FINAL

RECORD OF DECISION

Landfill No. 2 (LF003)
Spill/Leak No. 4 at the Weather Station Building (SS010)
Upper Tram Terminal Area (SS016)
Lower Tram Terminal Area (SS017)

CAPE ROMANZOF LONG-RANGE RADAR SITE, ALASKA

CONTRACT NO. FA8903-08-D-8784 Task Order 0036
PROJECT NO. DBWT20107317

FEBRUARY 2013

FINAL
RECORD OF DECISION

Cape Romanzof Long-Range Radar Site

Cape Romanzof, Alaska

Prepared for:
611th Air Support Group Civil Engineering Squadron,
Asset Management Flight Restoration Element

and

Air Force Civil Engineer Center

February 2013

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Acronyms

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ACR	Acre
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
BCY	bank cubic yard
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BLM	Bureau of Land Management
BTEX	benzene, toluene, ethylbenzene, and xylenes
CADD	computer-aided design and drafting
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CES	Civil Engineering Squadron
CFR	Code of Federal Regulations
CM (cm)	centimeter
COC	chemical of concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CRP	Community Relations Plan
CSM	Conceptual Site Model
CWT	hundredweight
CY (cy)	cubic yards
DERP	Defense Environmental Restoration Program
DoD	(United States) Department of Defense
DOT	(United States) Department of Transportation
DRMO	Defense Reutilization and Marketing Office
DRO	diesel-range organics
EA	each
EC	engineering control
EcoSSL	ecological soil screening level
ECY	excavated cubic yards
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences

Acronyms (Continued)

ESL	ecological screening level
FS	Feasibility Study
ft	foot (feet)
GAC	granulated activated carbon
GPS	global positioning system
GRO	gasoline-range organics
H	highly effective alternative / fully meets criterion
HI	hazard index
HQ	hazard quotient
HR (hr)	hour
I	Ineffective alternative / does not meet criterion
IC	institutional control
IRP	Installation Restoration Program
JBER	Joint Base Elmendorf-Richardson
LB (lb.)	pound
LRRS	Long-Range Radar Site
LS	lump sum
LTM	long-term monitoring
LUC	Land Use Control
M	Moderately effective alternative / partially meets criterion
MAP	Management Action Plan
MARS	minimally attended radar system
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MO (mo.)	month
mph	miles per hour
msl	mean sea level
NA	not applicable
NCP	National Contingency Plan
NFRAP	No Further Response Action Planned
No.	Number
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
O&M	operations and maintenance
OD	outer diameter
OZ (oz.)	ounce
PA/SI	Preliminary Assessment/Site Inspection
PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricant
PPE	personal protective equipment
ppm	part(s) per million

Acronyms (Continued)

PRG	Preliminary Remediation Goals
QA	quality assurance
QC	quality control
RA	Risk Assessment
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
RRO	residual-range organics
SARA	Superfund Amendments and Reauthorization Act
SF	slope factor
SVOC	semi-volatile organic compound
SY	square yard
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
TRV	toxicity reference value
TSCA	Toxic Substances Control Act
UCL	upper confidence level
USAF	United States Air Force
USD	U.S. Dollars
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound
WACS	White Alice Communication System
WRCC	Western Regional Climate Center
YKHC	Yukon Kuskokwim Health Corporation

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Facility Name:	Cape Romanzof Long-Range Radar Site (LRRS)
Site Location:	Cape Romanzof LRRS, Alaska Latitude 61° 46' 49'' North, Longitude 166° 02' 19'' West
Operable Unit/Site:	Landfill Number (No.) 2 (LF003) Spill/Leak No. 4 at the Weather Station Building (SS010) Upper Tram Terminal Area (SS016) Lower Tram Terminal Area (SS017)

The United States Air Force's (USAF) Cape Romanzof LRRS is located within the Yukon Delta National Wildlife Refuge in western Alaska, approximately 540 air miles west of Anchorage, 165 air miles northwest of Bethel, and 170 air miles southeast of Nome (Figure 1-1). It sits on a small peninsula extending into the Bering Sea. The nearest towns to Cape Romanzof LRRS are Scammon Bay (population 498) and Hooper Bay (population 1,137), which are approximately 15 miles east and south, respectively (Alaska Department of Commerce, Community and Economic Development [ADCCED], 2011). The communities are not connected to Cape Romanzof LRRS by road; however, winter trails provide some access to the facility.

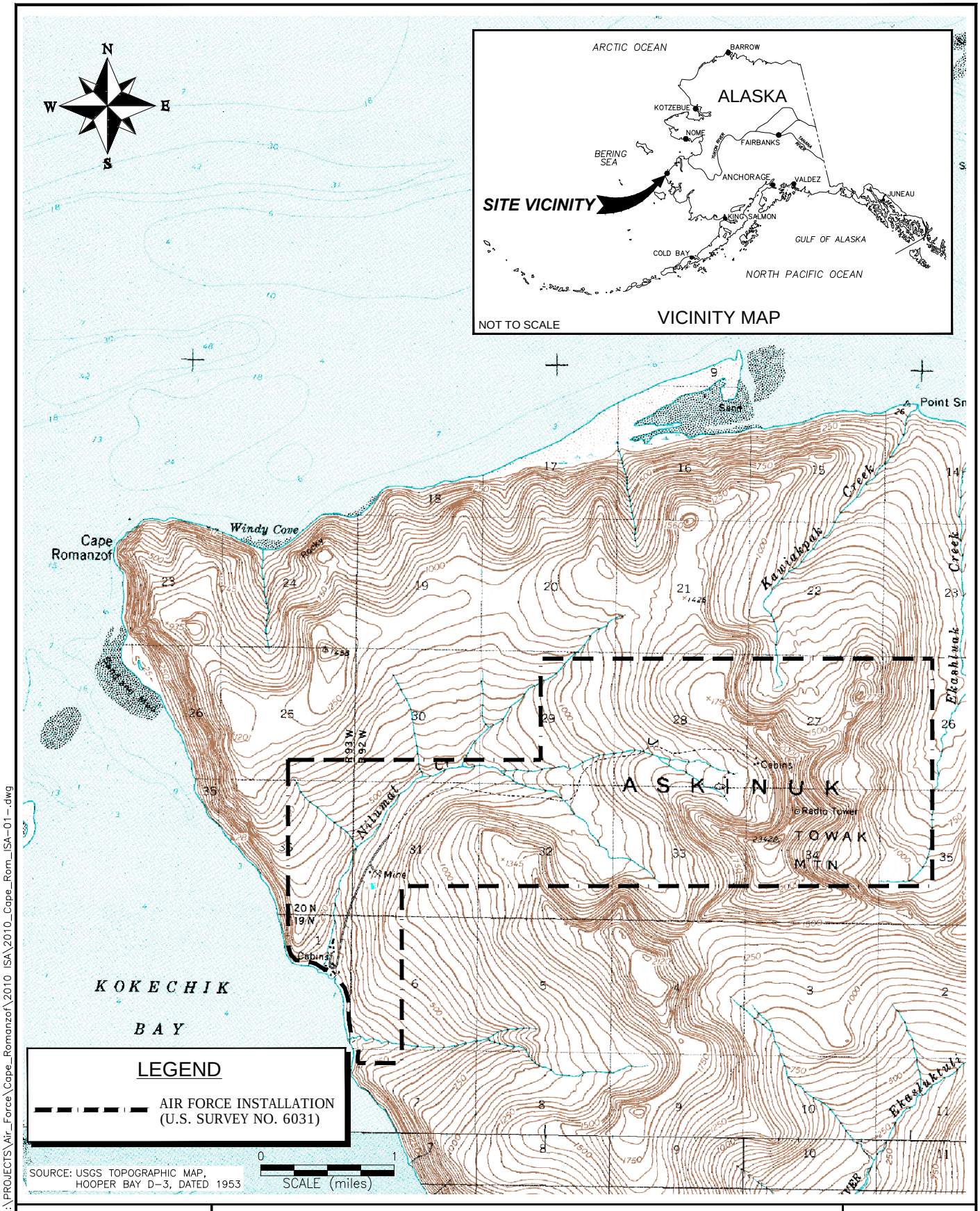
Cape Romanzof LRRS is listed with Non - National Priorities List (NPL) status as of 30 June 1992 with a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) number of AK9572728633.

