCH, 2016

Notary Public in and for the State Alaska.

My commission expires DEC 7, 2017

NOTARY PUBLIC
M. BURNELL
STATE OF ALASKA
My commission Expires December 7, 20___

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**Indian Mountain LRRS**

**Public Comment Period Notice**
**Proposed Plan for MMRP Sites AB938 and SR937**

The Air Force invites interested parties to participate in a Public Comment period for the Proposed Plan concerning the status of the environmental restoration of the Indian Mountain Long-Range Radar Sites. The purpose of the Proposed Plan is to discuss remedial options and announce the preferred action alternative for two MMRP sites, open burn area AB938 and small arms range SR937. A public meeting will be held at the community center in Hughes, Alaska to discuss the preferred alternative for lead contaminated soil. The date is TBD.

Copies of this document are available on the Air Force administrative record site (http://afcec.publicadminrecord.us.af.mil/). Copies have also been mailed to the City of Hughes and Hughes Village offices.

Questions or comments regarding the status of these sites may be submitted to Robert Johnston the Air Force Remedial Project Manager, at Robert.Johnston.17@us.af.mil or via telephone at 907-552-7193 or at 800-222-4137. Comments can be submitted during the comment period or at the public meeting.

The public comment period for the Proposed Plan is:
**Monday, December 7, 2015 through Thursday, January 7, 2016**

# AFFIDAVIT OF PUBLICATION

**UNITED STATES OF AMERICA**
**STATE OF ALASKA** } **SS.**
**FOURTH DISTRICT**

**Before me, the undersigned, a notary public, this day personally appeared** Jenny Nance **, who, being first duly sworn, according to law, says that he/she is an Advertising Clerk of the Fairbanks Daily News-Miner, a newspaper (i) published in newspaper format, (ii) distributed daily more than 50 weeks per year, (iii) with a total circulation of more than 500 and more than 10% of the population of the Fourth Judicial District, (iv) holding a second class mailing permit from the United States Postal Service, (v) not published primarily to distribute advertising, and (vi) not intended for a particular professional or occupational group. The advertisement which is attached is a true copy of the advertisement published in said paper on the following day(s):**

December 6, 2015

JACOBS ENGINEERING

AD # 40500096

ACCT # 232929

INDIAN MOUNTAIN LRRS

8" DISPLAY AD 2 of 2 PUBLIC NOTICES

**and that the rate charged thereon is not excess of the rate charged private individuals, with the usual discounts.**

Jenny Nance

**Subscribed and sworn to before me on this** 11th **day of** MARCH **, 20**16

[signature]

**Notary Public in and for the State Alaska.**

**My commission expires** DEC 7, 2017

**NOTARY PUBLIC**
**M. BURNELL**
**STATE OF ALASKA**
**My commission Expires December 7, 20**____

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**Indian Mountain LRRS**

**Public Comment Period Notice**
**Proposed Plan for ERP Site OT008**

The Air Force invites interested parties to participate in a Public Comment period concerning the status of the environmental restoration of the Indian Mountain Long-Range Radar Site. The purpose of the Proposed Plan is to discuss remedial options for ERP site OT008, which encompasses the former White Alice Communications Station, Stained Soil Area, and Pump House. The Proposed Plan discusses remediation options and the preferred action for polychlorinated biphenyl (PCB) and fuel (POL) contaminated soil. A public meeting will be held at the community center in Hughes, Alaska on a date TBD to discuss the preferred alternative for PCB and POL- contaminated soil.

Copies of the document are available on the Air Force administrative record site (http://afcec.publicadminrecord.us.af.mil/). Copies have also been mailed to the City of Hughes and Hughes Village offices.

Questions or comments regarding the status of this site may be submitted to Robert Johnston the Air Force Remedial Project Manager, at Robert.Johnston.17@us.af.mil or via telephone at 907-552-7193 or at 800-222-4137. Comments can be submitted during the comment period or during the public meeting.

**The public comment period for the Proposed Plan is:**
**Monday, December 7, 2015 through Thursday, January 7, 2016**

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# APPENDIX E

## Risk Assessment Data

Table D.10.
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - OT008, INDIAN MOUNTAIN LRRS

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | Site Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Soil | Indian Mountain | Ingestion | | | | | | | | | | | | | |
| | | | | Diesel Range Organics (C10-C25) | 2986 | MG/KG | 8.77E-05 | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | 2.45E-04 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Gasoline Range Organics (C6-C10) | 118.2 | MG/KG | 3.47E-06 | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | 9.72E-06 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | PCB-1260 (Aroclor 1260) | 362 | MG/KG | 1.06E-05 | mg/kg-day | 2.0E+00 | (mg/kg-day)$^{-1}$ | 2.E-05 | 2.98E-05 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Residual Range Organics (C25-C36) | 1043 | MG/KG | 3.06E-05 | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | 8.57E-05 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Naphthalene | 2.523 | mg/kg | 7.41E-08 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 2.07E-07 | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | 0.00001 |
| | | | | Benzo(b)fluoranthene | 0.0199 | mg/kg | 5.84E-10 | mg/kg-day | 7.3E-01 | (mg/kg-day)$^{-1}$ | 4.E-10 | 1.64E-09 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Benzo(a)anthracene | 0.0154 | mg/kg | 4.52E-10 | mg/kg-day | 7.3E-01 | (mg/kg-day)$^{-1}$ | 3.E-10 | 1.27E-09 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Benzo(a)pyrene | 0.0142 | mg/kg | 4.17E-10 | mg/kg-day | 7.3E+00 | (mg/kg-day)$^{-1}$ | 3.E-09 | 1.17E-09 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Fluorene | 0.219 | mg/kg | 6.43E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.80E-08 | mg/kg-day | 4.0E-02 | 1/(mg/kg-day) | 0.0000005 |
| | | | | 1,2,4-Trimethylbenzene | 1.266 | mg/kg | 3.72E-08 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.04E-07 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Acenaphthene | 0.176 | mg/kg | 5.17E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.45E-08 | mg/kg-day | 6.0E-02 | 1/(mg/kg-day) | 0.0000002 |
| | | | | Methylene chloride | 0.0136 | mg/kg | 3.99E-10 | mg/kg-day | 2.0E-03 | (mg/kg-day)$^{-1}$ | 8.E-13 | 1.12E-09 | mg/kg-day | 6.0E-03 | 1/(mg/kg-day) | 0.0000002 |
| | | | | 1,2,4-Trichlorobenzene | 1.009 | mg/kg | 2.96E-08 | mg/kg-day | 2.9E-02 | (mg/kg-day)$^{-1}$ | 9.E-10 | 8.29E-08 | mg/kg-day | 1.0E-02 | 1/(mg/kg-day) | 0.000008 |
| | | | | Dibenzo(a,h)anthracene | 0.00376 | mg/kg | 1.10E-10 | mg/kg-day | 7.3E+00 | (mg/kg-day)$^{-1}$ | 8.E-10 | 3.09E-10 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Xylene, Isomers m & p | 0.132 | mg/kg | 3.87E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.08E-08 | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | 0.00000005 |
| | | | | n-Butylbenzene | 0.221 | mg/kg | 6.49E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.82E-08 | mg/kg-day | 5.0E-02 | 1/(mg/kg-day) | 0.0000004 |
| | | | | o-Xylene | 0.197 | mg/kg | 5.78E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.62E-08 | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | 0.00000008 |
| | | | | Acetone | 0.0623 | mg/kg | 1.83E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 5.12E-09 | mg/kg-day | 9.0E-01 | 1/(mg/kg-day) | 0.000000006 |
| | | | | Ethylbenzene | 0.039 | mg/kg | 1.14E-09 | mg/kg-day | 1.1E-02 | (mg/kg-day)$^{-1}$ | 1.E-11 | 3.21E-09 | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | 0.00000003 |
| | | | | 1,2,3-Trichlorobenzene | 4.597 | mg/kg | 1.35E-07 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 3.78E-07 | mg/kg-day | 8.0E-04 | 1/(mg/kg-day) | 0.0005 |
| | | | | Isopropylbenzene | 0.0452 | mg/kg | 1.33E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 3.72E-09 | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | 0.00000004 |
| | | | | 1,3,5-Trimethylbenzene | 0.115 | mg/kg | 3.38E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 9.45E-09 | mg/kg-day | 1.0E-02 | 1/(mg/kg-day) | 0.0000009 |
| | | | | sec-Butylbenzene | 0.11 | mg/kg | 3.23E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 9.04E-09 | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | 0.00000009 |
| | | | | Hexachlorobutadiene | 0.00834 | mg/kg | 2.45E-10 | mg/kg-day | 7.8E-02 | (mg/kg-day)$^{-1}$ | 2.E-11 | 6.85E-10 | mg/kg-day | 1.0E-03 | 1/(mg/kg-day) | 0.0000007 |
| | | | | 1,4-Dichlorobenzene | 0.00872 | mg/kg | 2.56E-10 | mg/kg-day | 5.4E-03 | (mg/kg-day)$^{-1}$ | 1.E-12 | 7.17E-10 | mg/kg-day | 7.0E-02 | 1/(mg/kg-day) | 0.00000001 |
| | | | | 1,1-Dichloroethene | 0.00183 | mg/kg | 5.37E-11 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.50E-10 | mg/kg-day | 5.0E-02 | 1/(mg/kg-day) | 0.000000003 |
| | | | | Tetrachloroethene (PCE) | 0.63 | mg/kg | 1.85E-08 | mg/kg-day | 2.1E-03 | (mg/kg-day)$^{-1}$ | 4.E-11 | 5.18E-08 | mg/kg-day | 6.0E-03 | 1/(mg/kg-day) | 0.000009 |
| | | | | 1,2-Dichlorobenzene | 0.051 | mg/kg | 1.50E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 4.19E-09 | mg/kg-day | 9.0E-02 | 1/(mg/kg-day) | 0.00000005 |
| | | | | 1,3-Dichlorobenzene | 0.39 | mg/kg | 1.14E-08 | mg/kg-day | 5.4E-03 | (mg/kg-day)$^{-1}$ | 6.E-11 | 3.21E-08 | mg/kg-day | 7.0E-02 | 1/(mg/kg-day) | 0.0000005 |
| | | | | Chloromethane | 0.024 | mg/kg | 7.05E-10 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.97E-09 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Trichloroethene (TCE) | 0.00029 | mg/kg | 8.51E-12 | mg/kg-day | 4.6E-02 | (mg/kg-day)$^{-1}$ | 4.E-13 | 2.38E-11 | mg/kg-day | 5.0E-04 | 1/(mg/kg-day) | 0.00000005 |
| | | | | 1,1-Dichloropropene | 0.0003 | mg/kg | 8.81E-12 | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | 2.47E-11 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Bromomethane | 0.044 | mg/kg | 1.29E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 3.62E-09 | mg/kg-day | 1.4E-03 | 1/(mg/kg-day) | 0.000003 |
| | | | | Chlorobenzene | 0.0088 | mg/kg | 2.58E-10 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 7.23E-10 | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | 0.00000004 |
| | | | | PCB-1016 (Aroclor 1016) | 44 | MG/KG | 1.29E-06 | mg/kg-day | 7.0E-02 | (mg/kg-day)$^{-1}$ | 9.E-08 | 3.62E-06 | mg/kg-day | 7.0E-05 | 1/(mg/kg-day) | 0.05 |
| | | | | trans-1,3-Dichloropropene | 0.029 | mg/kg | 8.51E-10 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 2.38E-09 | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | 0.0000001 |
| | | | Exp. Route Total | | | | | | | | 2.E-05 | | | | | 0.05 |