Cape Romanzof LRRS includes 4,900 acres of land that have been divided into two areas, the Lower Camp and the Upper Camp. The Lower Camp lies at the head of an alpine tundra valley next to intermittent streams, which drain into a perennial stream, Fowler (Nilumat) Creek. The Upper Camp is situated atop Towak Mountain, a high ridge directly above the head of the valley. The mountain top Upper Camp is linked to the Lower Camp by a gravel road and tramway year-round. Four sites, also known as "source areas", are the subject of this Record of Decision (ROD) and decision document: LF003, SS010, SS016, and SS017, and are described below.

Landfill No. 2 (LF003) is located along the access road from the runway to the Lower Camp. The landfill is situated along the south side of the access road, approximately 1 mile west of the Composite Facility. LF003 covers approximately 43,800 square feet (ft) and contains various wastes including garbage, wood, metal, plastic, construction/demolition debris, shop waste, and incinerator ash. The landfill was operated until the mid-1970s and is the suspected source of the polychlorinated biphenyl (PCB) contamination that has been documented in this area.

Spill/Leak No. 4 at the Weather Station Building (SS010) is located approximately 600 ft east of the southwest end of the Cape Romanzof LRRS airstrip, including Weather Station Building 4101, two utility trenches, and a newly installed weather observation tower approximately 200 ft uphill of the Weather Station Building. The old weather observation tower building (Building 4000) has been removed from the gravel pad, as well as Tank #11, a 25,000-gallon diesel fuel aboveground storage tank (AST), and Tank #4, a 1,100-gallon diesel fuel AST. The former location of the 25,000-gallon AST is the Spill/Leak No. 4 area.

Sites SS016 (Upper Tram Terminal Area) and SS017 (Lower Tram Terminal Area) are located at the two tramway buildings. The Upper Tram Terminal is situated on top of a steep slope at the Upper Camp. The Lower Tram Terminal Area sits at the toe of this slope. The locations of sites LF003, SS010, SS016, and SS017 are shown in Figure 1-2**.**



DATE: 14 JUN 2010	United States Air Force	
PROJ. NO.: 20077.048.036	**INSTALLATION LOCATION**	
FILE: see plot stamp	Cape Romanzof LRRS Alaska	**FIGURE 1-1**
DRAWN BY: SJ		

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LOWER CAMP

LANDFILL NO. 2 (LF03)

LOWER TRAMWAY TERMINAL (SS017)

UPPER TRAMWAY TERMINAL (SS016)

FOWLER CREEK

WEATHER STATION (SS010)

KOKECHIK BAY

N

W E

S

LEGEND

AIR FORCE INSTALLATION (U.S. SURVEY NO. 6031)

1500 0 750 1500

SCALE (FEET)

DATE: 10 JUN 2010	United States Air Force
PROJ. NO.: 20077.048.036	**CAPE ROMANZOF LRRS, SOURCE AREAS**
FILE: see plot stamp	Cape Romanzof LRRS Alaska
DRAWN BY: SJ	**FIGURE 1-2**

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1.2 STATEMENT OF BASIS AND PURPOSE

Pursuant to the Defense Environmental Restoration Program (DERP), 10 United States Code 2701, and Executive Order 12580 (signed January 23, 1987), the USAF is responding to historical releases that occurred at its facilities, including Cape Romanzof LRRS. This Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) ROD presents the Selected Remedies for Landfill No. 2 (LF003), Upper Tram Terminal Area (SS016), and Lower Tram Terminal Area (SS017) at Cape Romanzof LRRS. This report also documents a remedy decision under Alaska regulations. Due to the CERCLA petroleum exclusion, State of Alaska laws, regulations and oversight apply at Spill/Leak No. 4 at the Weather Station Building (SS010). This decision document presents the Selected Remedies for Sites LF003, SS016, and SS017 at Cape Romanzof LRRS, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and, to the extent practicable, the National Contingency Plan (NCP). These decisions were based on data present in the Administrative Record for this facility. This decision document also presents the Selected Remedy for the fourth site at Cape Romanzof LRRS, petroleum site SS010, was chosen in accordance with State of Alaska laws and regulations.

The United States Environmental Protection Agency (USEPA) defers to the Alaska Department of Environmental Conservation (ADEC) for regulatory oversight of Installation Restoration Program (IRP) remedial activities at non-NPL CERCLA sites. The USEPA is a supporting regulatory agency, and the USAF is the lead agency under CERCLA for Cape Romanzof LRRS for sites LF003, SS016, and SS017. This document is issued by the Department of the USAF, which is managing remediation of contamination at Cape Romanzof LRRS in accordance with CERCLA, as required by the DERP and integrates Alaska state law into the CERCLA process. CERCLA regulates the cleanup of sites that contain hazardous substances. The term "hazardous substance" as defined by CERCLA excludes "petroleum, including crude oil or any fraction thereof," unless specifically listed or designated under CERCLA (Section 101[14]). The cleanup of sites within the state of Alaska that are contaminated strictly with petroleum are regulated by the ADEC in accordance with Alaska state laws and regulations. ADEC regulates petroleum and other hazardous substances under Title 18 of the Alaska Administrative Code (AAC), Chapter 75 (18 AAC 75) – Alaska Oil and Hazardous Substance Pollution Control Act (ADEC, 2012a). Site SS010 at Cape Romanzof LRRS is subject to the CERCLA petroleum exclusion and is regulated exclusively by the ADEC.