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | Site Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Diesel Range Organics (C10-C25) | 2986 | MG/KG | ND | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Gasoline Range Organics (C6-C10) | 118.2 | MG/KG | ND | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | PCB-1260 (Aroclor 1260) | 362 | MG/KG | 9.82E-06 | mg/kg-day | 2.0E+00 | (mg/kg-day)$^{-1}$ | 2.E-05 | 3.27E-04 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Residual Range Organics (C25-C36) | 1043 | MG/KG | ND | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Naphthalene | 2.523 | mg/kg | 6.35E-08 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 2.12E-06 | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | 0.0001 |
| | | | | Benzo(b)fluoranthene | 0.0199 | mg/kg | 5.01E-10 | mg/kg-day | 7.3E-01 | (mg/kg-day)$^{-1}$ | 4.E-10 | 1.67E-08 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Benzo(a)anthracene | 0.0154 | mg/kg | 3.88E-10 | mg/kg-day | 7.3E-01 | (mg/kg-day)$^{-1}$ | 3.E-10 | 1.29E-08 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Benzo(a)pyrene | 0.0142 | mg/kg | 3.58E-10 | mg/kg-day | 7.3E+00 | (mg/kg-day)$^{-1}$ | 3.E-09 | 1.19E-08 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Fluorene | 0.219 | mg/kg | 5.52E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.84E-07 | mg/kg-day | 4.0E-02 | 1/(mg/kg-day) | 0.000005 |
| | | | | 1,2,4-Trimethylbenzene | 1.266 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Acenaphthene | 0.176 | mg/kg | 4.43E-09 | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | 1.48E-07 | mg/kg-day | 6.0E-02 | 1/(mg/kg-day) | 0.000002 |
| | | | | Methylene chloride | 0.0136 | mg/kg | 2.63E-10 | mg/kg-day | 2.0E-03 | (mg/kg-day)$^{-1}$ | 5.E-13 | 8.78E-09 | mg/kg-day | 6.0E-03 | 1/(mg/kg-day) | 0.000001 |
| | | | | 1,2,4-Trichlorobenzene | 1.009 | mg/kg | ND | mg/kg-day | 2.9E-02 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-02 | 1/(mg/kg-day) | NA |
| | | | | Dibenzo(a,h)anthracene | 0.00376 | mg/kg | 9.47E-11 | mg/kg-day | 7.3E+00 | (mg/kg-day)$^{-1}$ | 7.E-10 | 3.16E-09 | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Xylene, Isomers m & p | 0.132 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | NA |
| | | | | n-Butylbenzene | 0.221 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 5.0E-02 | 1/(mg/kg-day) | NA |
| | | | | o-Xylene | 0.197 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | NA |
| | | | | Acetone | 0.0623 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 9.0E-01 | 1/(mg/kg-day) | NA |
| | | | | Ethylbenzene | 0.039 | mg/kg | ND | mg/kg-day | 1.1E-02 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | NA |
| | | | | 1,2,3-Trichlorobenzene | 4.597 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 8.0E-04 | 1/(mg/kg-day) | NA |
| | | | | Isopropylbenzene | 0.0452 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | NA |
| | | | | 1,3,5-Trimethylbenzene | 0.115 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-02 | 1/(mg/kg-day) | NA |
| | | | | sec-Butylbenzene | 0.11 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | NA |
| | | | | Hexachlorobutadiene | 0.00834 | mg/kg | ND | mg/kg-day | 7.8E-02 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.0E-03 | 1/(mg/kg-day) | NA |
| | | | | 1,4-Dichlorobenzene | 0.00872 | mg/kg | ND | mg/kg-day | 5.4E-03 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 7.0E-02 | 1/(mg/kg-day) | NA |
| | | | | 1,1-Dichloroethene | 0.00183 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 5.0E-02 | 1/(mg/kg-day) | NA |
| | | | | Tetrachloroethene (PCE) | 0.63 | mg/kg | ND | mg/kg-day | 2.1E-03 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 6.0E-03 | 1/(mg/kg-day) | NA |
| | | | | 1,2-Dichlorobenzene | 0.051 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 9.0E-02 | 1/(mg/kg-day) | NA |
| | | | | 1,3-Dichlorobenzene | 0.39 | mg/kg | ND | mg/kg-day | 5.4E-03 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 7.0E-02 | 1/(mg/kg-day) | NA |
| | | | | Chloromethane | 0.024 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Trichloroethene (TCE) | 0.00029 | mg/kg | ND | mg/kg-day | 4.6E-02 | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 5.0E-04 | 1/(mg/kg-day) | NA |
| | | | | 1,1-Dichloropropene | 0.0003 | mg/kg | ND | mg/kg-day | No toxicity value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | No toxicity value | 1/(mg/kg-day) | NA |
| | | | | Bromomethane | 0.044 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 1.4E-03 | 1/(mg/kg-day) | NA |
| | | | | Chlorobenzene | 0.0088 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | NA |
| | | | | PCB-1016 (Aroclor 1016) | 44 | MG/KG | 1.19E-06 | mg/kg-day | 7.0E-02 | (mg/kg-day)$^{-1}$ | 8.E-08 | 3.98E-05 | mg/kg-day | 7.0E-05 | 1/(mg/kg-day) | 0.6 |
| | | | | trans-1,3-Dichloropropene | 0.029 | mg/kg | ND | mg/kg-day | No Toxicity Value | (mg/kg-day)$^{-1}$ | NA | ND | mg/kg-day | 2.0E-02 | 1/(mg/kg-day) | NA |
| | | | Exp. Route Total | | | | | | | | 2.E-05 | | | | | 0.6 |
| | | Exposure Point Total | | | | | | | | | 4.E-05 | | | | | 0.6 |
| | Exposure Medium Total | | | | | | | | | | 4.E-05 | | | | | 0.6 |

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | Site Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | Air | Inhalation | Inhalation | | | | | | | | | | | | | |
| | | of Fugitive Dust | | Diesel Range Organics (C10-C25) | 2986 | MG/KG | 5.32E-05 | ug/m$^3$ | No toxicity value | (ug/m$^3$)$^{-1}$ | NA | 1.49E-07 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Gasoline Range Organics (C6-C10) | 118.2 | MG/KG | 2.11E-06 | ug/m$^3$ | No toxicity value | (ug/m$^3$)$^{-1}$ | NA | 5.89E-09 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | PCB-1260 (Aroclor 1260) | 362 | MG/KG | 6.45E-06 | ug/m$^3$ | 5.7E-04 | (ug/m$^3$)$^{-1}$ | 4.E-09 | 1.81E-08 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Residual Range Organics (C25-C36) | 1043 | MG/KG | 1.86E-05 | ug/m$^3$ | No toxicity value | (ug/m$^3$)$^{-1}$ | NA | 5.20E-08 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Naphthalene | 2.523 | mg/kg | 4.49E-08 | ug/m$^3$ | 3.4E-05 | (ug/m$^3$)$^{-1}$ | 2.E-12 | 1.26E-10 | mg/m$^3$ | 3.0E-03 | mg/m3 | 0.00000004 |
| | | | | Benzo(b)fluoranthene | 0.0199 | mg/kg | 3.54E-10 | ug/m$^3$ | 1.1E-04 | (ug/m$^3$)$^{-1}$ | 4.E-14 | 9.92E-13 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Benzo(a)anthracene | 0.0154 | mg/kg | 2.74E-10 | ug/m$^3$ | 1.1E-04 | (ug/m$^3$)$^{-1}$ | 3.E-14 | 7.68E-13 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Benzo(a)pyrene | 0.0142 | mg/kg | 2.53E-10 | ug/m$^3$ | 1.1E-03 | (ug/m$^3$)$^{-1}$ | 3.E-13 | 7.08E-13 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Fluorene | 0.219 | mg/kg | 3.90E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 1.09E-11 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | 1,2,4-Trimethylbenzene | 1.266 | mg/kg | 2.25E-08 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 6.31E-11 | mg/m$^3$ | 7.0E-03 | mg/m3 | 0.000000009 |
| | | | | Acenaphthene | 0.176 | mg/kg | 3.13E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 8.78E-12 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Methylene chloride | 0.0136 | mg/kg | 2.42E-10 | ug/m$^3$ | 1.0E-08 | (ug/m$^3$)$^{-1}$ | 2.E-18 | 6.78E-13 | mg/m$^3$ | 6.0E-01 | mg/m3 | 0.000000000001 |
| | | | | 1,2,4-Trichlorobenzene | 1.009 | mg/kg | 1.80E-08 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 5.03E-11 | mg/m$^3$ | 2.0E-03 | mg/m3 | 0.00000003 |
| | | | | Dibenzo(a,h)anthracene | 0.00376 | mg/kg | 6.70E-11 | ug/m$^3$ | 1.2E-03 | (ug/m$^3$)$^{-1}$ | 8.E-14 | 1.88E-13 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Xylene, Isomers m & p | 0.132 | mg/kg | 2.35E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 6.58E-12 | mg/m$^3$ | 1.0E-01 | mg/m3 | 0.00000000007 |
| | | | | n-Butylbenzene | 0.221 | mg/kg | 3.94E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 1.10E-11 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | o-Xylene | 0.197 | mg/kg | 3.51E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 9.82E-12 | mg/m$^3$ | 1.0E-01 | mg/m3 | 0.0000000001 |
| | | | | Acetone | 0.0623 | mg/kg | 1.11E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 3.11E-12 | mg/m$^3$ | 3.1E+01 | mg/m3 | 0.0000000000001 |
| | | | | Ethylbenzene | 0.039 | mg/kg | 6.95E-10 | ug/m$^3$ | 2.5E-06 | (ug/m$^3$)$^{-1}$ | 2.E-15 | 1.95E-12 | mg/m$^3$ | 1.0E+00 | mg/m3 | 0.000000000002 |
| | | | | 1,2,3-Trichlorobenzene | 4.597 | mg/kg | 8.19E-08 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 2.29E-10 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Isopropylbenzene | 0.0452 | mg/kg | 8.05E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 2.25E-12 | mg/m$^3$ | 4.0E-01 | mg/m3 | 0.000000000006 |
| | | | | 1,3,5-Trimethylbenzene | 0.115 | mg/kg | 2.05E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 5.74E-12 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | sec-Butylbenzene | 0.11 | mg/kg | 1.96E-09 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 5.49E-12 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Hexachlorobutadiene | 0.00834 | mg/kg | 1.49E-10 | ug/m$^3$ | 2.2E-05 | (ug/m$^3$)$^{-1}$ | 3.E-15 | 4.16E-13 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | 1,4-Dichlorobenzene | 0.00872 | mg/kg | 1.55E-10 | ug/m$^3$ | 1.1E-05 | (ug/m$^3$)$^{-1}$ | 2.E-15 | 4.35E-13 | mg/m$^3$ | 8.0E-01 | mg/m3 | 0.0000000000005 |
| | | | | 1,1-Dichloroethene | 0.00183 | mg/kg | 3.26E-11 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 9.13E-14 | mg/m$^3$ | 2.0E-01 | mg/m3 | 0.0000000000005 |
| | | | | Tetrachloroethene (PCE) | 0.63 | mg/kg | 1.12E-08 | ug/m$^3$ | 2.6E-07 | (ug/m$^3$)$^{-1}$ | 3.E-15 | 3.14E-11 | mg/m$^3$ | 4.0E-02 | mg/m3 | 0.0000000008 |
| | | | | 1,2-Dichlorobenzene | 0.051 | mg/kg | 9.08E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 2.54E-12 | mg/m$^3$ | 2.0E-01 | mg/m3 | 0.00000000001 |
| | | | | 1,3-Dichlorobenzene | 0.39 | mg/kg | 6.95E-09 | ug/m$^3$ | 1.1E-05 | (ug/m$^3$)$^{-1}$ | 8.E-14 | 1.95E-11 | mg/m$^3$ | 8.0E-01 | mg/m3 | 0.00000000002 |
| | | | | Chloromethane | 0.024 | mg/kg | 4.27E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 1.20E-12 | mg/m$^3$ | 9.0E-02 | mg/m3 | 0.00000000001 |
| | | | | Trichloroethene (TCE) | 0.00029 | mg/kg | 5.17E-12 | ug/m$^3$ | 4.1E-06 | (ug/m$^3$)$^{-1}$ | 2.E-17 | 1.45E-14 | mg/m$^3$ | 2.0E-03 | mg/m3 | 0.000000000007 |
| | | | | 1,1-Dichloropropene | 0.0003 | mg/kg | 5.34E-12 | ug/m$^3$ | No toxicity value | (ug/m$^3$)$^{-1}$ | NA | 1.50E-14 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | Bromomethane | 0.044 | mg/kg | 7.84E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 2.19E-12 | mg/m$^3$ | 5.0E-03 | mg/m3 | 0.0000000004 |
| | | | | Chlorobenzene | 0.0088 | mg/kg | 1.57E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 4.39E-13 | mg/m$^3$ | 5.0E-02 | mg/m3 | 0.000000000009 |
| | | | | PCB-1016 (Aroclor 1016) | 44 | MG/KG | 7.84E-07 | ug/m$^3$ | 2.0E-05 | (ug/m$^3$)$^{-1}$ | 2.E-11 | 2.19E-09 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | | trans-1,3-Dichloropropene | 0.029 | mg/kg | 5.17E-10 | ug/m$^3$ | No Toxicity Value | (ug/m$^3$)$^{-1}$ | NA | 1.45E-12 | mg/m$^3$ | No toxicity value | mg/m3 | NA |
| | | | Exp. Route Total | | | | | | | | 4.E-09 | | | | | 0.00000008 |
| | | Exposure Point Total | | | | | | | | | 4.E-09 | | | | | 0.00000008 |
| | Exposure Medium Total | | | | | | | | | | 4.E-09 | | | | | 0.00000008 |
| Medium Total | | | | | | | | | | | 4.E-05 | | | | | 0.6 |
| | | | | | | | | | Total of Receptor Risks Across All Media | | 4.E-05 | | | Total of Receptor Hazards Across All Media | | 0.6 |