As the agency responsible for regulatory oversight of the IRP remedial activities, the ADEC agrees that the remedy selected, when properly implemented, by the USAF under CERCLA complies with CERCLA and Alaska state law for all non-petroleum contaminated media at the four subject areas. The ADEC also agrees that the remedy selected, when properly implemented, for petroleum sites complies with Alaska state law.

1.3 ASSESSMENT OF SITE

The response actions selected in this ROD are necessary to ensure protectiveness of human health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Soil (surface and subsurface), sediment, and groundwater samples have been collected at each of the four areas (LF003, SS010, SS016, and SS017) at Cape Romanzof LRRS to identify chemicals of concern (COCs), assess the site, and determine if the following apply to each site:

- Contaminants are present in concentrations exceeding State of Alaska cleanup levels under 18 AAC 75.341 or 18 AAC 75.350.
- Contaminants exceed acceptable exposure levels that are protective of human health and the environment under CERCLA as set forth in the NCP [40 Code of Federal Regulations (CFR) § 300.430(e)(2)(i)].

The following is an overview of the assessment of these areas:

- **LF003** – The COCs identified at LF003 are PCBs and Lead in surface soil and sediments, with approximately 227 cubic yards (cy) of contaminated surface soil and an estimated 20 cy of contaminated sediment. Additionally, Landfill No. 2 containing solid waste and hazardous materials remains capped in-place. Remedial action is required under CERCLA as well as Alaska state law to address these COCs in order to protect human health and the environment at this area (USAF, 2011).
- **SS010** – The COCs identified at SS010 are diesel-range organics (DRO) in subsurface soil and potential fuel contamination in groundwater, (i.e., DRO, gasoline-range organics [GRO], and residual-range organics [RRO]). Approximately 3,518 cy of DRO-contaminated subsurface soil is present at SS010. The quantity of fuel-contaminated groundwater is not determined. Petroleum (i.e., DRO, GRO, and RRO) is not considered to be a hazardous substance under CERCLA and is therefore not regulated by CERCLA. For these reasons, no action for petroleum is necessary under CERCLA; however, petroleum is considered a hazardous substance under Title 46 of the Alaska Statues and regulations promulgated there under. Remedial action is therefore required under State of Alaska regulations to address petroleum-based contamination (USAF, 2011).
- **SS016** – The COCs identified at SS016 consist of PCBs and lead in surface soil. Approximately 339 cy of surface soil has PCB contamination, and the volume of lead-contaminated soil is not determined at SS016. Remedial action is required under CERCLA as well as the Alaska state law to address these COCs in order to protect human health and the environment at this area (USAF, 2011).
- **SS017** – The COCs identified at SS017 consist of PCBs and lead in subsurface soil and surface soil. Approximately 11 cy of PCB-contaminated subsurface soil and 179 cy of PCB-contaminated surface soil are estimated to exist at the site. The volume of lead contaminated subsurface and surface soil is not determined. Remedial action is required under CERCLA as well as the Alaska state law to address these COCs in order to protect human health and the environment at this area (USAF, 2011).

The remedies were selected after developing, evaluating, and analyzing the alternatives per site and per media. The 31 alternatives (including No Action) that were analyzed for the Cape Romanzof LRRS are described in Section 2.10. The numbers of alternatives that were analyzed per matrix and per area for Cape Romanzof LRRS are listed below.

- LF003 (Landfill No. 2)

  - Surface Soil ("LF03SS") –Six (6) alternatives (i.e., one no-action and five action)
  - Sediment ("LF03SD") – Four (4) alternatives
- SS010 (Spill/Leak No. 4 at the Weather Station Building)
  - Subsurface Soil ("SS10SB") – Five (5) alternatives
  - Groundwater ("SS10GW") – Four (4) alternatives
- SS016 (Upper Tram Terminal Area)
  - Surface Soil ("SS16SS") – Four (4) alternatives
- SS017 (Lower Tram Terminal Area)
  - Surface Soil ("SS17SS") – Four (4) alternatives
  - Subsurface Soil ("SS17SB") – Four (4) alternatives

The USAF is committed to implementing, monitoring, maintaining, and enforcing all components of the selected remedy. The response action selected is necessary to ensure protectiveness of human health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 DESCRIPTION OF SELECTED REMEDY

It is important to note that the selected remedies may change somewhat as a result of the remedial design and construction processes. If changes to the remedies described in this ROD occur, they will be documented using a technical memorandum in the Administrative Record, an Explanation of Significant Differences (ESD), or a ROD amendment.

1.4.1 Selected Remedies for CERCLA Sites

Contaminants exceed acceptable exposure levels that are protective of human health and the environment under CERCLA at three sites: LF003, SS016, and SS017, within the Cape Romanzof LRRS. Remedies selected under CERCLA for each of these sites are presented by site in the following sections.

1.4.1.1 LF003

The selected remedies for LF003 for PCB-contaminated surface soil and PCB-contaminated sediment are described as follows:

- Surface Soil – Alternative LF03SS5: PCB Soil (≥1 milligrams per kilogram [mg/kg]): Excavation and Off-Site Disposal:
  - Surface soil with PCB concentrations ≥1 mg/kg will be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soil that contains PCBs in excess of 50 mg/kg will be considered a Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The

quantity of surface soil requiring excavation at the site is estimated to be approximately 227 cy with a maximum PCB concentration of 110 mg/kg.

- Confirmation sampling following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavation.
- The excavated area will be revegetated to help reduce the chance of erosion.

- Sediment – Alternative LF03SD3: Excavation, Off-Site Disposal, and Long-Term Monitoring (LTM):
  - Sediment with PCB concentrations above ≥1 mg/kg will be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All sediment that contains PCBs in excess of 50 mg/kg will be considered a RCRA Subtitle C hazardous waste. Contaminated sediment with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of sediment requiring excavation at the site is estimated to be approximately 20 cy with a maximum PCB concentration of 230 mg/kg.
  - Confirmation sampling of sediment and surface water following the excavation will document the effectiveness of the remedy.
  - Soil from a local borrow source will be used to backfill the excavation.
  - The excavated area will be revegetated to help reduce the chance of erosion.
  - While the excavation would remove the sediment currently present, it may not remove the source of the PCBs, which is thought to be the landfill itself. Therefore, contaminated sediment may continue to migrate from the landfill via the seep and into the sediment near the toe of the landfill. Eroded soil control barriers will be constructed on-site to prevent the off-site migration of runoff water that may contain PCB contaminated sediment in order to protect the surface water that flows around the landfill and further away (Fowler Creek). Annual cap inspections and maintenance will be conducted at which time both sediment and surface water will be analyzed to check PCB contamination levels and collected and disposed if it exceeds clean up levels. Over time, PCB concentrations in collected sediment will decrease as source concentrations decrease.
  - Institutional controls (ICs) that prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses, require a dig permit in the event of excavation, implement soils management plan, and maintain the landfill cap at LF003 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the Land Use Control (LUC) Plan for LF003
  - Signs warning that PCB buried solid waste and potentially hazardous materials are present and site access is restricted will be constructed and maintained at the

site to alert personnel that PCB-contaminated sediments may be present within the drainage channel and sediment control barriers.