TABLE 7.1.RME

CALCULATION OF NON-CANCER HAZARDS - PETROLEUM HYDROCARBONS

REASONABLE MAXIMUM EXPOSURE AT 0T008, INDIAN MOUNTAIN LRRS

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | Site Employee |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | |
| Surface Soil | Surface Soil | On-Site | Ingestion | OT08 | | | | | | | |
| | | | | DRO | | | | | | | |
| | | | | C10-C25 Aliphatic | 2.39E+03 | mg/kg | 1.96E-04 | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | 0.002 |
| | | | | C10-C25 Aromatic | 1.19E+03 | mg/kg | 9.82E-05 | mg/kg-day | 4.0E-02 | 1/(mg/kg-day) | 0.002 |
| | | | | RRO | | | | | | | |
| | | | | C25-C36 Aliphatic | 9.39E+02 | mg/kg | 7.72E-05 | mg/kg-day | 2.0E+00 | 1/(mg/kg-day) | 0.00004 |
| | | | | C25-C36 Aromatic | 3.13E+02 | mg/kg | 2.57E-05 | mg/kg-day | 3.0E-02 | 1/(mg/kg-day) | 0.0009 |
| | | | | GRO | | | | | | | |
| | | | | C6-C10 Aliphatic | 8.27E+01 | mg/kg | 6.80E-06 | mg/kg-day | 5.0E+00 | 1/(mg/kg-day) | 0.000001 |
| | | | | C6-C10 Aromatic | 5.91E+01 | mg/kg | 4.86E-06 | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | 0.00002 |
| | | | Dermal | OT08 | | | | | | | |
| | | | | DRO | | | | | | | |
| | | | | C10-C25 Aliphatic | 2.39E+03 | mg/kg | 1.30E-04 | mg/kg-day | 1.0E-01 | 1/(mg/kg-day) | 0.001 |
| | | | | C10-C25 Aromatic | 1.19E+03 | mg/kg | 6.48E-05 | mg/kg-day | 4.0E-02 | 1/(mg/kg-day) | 0.002 |
| | | | | RRO | | | | | | | |
| | | | | C25-C36 Aliphatic | 9.39E+02 | mg/kg | 5.09E-05 | mg/kg-day | 2.0E+00 | 1/(mg/kg-day) | 0.00003 |
| | | | | C25-C36 Aromatic | 3.13E+02 | mg/kg | 1.70E-05 | mg/kg-day | 3.0E-02 | 1/(mg/kg-day) | 0.0006 |
| | | | | GRO | | | | | | | |
| | | | | C6-C10 Aliphatic | 8.27E+01 | mg/kg | 4.49E-06 | mg/kg-day | 5.0E+00 | 1/(mg/kg-day) | 0.0000009 |
| | | | | C6-C10 Aromatic | 5.91E+01 | mg/kg | 3.21E-06 | mg/kg-day | 2.0E-01 | 1/(mg/kg-day) | 0.00002 |
| | Air | Inhalation of Fugitive Dust and Volatiles | Inhalation | OT08 | | | | | | | |
| | | | | DRO | | | | | | | |
| | | | | C10-C25 Aliphatic | 2.39E+03 | mg/kg | 6.49E-08 | $mg/m^3$ | 1.0E+00 | $mg/m^3$ | 0.00000006 |
| | | | | C10-C25 Aromatic | 1.19E+03 | mg/kg | 3.24E-08 | $mg/m^3$ | 2.0E-01 | $mg/m^3$ | 0.0000002 |
| | | | | RRO | | | | | | | |
| | | | | C25-C36 Aliphatic | 9.39E+02 | mg/kg | 2.55E-08 | $mg/m^3$ | No toxicity value | $mg/m^3$ | NA |
| | | | | C25-C36 Aromatic | 3.13E+02 | mg/kg | 8.50E-09 | $mg/m^3$ | No toxicity value | $mg/m^3$ | NA |
| | | | | GRO | | | | | | | |
| | | | | C6-C10 Aliphatic | 8.27E+01 | mg/kg | 2.25E-09 | $mg/m^3$ | 1.8E+01 | $mg/m^3$ | 0.0000000001 |
| | | | | C6-C10 Aromatic | 5.91E+01 | mg/kg | 1.61E-09 | $mg/m^3$ | 4.0E-01 | $mg/m^3$ | 0.000000004 |

# APPENDIX F

## Responses to Comments

**Alaska Department of Environmental Conservation**

**Comments on the Draft Final 2016 Record of Decision for Site OT008, Indian Mountain LRRS, AK**

**Commenter: Kim DeRuyter and John Halverson (ADEC)** **Comments Developed: October 28, 2016**

| Cmt. No. | Pg. & Line | Sec. | Comment/Recommendation | Response |
|---|---|---|---|---|
| 1. | 1-7 | 1.4 | The second paragraph states that GRO is present above cleanup levels at only one location (1,600 mg/kg at SD01), but the table on Figure 2-1 indicates that SB02 also exceeds cleanup levels at 7,700 mg/kg. Please include SB02 in this section. | Agree. The second to last sentence in paragraph 2, Section 1.4, will be revised:<br>"Of these, only gasoline-range organics (GRO) is present above its cleanup level (1,400 mg/kg), and in only two locations: 1,600 mg/kg at SD01 and 7,700 mg/kg at SB02. For this reason, …" |
| 2. | 1-8 | 1.4 | Bullet 6 states that a permeable geofabric liner will separate the ground surface from soils to be land farmed. ADEC recommends not lining the landfarm with fabric. | Agree. The following text will be removed from the bulleted lists in Sections 1.4 and 2.12.2:<br>"~~A permeable geofabric liner will separate the ground surface from soils to be landfarmed~~." |
| 3. | 1-8 | 1.4 | Please update the underlined sentence in bullet 7 to read: "Step-out sampling will occur at the WACS until 1 mg/kg is achieved to confirm that the cap will cover all soil above the RAO for PCBs." | Agree. The text will be revised as indicated below; note that this will occur in Sections 2.9.1 (PCB Alternative 5) and 2.12.2 (see Response #10).<br>"Step-out sampling will occur at the WACS until 1 mg/kg is achieved to confirm that the cap will cover all soil above the RAO for PCBs." |
| 4. | 1-9 | 1.4.1 | Please include information in this section about future, long-term property ownership. | Agree. The following sentence will be added to the end of Section 1.4.1:<br>"Although USAF may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, USAF shall retain ultimate responsibility for remedy integrity." |
| 5. | 2-45 | 2.9.1 | For PCB Alternative 7 - Please review and revise the text in bullet 2; possible cut and paste error. | Agree. Bullet 2 will be deleted. A new bullet will be added preceding the current list under PCB Alternative 7:<br>"An EPA technical impracticability waiver must be requested and granted in order to leave contamination above TSCA allowable limits at OT008." |
| 6. | 2-44 | 2.9.1 | In order to allow for proper inspection and maintenance of the soil cap, please include language that the 2-foot thickness of the cap will be verifiable in the field during inspections. | Agree. A permeable geofabric liner will be added to the PCB capping alternatives as a barrier between the contaminated soil and the clean cap; revisions are detailed below. See also Response #10.<br><br>The following text will appear in Section 1.4, bullet 2 (under *PCBs*):<br>"Consolidation, placement of a permeable geofabric liner, and capping at the WACS (PCBs between 1 mg/kg and 10 mg/kg)" |

| Cmt. No. | Pg. & Line | Sec. | Comment/Recommendation | Response |
|---|---|---|---|---|
| | | | | The permeable liner will be added to PCB Alternative 5 in Table 2-9 (Section 2.9) under the column heading 'Advantages':<br><br>"Permeable liner and protective cap limit exposure to PCBs ≤ 10 mg/kg"<br><br>The bulleted lists for PCB Alternatives 5, 6, and 7 in Section 2.9.1 will be updated:<br><br>Alternative 5, Bullet 2: "PCB-contaminated soil above 1 mg/kg and less than 10 mg/kg would be covered with a permeable geofabric liner prior to capping …"<br><br>Alternative 6, bullet 1, sub-bullet 1: "The excavation will then be covered with a permeable geofabric liner and capped to prevent exposure."<br><br>Alternative 7, bullet 1 (now bullet 2): "… consolidated with the remaining 3,307 cy present at the WACS to be covered with a permeable geofabric liner and capped."<br><br>The second bullet in Section 2.12.2 will be revised:<br><br>"… PCB-contaminated soil above 1 mg/kg and less than 10 mg/kg would be covered with a permeable geofabric liner prior to capping …" |
| 7. | 2-38 | Table 2-9 | For PCB Alternative 4 – Please add text in the table to explain that the concentrations (1 -10 mg/kg) would remain in the on-site monofill. | Agree. A fourth bullet will be added under the column 'Advantages' and a third bullet will be added under the column 'Disadvantages' in Table 2-9:<br><br>"-PCBs above 10 mg/kg would be removed from OT008"<br><br>"-PCB concentrations above the ADEC cleanup level (1 mg/kg) would remain in the onsite monofill" |
| 8. | 2-50 | Table 2-10 and 2.10.8. | Option 7 should be "No" for State Acceptance; ADEC does not accept capping as a solution for PCBs greater than 10 mg/kg. This should also be reflected in the text in section 2.10.8. | Agree. State acceptance will be changed from 'yes' to 'no' under the modifying criteria of Table 2-10.<br><br>In Section 2.9.8, administrative concurrence with PCB Alternative 7 will be changed from "unlikely" to "not possible." |
| 9. | 2-61 and 2-63 | 2.12.2 and Figure 2-4 | As previously discussed, ADEC recommends further consolidation of PCB contaminated soil to reduce the area covered by the cap and to make it more clear where the cap starts and stops. The large area and irregular shape | Agree. USAF recommends discussing the recommended approach in an RI scoping meeting to ensure that the forthcoming work plan adequately addresses ADEC concerns while minimizing exposure risk to onsite workers.<br><br>See also Response # 6; the permeable liner will serve as an indicator that cap |

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| | | | proposed would make it difficult to preform IC inspections and determine where the contaminated soil remains and whether erosion has occurred. | integrity has been affected.<br>See also Response #10; PCB Bullet 6 revision for Sections 2.9.1 and 2.12.2. |
| 10. | | General | Please make IC/LTM descriptions consistent and comprehensive throughout the document. Please update Sections 1.4 (bullet 3), Section 2.9.1 (Page 2-44, bullets 5 and 6), and Section 2.12.2 (page 2-61). | Agree, text will be re-organized and modified for consistency. Section 1.4 will be shortened to list the major remedy components.<br>The major components of the selected remedy are as follows (more specific details are provided in the discussions of PCB Alternative 5 and DRO Alternative 3a in Section 2.9.1):<br>**PCBs**<br>• Removal and disposal (PCBs greater than or equal to 10 mg/kg, including TSCA-regulated and principal threat waste)<br>• Consolidation and capping at the WACS (PCBs between 1 mg/kg and 10 mg/kg)<br>• Confirmation sampling from the Stained Soil Area and the Pump House and the lateral and vertical extents of the WACS excavation<br>• LUCs such as signs, fencing, and dig restrictions<br>• Annual LUC and cap inspections, maintenance as needed, and inspection reports<br>• CERCLA Five-Year Reviews<br>**DRO**<br>• Topographically flat area selection<br>• Pre-treatment samples from the proposed landfarm area<br>• Earthen berm construction<br>• LUCs to limit access and prevent exposure<br>• Excavation, mechanical mixing, and spreading of DRO-contaminated soil to a maximum depth of 10 inches<br>• Confirmation soil sampling from the excavations<br>• Baseline analytical samples at the landfarm and a field screening correlation study<br>• Tilling twice per year until the ADEC cleanup level has been achieved<br>• Analytical sampling as indicated by field screening results |

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| | | | | • No ADEC periodic reviews required<br><br>The bulleted lists in Sections 2.9.1 and 2.12.2 will be provided verbatim in both sections, with the notable difference that cost/duration estimates are included as bullets in Section 2.9.1 (this information has its own subsection under Section 2.12 Selected Remedy), additional LUC language will be added to 2.12.2 (per second part of this comment), and verb tense. The present subjunctive tense 'would' is appropriate for the hypothetical comparison of alternatives (Section 2.9.1); the future indicative tense 'will' indicates that the remedy has been selected and is to be implemented as described in Section 2.12.2. The revised text in Section 2.12.2 is provided below:<br><br><u>PCBs</u><br><br>• All PCB-contaminated soil 10 mg/kg and above will be removed from the WACS, Stained Soil Area, and Pump House, estimated at 3,090 cy, will be excavated and removed for disposal in the contiguous United States.<br>• PCB-contaminated soil from 1 mg/kg to less than 10 mg/kg will be removed from the Stained Soil Area and Pump House for consolidation and capping with a minimum of 2 feet of clean fill at the WACS. PCB-contaminated soil above 1 mg/kg and less than 10 mg/kg will be covered with a permeable geofabric liner prior to capping. The cap will be designed and constructed to withstand environmental conditions, and will prevent exposure of humans and the environment to residual PCBs.<br>• PCB concentrations above 10 mg/kg and below 50 mg/kg will be disposed of as nonhazardous waste; PCB concentrations 50 mg/kg and above will be disposed of as hazardous waste in a Resource Conservation and Recovery Act (RCRA) Subtitle C facility.<br>• Soil that reaches or exceeds 50 mg/kg PCBs, including those defined as a principal threat waste (500 mg/kg and above), will be handled, transported, and disposed of in accordance with TSCA. TSCA-regulated soils are subject to more stringent storage, transportation, and disposal requirements and will be segregated from other waste soils for that reason.<br>• Confirmation soil samples will be collected from the excavations to show that remaining PCB concentrations are below the cleanup level (1 mg/kg) |