- Eroded soil barriers, collected sediment, and signs will be managed and maintained by the USAF until it is determined that sediments no longer pose an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure.
  - Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and Alaska Department of Natural Resources (ADNR) land records.

- Landfill – The remedy for buried solid and potentially hazardous materials in Landfill No. 2 is ICs/LUCs and LTM.
  - ICs that prohibit the development and use of property for residential housing, prohibit excavation or disturbance of the landfill cap/cover, and require maintenance of the cap/cover will be established. ICs/LUCs will include site dig permit system and soils management plan to prevent direct exposure to buried wastes and contaminants. ICs will be incorporated into the LUC Plan for LF003
  - Signs warning that PCB buried solid waste and potentially hazardous materials are present and site access is restricted will be constructed and maintained at the site to alert personnel that PCB-contaminated sediments may be present within the drainage channel and sediment control barriers
  - Annually, inspections (with photos and field observations) of the landfill cap, signs, and control barriers, maintenance, and performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

1.4.1.2 SS016

The selected remedy for PCB- and lead-contaminated surface soil at Site SS016 is described as follows:

- Surface Soil – Alternative SS16SS4: PCB Soil (≥1 mg/kg) and Lead (≥400 mg/kg), Excavation, to the Extent Feasible, and Off-Site Disposal:
  - Surface soil with PCB concentrations above ≥1 mg/kg and lead ≥400 mg/kg will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be Toxic Substance Control Act (TSCA) PCB remediation waste will be sent to a TSCA or RCRA Subtitle C hazardous waste landfill and if lead soils fail the toxicity characteristic leaching procedures (TCLP) will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 339 cy with a maximum PCB concentration of 6,600 mg/kg.

- Confirmation sampling following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavation.
- The excavated area will be revegetated to help reduce the chance of erosion.
- Because the site is located on a steep slope in an area covered with large boulders, it may not be possible to remove all PCB soil ≥1 mg/kg for safety and logistical reasons. If areas of PCB soil ≥1 mg/kg are left in-place at the site, the following actions will be implemented:
  - A cap will be placed over remaining surface soil contaminated with PCBs and lead above cleanup levels (≥1 mg/kg and ≥400 mg/kg respectively) protective of human health and the environment to prevent access and exposure to contaminated soil. Given the steep, boulder-covered, and exposed slope at this site, the most feasible type of cap to install is gravel; asphalt would be too labor-and equipment-intensive for such a remote area and soil would be blown away by the wind. Gravel will not be as subject to erosion as soil; therefore, the cap would not be revegetated.
  - Engineering controls (ECs) such as signs warning of contamination will be erected at the location where surface soil is located at concentrations above cleanup levels protective of human health and the environment.
  - ICs that prohibit development and use of property for residential housing, prevent use of contaminated soil for restricted uses, require dig permit in the event of excavation, implement soil management plan, and maintain cap (if necessary) at SS016 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the LUC Plan. Periodic site inspections will be performed to check the condition of the cap and signs; maintenance will be completed as needed. The cap and signs will be maintained by the USAF until it is determined that PCB contaminated soil no longer poses an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure at the site.
  - Locations of the cap and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.
- In the case that all PCB contaminated surface soil ≥1 mg/kg and lead contaminated soil ≥400 mg/kg is not able to be removed due to safety or logistical issues, then ICs and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

1.4.1.3 SS017

The selected remedies for PCB- and lead-contaminated surface soil and subsurface soil at Site SS017 are described as follows:

- Surface soil – Alternative SS17SS4: Excavation and Off-Site Disposal includes the following remedial actions;
    - Surface soil with PCB and lead concentrations above ≥1 mg/kg and ≥400 mg/kg respectfully will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA Subtitle C hazardous waste and if lead soils fail the TCLP will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 179 cy with a maximum PCB concentration of 68 mg/kg. All lead-contaminated soil areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil.
    - Confirmation sampling for both PCBs and lead following the excavation will document the effectiveness of the remedy.
    - Soil from a local borrow source will be used to backfill the excavation.
    - The excavated area will be revegetated to help reduce the chance of erosion.
- Subsurface soil – Alternative SS17SB4 – Excavation and Off-Site Disposal includes the following remedial actions;
    - Surface soil with PCB and lead concentrations above ≥1 mg/kg and ≥400 mg/kg respectfully will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA Subtitle C hazardous waste and if lead soils fail the TCLP will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 11.7 cy with a maximum PCB concentration of 13.6 mg/kg. All lead-contaminated soil areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil.
    - Confirmation sampling for both PCBs and lead following the excavation will document the effectiveness of the remedy.
    - Soil from a local borrow source will be used to backfill the excavation.
    - The excavated area will be revegetated to help reduce the chance of erosion.

1.4.2 Selected Remedies for Non-CERCLA Sites

Petroleum contaminants are present in concentrations exceeding Alaska state cleanup levels under 18 AAC 75.341 or 18 AAC 75.345 at one site, SS010, within Cape Romanzof LRRS. There are no CERCLA Hazardous Substances exceeding acceptable exposure levels protective of human health and the environment at this site, therefore the site is regulated strictly under

Alaska state law. Remedies selected under Alaska state law for SS010 are presented in the following section.

1.4.2.1 SS010

The selected remedies for SS010 for DRO-contaminated subsurface soil and potential fuel-contaminated (DRO, GRO, or RRO) groundwater are as follows:

- Subsurface soil – Alternative SS10SB2 – Institutional Controls and Engineering Controls:
  - Contaminated subsurface soil will remain in place to naturally attenuate.
  - ICs that prevent access to groundwater until groundwater cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system, prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and conduct LTM at SS010. ICs will be incorporated into the LUC Plan for SS010.
  - Annual inspections (with photos and field observations) of the signs, control barriers and submit the performance reports to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of inspections and reports may be reduced.
  - Land Use Controls will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as land use control boundaries will encompass all areas where subsurface soil contaminant levels pose an unacceptable risk to human health and the environment and will be surveyed and a map designating their locations will accompany notations placed on land records.
  - These controls are in place to ensure that invasive activities are not taking place within the boundary of the sites where land use has been restricted, or that ADEC and USAF approvals are obtained prior to conducting such work.
  - In the case that all contaminated subsurface soil is not able to be removed due to safety or logistical issues, then ICs annual inspections and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

- Groundwater – Alternative SS10GW2 – Institutional Controls, Engineering Controls, Natural Attenuation, and Long-Term Monitoring includes the following actions:
  - Potentially contaminated groundwater will remain in place. Over time, natural attenuation of the contaminants is expected to occur and LTM will provide the data necessary to determine whether the plume is stable or shrinking or when contaminant levels allow for unlimited use and unrestricted exposure.
  - Three monitoring wells will be installed and sampled at the source area (one well) and downgradient of the source area upgradient of Fowler Creek (two wells) in order to determine groundwater flow direction and if groundwater is contaminated

and if so, if contamination poses an unacceptable risk to surface water quality at Fowler Creek.