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| | | | | at the Stained Soil Area and the Pump House, and below 10 mg/kg at the lateral and vertical extents of the WACS excavation. Step-out sampling will occur at the WACS until 1 mg/kg is achieved to confirm that the cap will cover all soil above the RAO for PCBs.<br>• Cap extents will be surveyed and mapped. Annual LUC and cap inspections and maintenance as needed will be performed to ensure the long-term integrity of the cap; inspection results and photographs will be communicated in a letter report to ADEC and promptly (within one year) addressed by USAF. Preferential drainage pathways, evidence of erosion, and any instances where the geofabric liner is apparent or has been compromised will be documented and addressed.<br>• LUCs such as signage and dig restrictions will be implemented to limit site access and, therefore, human exposure to PCBs. Long-term LUC management is described below:<br>- Current site use is industrial and expected to remain industrial. The Air Force shall restrict any future site use that has the potential to affect the protectiveness of the selected remedy including residential development, recreational use, and disposition and use of any soil excavated from the site, in the *LUC Management Plan*.<br>- LUC boundaries will be surveyed and mapped for inclusion into the LUC *Management Plan* and use during annual LUC and cap inspections.<br>- LUCs are anticipated to be permanent at the WACS, as PCB concentrations are unlikely to degrade naturally. The Air Force shall file a notice with the USAF real property office and in State of Alaska Department of Natural Resources land records that describes the nature and location of the pollutants or contaminants and the types and locations of LUCs.<br>- The Air Force shall include signage around OT008 to prevent unauthorized access. The signage will be implemented and maintained by 611th Civil Engineer Squadron (611 CES).<br>- The Air Force will utilize the base dig permit system, which will prevent activities that could disturb the buried anomalies. The base |

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| | | | | dig permit system is implemented by 611 CES.<br>- The Air Force will utilize the base construction review process, which will prevent ground-disturbing construction activities. The base construction review process is implemented by 611 CES.<br>- The Air Force is responsible for implementing, maintaining, monitoring, reporting, and enforcing LUCs. The Air Force shall inform, monitor, enforce, and bind, where appropriate, authorized lessees, tenants, contractors, and other authorized occupants of Indian Mountain LRRS regarding the LUCs affecting OT008.<br>- Although the Air Force may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Air Force shall retain ultimate responsibility for remedy implementation and protectiveness.<br>- The Air Force will notify ADEC as soon as practicable, but no longer than ten days after discovery, of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. The Air Force will take prompt measures to correct the violation or deficiency and prevent its recurrence. In this notification, the Air Force will identify any corrective measures it has taken or any corrective measures it plans to take and the estimated time frame for completing them. For corrective measures taken after the notification, the Air Force shall notify ADEC when the measures are complete.<br>- The Air Force must provide notice to ADEC at least six months prior to any transfer or sale of property containing LUCs so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify ADEC at least six months prior to any transfer or sale, then the facility will notify the state as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to LUCs. The Air Force agrees to provide ADEC with such notice, within the same time frames, for federal-to-federal transfer of property accountability. The Air Force shall provide either access to or a copy of the executed |

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| | | | | deed or transfer assembly to ADEC.<br>- The Air Force shall not modify or terminate LUCs, modify land uses that might impact the effectiveness of the LUCs, take any anticipated action that might disrupt the effectiveness of the LUCs, or take any action that might alter or negate the need for LUCs without 45 days prior to the change seeking and obtaining approval from ADEC of any required ROD modification.<br>- The Air Force will monitor and inspect all site areas subject to LUCs as PCB-contaminated soil will remain onsite indefinitely. LUC and cap inspections will be conducted and reported annually.<br>- The Air Force will report no less often than once every five years to ADEC on the frequency, scope, and nature of LUC monitoring activities, the results of such monitoring, any changes to the LUCs, and any corrective measures resulting from monitoring during the time period.<br>• This alternative will require five-year reviews under CERCLA. PCB-contaminated soil, although contained under a protective cap, will remain above cleanup levels at the WACS. Five-year reviews evaluate the overall effectiveness of the remedy and ensure that it remains protective over the long-term, to include the integrity of the landfill cap and the frequency, scope, and nature of LUC monitoring activities, the results of such monitoring, any changes to the LUCs, and any corrective measures resulting from monitoring during the time period. Documentation from annual inspections and any subsequent maintenance performed as a result of deficiencies will be compiled in the five-year review reports.<br>• Commingled PCB- and DRO-contaminated soil will be treated as PCB-contaminated soil and either removed (10 mg/kg PCBs and above) or consolidated and capped at the WACS (less than 10 mg/kg PCBs). PCBs are considered more toxic than DRO and therefore drive risk at the OT008.<br>DRO<br>• A topographically flat area will be selected for the landfarming treatment area to minimize the risk of erosion of the contaminated soil and runoff |

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| | | | | of sediments to adjacent undisturbed areas.<br>• An earthen berm around the DRO landfarm area will be constructed and used for containment. Pre-treatment samples from the proposed landfarm area floor and berm will be collected to ensure that the area selected is not contaminated.<br>• All DRO-contaminated soil above the ADEC Method Two cleanup level for ingestion (10,250 mg/kg DRO) will be excavated, mechanically mixed, and spread to a maximum depth of 10 inches.<br>• Confirmation soil samples will be taken from the excavations to show that remaining DRO concentrations are below the ADEC cleanup level.<br>• Baseline analytical samples will be collected at the landfarm according to the frequency recommended in Table 2A of ADEC *Field Sampling Guidance* and correlated with field screening results.<br>• Tilling will occur twice per year after the initial placing of the soil until soil samples from the landfarm show that the ADEC cleanup level for ingestion (10,250 mg/kg) has been achieved. Tilling the soil will accelerate natural volatilization and attenuation.<br>- Field screening using a PID will be conducted in conjunction with tilling to estimate progress toward RAOs; analytical samples will be collected once a consistent reduction in PID readings has been established and be repeated until RAOs are achieved.<br>- If concentrations do not appear to be decreasing at an acceptable rate after two field seasons, nutrient testing may occur to evaluate the addition of water or fertilizer to further expedite degradation.<br>• LUCs such as a temporary snowfence, signs, and dig restrictions will limit access and prevent incidental contact by workers periodically visiting the Upper Camp until the cleanup level is achieved (approximately two years) and the area becomes suitable for UU/UE. Only industrial use will be permitted. USAF will be responsible for the implementation maintenance of these LUCs in the interim and site restoration to include deconstruction and grading to match natural contours once treatment is complete. The fence, signage, and restrictions will be removed upon remedy completion.<br>• This alternative does not require periodic reviews under State of Alaska |

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| | | | | regulations. All DRO-contaminated soil above the ADEC cleanup level will be treated at the LRRS; once cleanup levels are achieved (approximately two years), OT008 will be suitable for UU/UE. |
| | | | Also, please add additional details to address the requirements of the attached guidance (2013 EPA Sample Federal Facility Land Use Control ROD Checklist with Suggested Language). | Note: USAF prefers to include the language from the *Air Force Land Use Control Checklist for Active Duty Bases <u>Not</u> on the NPL* (AFLOA/JACE-FSC) (6 March 2015). <u>Please see the sub-bullet points under Bullet 7 for PCBs that will be included in Section 2.12.2, above, which parallel the 14 points listed in the checklist.</u><br><br>In addition, two paragraphs will be added as under Section 2.9.1 to introduce general LUC rationale and requirements as a common element to several remedies:<br><br>"A common element shared by several of the remedies is the implementation of permanent or temporary LUCs due to the presence of PCB and DRO contamination. Permanent LUCs would be implemented under PCB Alternatives 4, 5, 6, and 7 and POL Alternative 2 and temporary LUCs would be implemented under POL Alternatives 3a and 3b; in these instances, residual soil contamination precludes recreational or residential site use. The purpose of LUCs is to protect human health from hazardous substances or pollutants and control the disposition of any soil excavated from the site. LUCs will also ensure the integrity of other site controls such as fencing or protective liners and caps.<br><br>"Reasonably anticipated current and future land use at OT008 is industrial and infrequent; where LUCs are a component of the remedy, restrictions would be implemented to preclude any development or use that could affect the protectiveness of the selected remedy. LRRS personnel and any potential trespassers will be notified of hazards and restrictions through site postings (i.e. warning signs). Areas where dig restrictions are in effect will be surveyed and clearly delineated on a map that is incorporated into the *LUC Management Plan* for Pacific Air Forces Regional Support Center installations. A deed notation will be executed with the USAF real property office and in State of Alaska Department of Natural Resources land records for contamination that remains in the soil at unacceptable levels. The USAF is responsible for implementing, monitoring, maintaining, reporting on, and enforcing LUCs until concentrations are below such levels that allow for UU/UE." |

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| 11. | | | -- End Comments – | |