- If groundwater is determined to be contaminated and poses no unacceptable risk to surface water quality at Fowler Creek, the USAF will perform periodic monitoring of groundwater contaminant levels and risk to surface water quality at Fowler Creek.
- If groundwater is determined to be contaminated and poses an unacceptable risk to surface water quality at Fowler Creek, the USAF will identify and conduct appropriate remedial action to protect surface water quality.

- ICs that prevent access to groundwater until groundwater cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system (such as monitoring wells) by implementing a well permitting system. Prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and conduct LTM and ICs will be incorporated into the LUC Plan for SS010.
- Periodic sampling and analysis of contaminated groundwater in the monitoring wells (LTM) will be performed at the site to assess changes in groundwater contaminant concentrations over time. Additionally, if groundwater is determined to be contaminated, the seeps and sediments adjacent to Fowler Creek (downgradient of the site) will be monitored to ensure that contamination does not reach the creek. When groundwater contaminant concentrations are below groundwater cleanup levels for two consecutive sampling events and risk to surface water quality at Fowler Creek is determined to be acceptable, LTM will be discontinued.
- Land Use Controls will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as land use control boundaries will encompass all areas where groundwater contaminant levels pose an unacceptable risk to human health and the environment and be surveyed and a map designating their locations will accompany notations placed on land records.
- Annual inspections will be conducted and performance reports will be submitted every year to ADEC for the first five years and then followed by a five-year review. At that time, the frequency of inspections and reports may be reduced.

1.5 STATUTORY DETERMINATIONS

1.5.1 CERCLA Sites

The selected remedy for each of the three CERCLA sites at Cape Romanzof LRRS addressed in this ROD is protective of human health and the environment, complies with promulgated

requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective.

Each selected remedy represents the maximum extent to which permanent solutions can be used in a practicable manner at each site. It provides the best balance or trade-offs in terms of balancing criteria while also considering the bias against off-site treatment and disposal and considering state and community acceptance. The NCP establishes the expectation that treatment will be used to address the principal threats posed by a site whenever practicable (40 CFR 300.430[a] [1] [iii] [A]).

The selected remedy for PCB and Lead-contaminated surface and subsurface soil at SS016, and SS017 and PCB-contaminated surface and subsurface soil downgradient of the landfill at LF003 does not satisfy the statutory preference for treatment as a principal element of the remedy because excavation and disposal of contaminated soil does not, as a whole, reduce the levels of contamination within the soil. However, this remedy is the most cost-effective and readily implementable approach to reduce the risk and obtain site closure at this remote site.

At SS016 and SS017, soils with PCB concentrations ≥1 mg/kg and lead concentrations ≥400 mg/kg will be transported off-site and will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. In the event that contamination above cleanup levels remains on-site due to safety or logistical issues associated with removal; engineering controls (eroded soil control barriers constructed on-site to prevent the off-site migration of runoff water that may contain contaminated soils) will be put in place to protect human health and the environment. In addition, ICs, LUCs, maintenance of the landfill cap, LTM and a CERCLA Five-Year Review will be required and an Explanation of Significant Differences or ROD Amendment will be completed.

At LF003, the landfill will remain in-place, thus institutional controls, annual inspections and maintenance for the first five years with a five-year review will be required, at which time the frequency inspections and reports may be reduced.

1.5.2 Non-CERCLA Sites

The selected remedy for Site SS010 under State of Alaska Regulations (ICs and natural attenuation) complies with requirements under 18 AAC 75.325-390. Periodic reviews and performance reports will be conducted and submitted to ADEC no less than every year for the first five years, followed by a Five-Year Review. At which time, the frequency of reviews and performance reports may be reduced.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD (Section 2.0). Additional information can be found in the Administrative Record file for Cape Romanzof LRRS, Alaska, which can be found at:

http://www.adminrec.com/TOC.asp?Base=Romanzof&Command=PACAF

- List of COCs and their concentrations;
- Baseline risk represented by the COCs;

- Cleanup levels established for COCs and the basis for these levels;
- How source materials constituting principal threats will be addressed;
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the Baseline Risk Assessment (RA) and ROD;
- Potential land and groundwater use that will be available at the site as a result of the selected remedy;
- Estimated capital, annual operation and maintenance (O&M), total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected; and
- Key factors that led to selecting the remedy.

1.7 AUTHORIZING SIGNATURES

This signature sheet documents the USAF approval of the remedies selected in this ROD for three CERCLA sites: Landfill Number 2 (LF003), Upper Tram Terminal Area (SS016), and Lower Tram Terminal Area (SS017) at Cape Romanzof LRRS, Alaska. The State of Alaska agrees that, when properly implemented, the selected remedies comply with state law.

This signature sheet also documents the USAF approval of the remedy selected under Alaska state law in this decision document for Spill/Leak No. 4 at the Weather Station Building (SS010) at Cape Romanzof LRRS, Alaska. The State of Alaska agrees that, when properly implemented, the selected remedy complies with state law.

The decision may be reviewed and modified in the future if new information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment. If additional contaminants are discovered, USAF and ADEC will determine compliance levels for soil and groundwater cleanup actions.

ROBYN M. BURK, Colonel, USAF
Commander, 611th Air Support Group

18 March 2013
Date

JOHN HALVERSON, Environmental Program Manager
Federal Facilities Section, Contaminated Sites Program
Alaska Department of Environmental Conservation

3/28/2013
Date

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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 the Administrative Record file that supports the remedy selection decision.

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Site Name (Number)	Landfill No. 2 (LF003) Spill/Leak No. 4 at the Weather Station Building (SS010) Upper Tram Terminal Area (SS016) Lower Tram Terminal Area (SS017)
Site Location:	Cape Romanzof LRRS, Alaska Latitude 61° 46' 49'' North, Longitude 166° 02' 19'' West
POC:	Mr. Keith Barnack – Project Manager Keith.Barnack@elmendorf.af.mil (907) 552-5160 USAF 611 CES/CEAR 10471 20th Street –Suite 338 JBER, AK 99506-2200

The USAF's Cape Romanzof LRRS is located within the Yukon Delta National Wildlife Refuge in western Alaska, approximately 540 air miles west of Anchorage, 165 air miles northwest of Bethel, and 170 air miles southeast of Nome (Figure 1-1). It sits on a small peninsula extending into the Bering Sea. The nearest towns to Cape Romanzof LRRS are Scammon Bay (population 498) and Hooper Bay (population 1,137) which are approximately 15 miles east and south, respectively (ADCCED, 2011). The communities are not connected to Cape Romanzof LRRS by road; however, winter trails provide some access to the facility.