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| 1. | General | There is much discussion of the seep at OT008, but no proposed remedy. GRO, DRO, RRO, and PCBs (as well as SVOCs and barium) were detected in seep water and sediment. Based on the presented information, the source of contamination at the seep is site SS010. Please state clearly whether contamination at the seep will be addressed in a separate ROD. Or consider including the seep in this ROD. | Agree | **Section 2.5.5 Ecology/Fauna will be updated as follows:**<br>"A seep in the vicinity of OT008 is ephemeral and emanates from nearby SS010; it does not support aquatic populations (USAF 2006)."<br>**The first paragraph of Section 2.5.7 Nature and Extent of Contamination/Known or Potential Routes of Migration will be revised:**<br>"Precipitation and snowmelt at Upper Camp infiltrates into the fractured rock and much of it emerges as seeps along the slopes that have been observed downslope from Upper Camp in all directions, suggesting that movement of runoff is radial rather than focused in a particular direction. One seep upgradient to the WACS emanates from SS010, which is upgradient to both the seep and to the WACS. Sample results indicated that the interceptor trench constructed between OT008 and SS010 in 1995, located on the downgradient side of the seep, did not prevent the migration of GRO, RRO, and PCBs (as well as SVOCs and barium) onto the former WACS site (USAF 2012c). This seep is described and addressed as part of the 2007 ROD for sites LF006, SS002, and SS010 (USAF 2007) and will not be included in this ROD. Surface runoff occurs via Sleepy Bear Creek northeast to Notoniono Creek Basin (USAF 2006); samples collected from these potential migration pathways are also attributed to SS010 and discussed in the ROD for that site (USAF 2007). No other surface water is present at OT008.<br>**A paragraph will be added at the end of Section 2.7.2 Human Exposure Risk:**<br>"Note that human health risks from exposure to the contaminated seep at OT008 was evaluated as part of the 2007 ROD for SS010. None of the receptors evaluated in the risk assessment for SS010 (site workers, site visitors, and subsistence hunter/gatherers) represented complete exposure | Agree |

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| | | | | pathways (USAF 2007)."<br>**The 2007 ROD for sites LF006, SS002, and SS010 will be added to the references page.** | |
| 2. | Page 1-8, Section 1.4 | a) Third bullet in list. Please revise to state: "Five year reviews, **annual** cap inspections, and maintenance as needed…." Please add underlined to sentence.<br>b) Fifth bullet in list. Please specify frequency of soil samples. Either annually or twice a year in conjunction with tilling is suggested. | a) Agree<br>b) Partially agree | **a) 'Annual' will be added to the third bullet as requested.**<br>b) The sample schedule will be guided by PID field screening. See Response #9 for sampling strategy.<br>ADEC Guidance states: "If adequate characterization data is already available, Responsible Parties may choose to forego the initial sampling. Similarly, they may choose to wait until the landfarm has been sufficiently tilled such that the first time it is sampled, it is anticipated that the target cleanup goals have been met."<br>**A reference to *Landfarming at Sites in Alaska* (ADEC 2011) will be added to Section 4.0 References.** | Agree |
| | | SUPPLEMENTAL COMMENT: Please include another bullet in the ROD that describes how initial concentrations will be adequately characterized. ADEC recommends multi-incremental (MI) analytical sampling and PID screening of the landfarm prior to operation for characterization and post operations to verify cleanup goals have been met. Sampling efforts during ongoing operations can be PID screening, but please describe how these will be accomplished and correlated throughout operations. | Mostly Agree | Baseline samples will be collected upon landfarm construction and the initiation of tilling. Well-placed discrete samples are preferred to MI samples as they can be collected from various depths and may provide a more holistic representation of both vertical and lateral contaminant distribution.<br>**Bullet 5 in Section 1.4 will be revised:**<br>"DRO-contaminated soil will be excavated, mechanically mixed, spread to a maximum depth of 10 inches, and tilled twice per year until soil samples from the landfarm show that the ADEC cleanup level for ingestion (10,250 mg/kg) has been achieved. Baseline analytical samples will be collected at the frequency recommended in Table 2A of ADEC *Field Sampling Guidance* and correlated with field screening results. Tilling the soil will accelerate natural volatilization and attenuation. Interim field screening will be conducted in conjunction with tilling." | |

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| 3. | Section 1.4.2 | a) The following sentence addresses PCB contamination: "Until cleanup levels are achieved, a combination of site controls and five-year reviews will be implemented to ensure protectiveness of human health and the environment". Please replace this sentence with a statement addressing the DRO contamination discussed in this section (2 years of land farming/sampling and annual reporting).<br>b) Please specify that the land farm will be deconstructed and the material graded to match natural contours once treatment is complete. | a) Agree<br><br>b) Agree | **a) The sentence will be clarified to reflect the DRO contamination and proposed remedy discussed in this Section 1.4.2; site restoration will be added to remedy components:**<br>"Until landfarming is complete and confirmation samples indicate that the cleanup level for DRO has been achieved, site controls such as fencing and signage will be maintained to ensure protectiveness of human health and the environment during soil treatment. The USAF will be responsible for implementing the selected remedy, including removal, landfarm construction, tilling, sampling, and site restoration."<br>**b) The bulleted lists in Sections 2.9.1 and 2.12.2 will also be updated to include grading to match natural contours.** | Agree |
| 4. | Page 2-4, Section 2.1.3 | Currently the only IRP site that does not have a signed ROD is SD001. Please revise. | Agree | **The paragraph following the second bulleted list in Section 2.1.3 will be updated as requested:**<br>"With the exception of OT008 (presented herein) <u>and SD001</u>, CERCLA ROD or Decision Documents have been submitted to ADEC <u>and approved for all other Indian Mountain LRRS sites.</u>" | Agree |
| 5. | Page 2-7, Section 2.4 | Text states: "…Pump house will be eligible for UU/UE immediately…" It would be better to replace "eliglble" with "Suitable". UU/UE isn't a formal designation like NFA or Cleanup Complete. Recommend making change throughout document. | Agree | **'suitable' will replace 'eligible' as it applies to UU/UE throughout the document.** | Agree |
| 6. | Page 2-9, Section 2.5.5 | Under "Fauna" this section refers to "Sleepy Bear Creek". However, IN the previous section it states that "The majority of Upper Camp surface runoff flows to the northeast to Notoniono Creek Basin." Which is it Notoniono creek or Sleepy bear creek? Please use consistent nomenclature. | Agree | **The following clarification will be added to Sections 2.5.4/Surface Water:**<br>"Both Indian River and Utopia Creek respond directly to precipitation events; runoff occurs <u>via Sleepy Bear Creek</u> northeast to Notoniono Creek Basin (USAF 2006)." | Agree |

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| | | SUPPLEMENTAL COMMENT: Please include a figure of the drainage patters with all waterbodies labeled for clarity. | Agree | Figure 1-1 for the entire Indian Mountain RRS will be revised with either the USGS or NGS service layers that indicate water bodies and drainage patterns, whichever is more detailed. Note that there is no continuous surface water at Upper Camp where OT008 is located. | |
| 7. | Table 2-11 | Update the Disadvantages of PCB Alternative 5 to include "LUCs and CERCLA five-year reviews would be required." | Agree | Table 2-11 is the Alternative Cost Summary; an incorrect repeated header that appeared from pages 2-38 to 2-41 will be revised.<br><br>**The requested text will be added to the 'Disadvantages' column for PCB Alternative 5 in Table 2-9.** | Agree |
| 8. | Page 2-43, Section 2.9.1 | a) Third Bullet: Upon review of this section and figure 2-4 I think we potentially have two different views of how this remedial action will be conducted in the WACS area. It appears the plan is simply to excavate the >10 ppm soil and then just cap the entire area. I was expecting to see some level of consolidation of the remaining PCB contaminated soil to reduce the extent of the area requiring capping. This will require confirmation sampling to ensure that all areas with PCB concentrations greater than 1 ppm have been removed and are placed in the capped area. I think the reduction of the capped areas will provide some saving to offset the cost of additional sampling and excavation.<br>b) Fourth bullet. It appears the only requirement for the cap is that it be a minimum of 2-ft of clean fill. The cap should be constructed to resist wind and water erosion and should include a crushed rock cover and other features to ensure durability over time. Recommend stating that the cap will be designed to reduce erosion.<br>c) Sixth bullet. Annual reviews and documentation of maintenance should be provided to ADEC in a timely manner. Not just presented in the Five year | a) Unclear | a) Page 2-43 addresses PCB Alternative 4, which is the onsite monofill option. Figure 2-4 shows PCB Alternative 5, which explicitly states that soils from the Pump House and SSA will be placed under the WACS cap and is consistent with the remedy description.<br><br>**If the comments refer to PCB Alternative 5 on Page 2-44, bullet 1 addresses consolidation and capping at the WACS:**<br><br>"PCB-contaminated soil from 1 mg/kg to less than 10 mg/kg will be removed from the Stained Soil Area and Pump House for consolidation and capping at the WACS."<br><br>**Bullet 3 addresses confirmation sampling:**<br><br>"Confirmation soil samples will be collected from the excavations to show that remaining PCB concentrations are below the cleanup level (1 mg/kg) at the Stained Soil Area and the Pump House, and below 10 mg/kg at the lateral and vertical extents of the WACS excavation."<br><br>**The alternative will be re-titled: "**Offsite Disposal of PCB-Contaminated Soil 10 mg/kg and Above, and Onsite Consolidation and Capping of PCB-Contaminated Soil From 1 mg/kg to Less Than 10 mg/kg. | Agree |