Cape Romanzof LRRS is listed with Non - NPL status as of 30 June 1992 with a CERCLIS number of AK9572728633.

Cape Romanzof LRRS includes 4,900 acres of land that have been divided into two areas, the Lower Camp and the Upper Camp. The Lower Camp lies at the head of an alpine tundra valley next to intermittent streams, which drain into a perennial stream, Fowler (Nilumat) Creek. The Upper Camp is situated atop Towak Mountain, a high ridge directly above the head of the valley. The mountain-top Upper Camp is linked to the Lower Camp by a gravel road and tramway year-round. Four sites, also known as "source areas", are the subject of this ROD and decision document: LF003, SS010, SS016, and SS017, and are described in the following subsections.

As the lead agency for remedial activities, the USAF has conducted environmental response actions at Cape Romanzof LRRS sites LF003, SS010, SS016, and SS017 in accordance both with CERCLA under the DERP, which was established by Section 211 of the SARA of 1986, and with State of Alaska laws and regulations. The contaminated areas addressed in this ROD and decision document are shown on Figure 1-2 and are described briefly in the following subsections. The selected remedies for the sites are detailed in Sections 1.4 and 2.13.

As the support agency for CERCLA releases and the lead regulatory agency for releases involving petroleum, the ADEC provides primary oversight of the environmental restoration actions.

Funding for remedial activities is provided by the DERP Account, a funding source approved by Congress to clean up contaminated sites on United States Department of Defense (DoD) installations.

2.1.1 LF003: Landfill No. 2

Landfill No. 2 (LF003) is located along the access road from the runway to the Lower Camp. The landfill is situated along the south side of the access road, approximately 1 mile west of the Composite Facility. The landfill covers approximately 43,800 square ft and contains various wastes including garbage, wood, metal, plastic, construction/demolition debris, shop waste, and incinerator ash, and was operated until the mid-1970s. The landfill is the suspected source of the PCB contamination that has been documented in this area.

The response action selected in this ROD is necessary to protect the public health or welfare or environment from actual or threatened releases of hazardous substance into the environment. The selected remedies under CERCLA and Alaska state law for LF003 are protective of human health and the environment and consist of the following:

- Surface Soil – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal
- Sediment – Excavation, Off-Site Disposal, and Long-Term Monitoring
- Landfill cap – Institutional Controls, Long-Term Monitoring and Maintenance

2.1.2 SS016 and SS017: Upper Tram Terminal Area and Lower Tram Terminal Area

Sites SS016 (Upper Tram Terminal Area) and SS017 (Lower Tram Terminal Area) are located at the two tramway buildings. The Upper Tram Terminal Area is situated on top of a steep slope at the Upper Camp. The Lower Tram Terminal Area sits at the toe of this slope. Tramway lines at numerous remote stations required lubrication resulting in petroleum, oil, and lubricant (POL) and, occasionally, PCB contamination at the base of the buildings, generally beneath the tram line.

The response action selected in this ROD is necessary to protect the public health or welfare or environment from actual or threatened releases of hazardous substance into the environment. The selected remedies under CERCLA and Alaska state law for SS016 and SS017 consist of the following; these remedies are protective of human health and the environment:

- SS016 Surface Soil – PCB soil ≥1 mg/kg and Lead soil ≥400 mg/kg excavation, to the extent feasible, and off-site disposal;
- SS017 Surface Soil – excavation and off-site disposal; and
- SS017 Subsurface Soil – excavation and off-site disposal.

If excavation to promulgated soil cleanup levels (1 mg/kg PCBs and 400 mg/kg Lead) is infeasible due to safety or logistical issues associated with remedial action, then capping and ICs with long-term monitoring and maintenance on the cap will be required.

2.1.3 SS010: Spill/Leak No. 4 at the Weather Station Building

Site SS010 is regulated exclusively under Alaska state law. The site is subject to the petroleum exclusion and is, therefore excluded from CERCLA regulation.

Site SS010 is located approximately 600 ft east of the southwest end of the Cape Romanzof LRRS airstrip, and includes Weather Station Building 4101, two utility trenches, and a newly installed weather observation tower approximately 200 ft uphill of the Weather Station Building. The old weather observation building (Building 4000) has been removed from the gravel pad, as well as Tank #11, a 25,000-gallon diesel fuel AST, and Tank #4, a 1,100-gallon diesel fuel AST. The former location of the 25,000-gallon AST is the Spill/Leak No. 4 area.

Two known groundwater wells are associated with Site SS010. The first well (Well No. 2) was drilled in 1962 and was reportedly located near the southeast corner of the Weather Station Building (USAF, 1990). Groundwater from this well was reportedly contaminated with fuel oil in 1964 (USAF, 1990); however, the source of contamination was never identified and no quantitative data have ever been successfully collected.

The response action selected under Alaska state law is necessary to protect the public health or welfare or environment from actual or threatened releases of pollutants or contaminants into the environment. The selected remedies under Alaska state law for SS010 are protective of human health and the environment and consist of the following:

- Subsurface Soil – ICs and ECs
- Groundwater – ICs, ECs, natural attenuation, and LTM.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section provides background information and summarizes the series of previous site activities and investigations that led to this ROD. It describes the CERCLA response actions undertaken at the Landfill No. 2 (LF003), Weather Station Building (SS010), Upper Tram Terminal Area (SS016), and Lower Tram Terminal Area (SS017) at Cape Romanzof LRRS, Alaska. There have been no enforcement activities at the subject sites.

Cape Romanzof LRRS was one of 10 original Aircraft Control and Warning System sites in the Alaska air defense system. Installation construction was finished in 1952, and operations began in 1953. In 1958, Cape Romanzof was established as a White Alice Communications System (WACS). In 1979, a commercially owned and operated communications system (Alascom) used a satellite earth terminal to replace the WACS operations.

Cape Romanzof LRRS has been operated by a government contractor since 1977. After the minimally attended radar system (MARS) was completed in the mid-1980s, the staffing level dropped to approximately six people, who live at the site year-round. Additional personnel stay at Cape Romanzof LRRS on a seasonal basis.

During 1988, a USAF crew demolished 24 buildings, eight building foundations, antennas, and other structures from WACS, Upper Camp, and Lower Camp areas. Debris was placed into the debris landfill (LF012). Hazardous material was shipped to the Defense Reutilization and Marketing Office (DRMO) at Joint Base Elmendorf-Richardson (JBER). After demolition, the sites were covered with an average depth of 2 to 3 ft of crushed rock.

During the early 1990s, various underground storage tanks (USTs), a 25,000-gallon AST, and associated piping were excavated. Also, Water Well No. 3 was abandoned, and Landfill 2 (LF003) was covered.

The current status of buildings at Cape Romanzof LRRS is summarized below.

- All of the WACS buildings at the Upper Camp have been demolished; only the MARS radar dome and tram station remain at Upper Camp.
- At the Lower Camp, almost all of the original buildings have been demolished; what now remain are two dome-style buildings (one for residential use and one small machine shop), a dry storage building, and some fuel tanks.

The CERCLA process was initiated at Cape Romanzof LRRS in 1989 with a Remedial Investigation (RI)/Feasibility Study (FS), and since, a number of environmental investigations have been performed at the LRRS, which, along with the associated reports, are listed below.

- 1989: *Installation Restoration Program, Remedial Investigation/Feasibility Study, Stage 1, Cape Romanzof LRRS, Alaska* (USAF, 1990);
- 1991: *Remedial Investigation/Feasibility Study, Cape Romanzof LRRS, Alaska* (USAF, 1991; 1992a; 1992b);
- 1995: *Investigation, Delineation, and Excavation of Contaminated Soil from SS15, SS08, SS14, ST09; Construction of Cells for Contaminated Soil; Capping of LF003; and Geology/Water Resources of Nilumat Creek Valley. Final Report. Cape Romanzof LRRS, Alaska* (USAF, 1995);
- 2000: *Preliminary Assessment/Site Inspection (PA/SI), Tramway Facilities and Soil Stockpile Sampling at Cape Newenham, Cape Romanzof, and Tin City LRRSs. Final Environmental Survey Report*. (USAF, 2000);
- 2002: *Interim Record of Decision for LF003, Cape Romanzof LRRS, Alaska* (USAF, 2002);
- 2003: *PCB Contaminated Soil Removal and Disposal, Cape Romanzof LRRS, Alaska Project Summary Report.* (USAF, 2003);
- 2004: *Clean Sweep Program, Cape Romanzof LRRS, Alaska.* (USAF, 2004a);
- 2005: *Environmental Monitoring Report for Landfill No. 2 (LF003) and Spill Sites SS13 and SS15, Cape Romanzof LRRS, Alaska.* (USAF 2005a);
- 2005: *Former Landfill (LF003) Surface Soil Investigation Report, Cape Romanzof LRRS, Alaska.* (USAF, 2005b);
- 2009: *Final Remedial Investigation, Cape Romanzof LRRS, Alaska.* (USAF, 2009a);
- 2009: *Final Long Term Monitoring Report, Cape Romanzof LRRS, Alaska* (USAF, 2009b);
- 2009: *Groundwater Use Determination, Source Area SS010, Cape Romanzof LRRS, Alaska.* (USAF, 2009c); and

- 2011: *Feasibility Study for LF003, SS010, SS016 and SS017. Cape Romanzof LRRS, Alaska.* (USAF, 2011).

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 support agency. Components of these items and documentation of how each component was satisfied for four contaminated areas at Cape Romanzof LRRS are described in Table 2-1 and Table 2-2.

Table 2-1 Public Notification of Document Availability

Requirement	Satisfied By
Notice of availability of the Proposed Plan and RI/FS must be made in a general circulation major local newspaper.	Notice of availability was published in the Public Announcements Section of the Tundra Drums and Public Notice Section of the Delta Discovery
Notice of availability must include a brief abstract of the proposed plan which describes the alternatives evaluated and identifies the preferred alternative (NCP Section 300.430(f)(3)(i)(A)).	Notice of availability included all of these components and is included for reference as Appendix C to this ROD.
Notice of availability should consist of the following information: • Site name and location • Date and location of public meeting • Identification of lead and support agencies • Alternatives evaluated in the detailed analysis • Identification of preferred alternative • Request for public comments • Public participation opportunities including: – Location of information repositories and Administrative Record file – Methods by which the public may submit written and oral comments, including a contact person – Dates of public comment period – Contact person for the community advisory group (e.g., Restoration Advisory Board), if applicable	

Notes:
NCP National Contingency Plan
RI/FS Remedial Investigation/Feasibility Study
ROD Record of Decision

Table 2-2 Public Comment Period Requirements

Requirement	Satisfied By
Lead agency should make document available to public for review on same date as newspaper notification.	Proposed Plan was made available to the public on 18 July 2012. The notification of availability was made on 18 July 2012.
Lead agency must ensure that all information that forms the basis for selecting the response action is included as part of the Administrative Record file and made available to the public during the public comment period.	JBER maintains the Administrative Record file for Cape Romanzof LRRS. All data collected and all CERCLA primary documents produced for Cape Romanzof LRRS are maintained as part of this file at www.adminrec.com, which is available to the public.
CERCLA Section 117(a)(2) requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan. NCP Section 300.430(f)(3)(i) requires the lead agency to allow the public a minimum of 30 days to comment on the RI/FS and the Proposed Plan and other supporting information located in the administrative record and information repository.	The USAF provided a public comment period for the Proposed Plan from 18 July 2012 to 17 August 2012.
The lead agency must extend the public comment period by at least 30 additional days upon timely request.	The USAF received no requests to extend the public comment period.
The lead agency must provide the opportunity for a public meeting to be held at or near the site during the public comment period. A transcript of this meeting must be made available to the public and be maintained in the Administrative Record and information repository for the site (pursuant to NCP Section 300.430(f)(3)(i)(E)).	The USAF provided opportunity for a public meeting during the public comment period. No requests for a public meeting were received.

Notes:

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	NCP	National Contingency Plan
JBER	Joint Base Elmendorf-Richardson	RI/FS	Remedial Investigation/Feasibility Study
LRRS	Long-Range Radar Site	USAF	United States Air Force

The USAF's responses to comments received during the public comment period are included in the Responsiveness Summary, which is provided as Section 3.0 of the ROD. USAF responses to agency comments are included in Appendix D of this ROD.

The 611th Civil Engineering Squadron (CES) conducts a comprehensive community involvement program to inform and involve the public in the environmental decision-making process. Community relations activities include the following:

- Management Action Plan (MAP): The MAP is a response action plan for a facility and is made available to the public in order to provide a summary of all restoration activities in one comprehensive document. The MAP provides references to the source documents so further information can be obtained (USAF, 1998).
- Community Relations Plan (CRP): A CRP was developed for the Cape Romanzof LRRS in 1996 and the plan is updated whenever changes in restoration activities or the local community warrant an update.