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| | | review. | b) Agree<br><br>c) Agree | **Note**: further consolidation of PCB-contaminated soil, i.e., pushing up edges of existing WACS extents, may be considered in coordination with stakeholders at the RA work plan phase. Clean fill is available onsite and site use is expected to remain the same.<br><br>b) Bullet 4 (PCB Alternative 5) will be amended to be consistent with the descriptions given in Section 1.4 and Table 2-9 with the following addition:<br><br>"The cap will be designed and constructed to withstand environmental conditions, and will prevent exposure of humans and the environment to residual PCBs."<br><br>c) USAF will communicate annual inspection results to ADEC via a letter report. This change will be reflected in:<br><br>**Section 1.4.1, last sentence**: "Any cap deficiencies will be reported to ADEC and promptly addressed by USAF.<br><br>**Section 2.9.1, PCB Alternative 5, bullet 4**: "…annual inspections and maintenance as-needed will be performed to ensure the long-term integrity of the cap; inspection results will be communicated in a letter report to ADEC and any deficiencies will be promptly addressed by USAF<br><br>**Section 2.12.2, first bullet, third sub-bullet**: ADEC notification and prompt cap maintenance (within one year) of any identified deficiency or damage." | |
| | | SUPPLEMENTAL COMMENT: (Please note, the page is 2-44, not 2-43). Please revise to clearly state that all soils contaminated with greater than 10 mg/kg PCBs will be identified and removed from the site and any contaminated soils ranging from 1 to 10 mg/kg will be fully delineated (to the horizontal and lateral extent) to prove it has all been contained under the cap. | Agree | Bullet 3 will be clarified:<br><br>"Confirmation soil samples will be collected from the excavations to show that remaining PCB concentrations are below the cleanup level (1 mg/kg) at the Stained Soil Area and the Pump House, and below 10 mg/kg at the lateral and vertical extents of the WACS. Step-out sampling will occur at the WACS until 1 mg/kg is achieved to confirm that the cap will cover all soil above the RAO for PCBs." | |

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| | | | | A similar clarification will be added to the final bullet in Section 1.4 | |
| 9. | Page 2-46, Section 2.9.1 | Third bullet under DRO Alternative 3a. Please specify that tilling will occur twice a year and please include frequency of confirmation sampling (annual or twice a year). | Agree | Bullet 3 will be revised to include "will be mechanically tilled <u>twice per year</u> to encourage biodegradation." Two sub-bullets will be added after bullet 3 in Section 2.9.1/POL Alternative 3a:<br>▪ Field screening using a photoionization detector will be conducted before and after tilling events to estimate progress toward RAOs; analytical samples will be collected once a consistent reduction in PID readings has been established and continue in conjunction with tilling until RAOs are achieved.<br>▪ If concentrations do not appear to be decreasing at an acceptable rate, nutrient testing may occur to evaluate the addition of water or fertilizer to further expedite degradation. | Agree |
| | | SUPPLEMENTAL COMMENT: (Similar to Item 2). Please include that initial screening with both PID and analytical samples (MI sampling) will be conducted at the landfarm to establish a baseline.<br><br>ADEC does not believe that PID screening prior to tilling activities each season is needed if initial baseline characterization is completed. PID screening results after tilling each season can be compared to the initial baseline results.<br><br>Also, please update the second bullet in the response to say the following: " If concentrations do not appear to be decreasing at an acceptable rate following 2 field seasons. | Mostly agree | See supplemental response #2.<br><br>**The sub-bullets for DRO Alternatives 3a and 3b will be revised in Section 2.9.1:**<br>– <u>Baseline analytical samples will be collected at the frequency recommended in Table 2A of ADEC *Field Sampling Guidance* and correlated with field screening results.</u><br>– Field screening using a PID <u>will be conducted in conjunction with tilling</u> to estimate progress toward RAOs; analytical samples will be collected once a consistent reduction in PID readings has been established and <u>be repeated</u> until RAOs are achieved.<br>– If concentrations do not appear to be decreasing at an acceptable rate <u>after two field seasons</u>, nutrient testing may occur to evaluate the addition of water | |

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| | | | | or fertilizer to further expedite degradation. | |
| 10. | Page 2-55, Section 2.10.6 | Second paragraph discusses offsite landfilling which is a requirement for PCB alternative 2 and 3. Actually PCB alternative 4, 5, and 6 also include offsite landfilling. Please revise. | Agree | Section 2.10.6, paragraph 2, first sentence will be updated:<br>Offsite landfilling in the contiguous 48 states, which occurs under PCB Alternatives 2 and 3 and, to a lesser degree, 4, 5, and 6 as well as under DRO Alternatives 4a and 4b, makes those alternatives relatively easy to implement in terms of administrative requirements | Agree |
| 11. | Page 2-61, Section 2.12.2 | Second sub-bullet. Please specify frequency of tilling and confirmation sampling. | Agree | Mechanical tilling would be performed after initial placement of the soil and then twice per year until the cleanup level is achieved, as verified through confirmation sampling. In the interim, field screening will be used to monitor attenuation.<br>For confirmation sampling strategy, see Response #9. | Agree |
| 12. | Page 2-70, Section 2.14 | Third Bullet. A timely letter report documenting the annual inspections should be provided to ADEC. | Agree | ADEC will be notified of inspection results, including any deficiencies. Please see Response #8.<br>Third bullet will be updated:<br>Inspection results will be communicated in a letter report to ADEC and any deficiencies promptly addressed by USAF in the year following the annual inspection during which deficiencies are identified.” | Agree |
| 13. | Page 3-4, Section 3.1.1 | “Can wind cause PCB migration?” Last sentence in first paragraph. Please revise to address typo. “If PCBs are detected in water,…” | Agree | The error will be corrected: If PCBs ~~in~~ are detected in water, it is likely due to suspended sediment or particulates in the water column. | Agree |
| 14. | Page 3-6, Section 3.1.1 | “When will it be decided?” Last sentence, please delete second “remedy implementation”. | Agree | The duplicate text will be removed from the public comment response in Section 3.1.1: Remedy implementation is programmed for ~~remedy implementation in~~ 2017. | Agree |
| 15. | Appendix B | Please coordinate language between the Human Health Conceptual Site Model (CSM) (Graphic and Scoping Forms) and the Ecosystem CSM Form for clarity. The human heath forms indicate that all surface water is “ephemeral and related to rainfall and snow melt”, while the ecosystem form | Clarification | Please see Response #1. | Agree |

| ADEC | | DATE: 7/28/2016<br>REVIEWER: H. Weiss-Racine<br>PHONE: 907.269.0298 | Action taken on comment by: Jacobs Engineering Group Inc. | | |
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| | | references a "contaminated seep". | | | |
| 16. | | -- End Comments -- | | | |