- Administrative Record: An Administrative Record has been established in the 611th CES offices on JBER. The Administrative Record contains the information that has been used to support USAF decision making and is accessible to the public. Most of the documents contained in the Administrative Record can be accessed through the internet at http://www.adminrec.com/PACAF.asp?Location=Alaska.
- Information Repository: An information repository containing past reports, newspaper clippings, and community relations documents relating to proposed plans and response action for all Environmental Restoration Program (ERP) sites is maintained by the 611th CES Community Relations Coordinator at JBER, and in the communities of Hooper Bay, Scammon Bay, and Chevak.
- Updated Mailing List: A mailing list of interested parties is maintained and updated regularly by the CES Community Relations Coordinator. These mailing lists are used to provide interested partied with copies of newsletters, fact sheets, public notices, and to announce public meetings that pertain to the environmental issues at the various installations.
- Fact Sheets and Newsletters: Fact sheets and newsletters are distributed as changes occur in the restoration program or when Proposed Plans require public comment.
- Public Meetings: No public meeting was requested by the public upon receiving the proposed plan and fact sheet; therefore, no public meeting was held and no comments were made in response by the public.
- 1-800 Hotline: A 1-800 number to the 611th CES Community Relations Coordinator was established in May 1995. The line provides immediate access to the 611th CES for questions and information relating to environmental activities at 611th sites. The number is 1-800-222-4137.

2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many large sites, the environmental problems at Cape Romanzof LRRS are complex. As a result, the USAF, with concurrence from ADEC, has organized the environmental restoration work at Cape Romanzof LRRS into 17 ERP sites as described below:

- SS013: Seep Area and Spill Location 5;
- SS015: Spill Site 15;
- SS007: Waste Accumulation Area No. 1;
- DP011: Debris Area;
- ST009: Former Truck Fueling Station;
- SS014: Drum Storage Area;
- SS001: Waste Accumulation Area No. 2;
- SS008: Waste Accumulation Area No. 3;
- LF002: Landfill No. 1;

- LF012: 611th/Disposal Pit/Debris Landfill;
- OT005: Road Oiling;
- OT006: White Alice Communication System;
- LF003: Landfill No. 2;
- LF004: Landfill No. 3;
- SS010: Weather Station Building, Spill Site 10;
- SS016: Upper Tram Terminal Area; and
- SS017: Lower Tram Terminal Area.

Sites SS007, LF012, OT005, SS008, LF002, OT006, and SS001 have been considered cleaned and closed with "No Further Action." Sites ST009, DP011, and SS014 have been closed with the implementation of ICs. Source Areas SS015 and SS013 are open sites with implementation of ICs by ROD determination in 2011.

This ROD addresses three of the four remaining contaminated areas: Landfill No. 2 (LF003), Upper Tram Terminal Area (SS016), and Lower Tram Terminal Area (SS017).

In addition, this decision document addresses the fourth remaining site which will be regulated under Alaska state law: Spill/Leak No. 4 at the Weather Station Building (SS010).

The overall cleanup strategy for the installation includes source reduction and implementation of remedies that are consistent with the remote nature of the site, lack of infrastructure, and USAF's limited presences at the site. Consistent with these strategies, 18 AAC 75.341 Method Two soil cleanup levels and 18 AAC 75.345 groundwater cleanup levels have been deemed appropriate for these contaminated areas.

Upon signature of this ROD, the selected remedial alternatives will be implemented.

2.5 CAPE ROMANZOF LRRS ENVIRONMENTAL CHARACTERISTICS

2.5.1 Physiography and Climate

Cape Romanzof LRRS is located in the Yukon-Kuskokwim Coastal Lowland region, which is generally characterized as a marshy, lake-dotted deltaic plain consisting of coastal deposits of interlayered alluvial and marine sediments. However, unlike the surrounding area, Cape Romanzof LRRS lies on a bold headland at the western end of the Askinuk Mountains, facing the Bering Sea. The installation is located at the head of a glacially carved valley that is surrounded by steep bedrock ridges. The valley floor is relatively shallow-sloped. The surrounding area has low, rounded hills and mountains with alpine tundra and ephemeral streams.

The Upper Camp is situated on a steep bedrock ridge directly above the head of the valley, adjacent to the peak of Towak Mountain. The Lower Camp area lies at the head of the valley at an elevation of approximately 1,500 to 1,600 ft above mean sea level (msl). Permafrost is not known to exist at Cape Romanzof LRRS.

Cape Romanzof is within the Alaskan Transitional Climatic Zone. Average annual precipitation for the 30-year period from 1971-2000 was approximately 25.56 inches, with an average greater than 2 inches per month from June through October. Average minimum temperatures for the same time period range from between approximately 0 and 18 °F in the winter months, and average maximum temperatures range from the high 30s to the mid-50s (°F) in the summer months. Extreme temperatures of 79 °F and -26 °F have been recorded historically (Western Regional Climate Center [WRCC], 2007).

Average annual wind speed at Cape Romanzof for the period of 1996 through 2006 is 15.5 miles per hour (mph), with maximum monthly average wind speeds of 18 mph and greater occurring from November through March. The LRRS is frequently exposed to gusts in excess of 50 mph. Annual prevailing wind direction at Cape Romanzof is north-northeast, or onshore, with south or south-southwest winds occurring during summer months (WRCC, 2007).

2.5.2 Geology

Cape Romanzof LRRS is located within the valley of Fowler (Nilumat) Creek at the western end of the Askinuk Mountain range that rises between several hundred ft and 2,300 ft above msl the flat, low-lying delta plain of the Yukon and Kuskokwim Rivers. The upper part of the valley has very steep sides and a relatively shallow-sloped valley floor; the U-shaped cross-section is typical of glaciated valleys.

The geology of the Upper Camp facilities (located on the narrow ridge above the valley) is characterized by a thin accumulation of angular sand and block residues overlying granitoid bedrock of Towak Mountain. Soils at the Upper Camp are characterized as a thin, granular, unconsolidated, non-cohesive layer of sand and gravel that is overlain by a spongy layer of mosses and organic matter of varying thicknesses.

The Lower Camp and adjacent facilities are underlain by deposits of talus and other colluvial materials that have moved down the steep valley side slopes toward Fowler Creek, largely under the influence of gravity. The colluvium includes a wide range of material sizes, from large granite blocks to fine-to-coarse grained sand, silt, and minor amounts of clay. The colluvium forms an apron at the base of the steep slope extending across part of the low-angle slope on the valley floor. The Lower Camp is located on the uphill margin of this apron. Soils at the Lower Camp are commonly sand and silt with gravel/talus horizons near the bedrock interface.

The central, low-slope angle part of the U-shaped valley is underlain by alluvial and possibly glacial deposits. Well No. 1, located near the valley axis, shows a sequence of gravelly clay with boulders (0 to 43 ft below ground surface [bgs], acting as an aquitard), overlying sand and boulders (43 to 57 foot depth), overlying weathered bedrock and then fresh granitoid bedrock at a depth of 100 ft bgs.

2.5.3 Hydrogeology

Groundwater is used as the drinking water source for Cape Romanzof LRRS. The water supply well, Well No. 1 at Lower Camp, was drilled in 1957 to a total depth of 154 ft. The well produces groundwater from two separate casing perforations, from 82 to 102 ft deep and 146 to 148 ft deep. The static water level is approximately 30 ft bgs, which is approximately 20 ft above the top of the aquifer, indicating that the water-bearing zones are confined. The clay-rich upper

43 ft of strata encountered during the drilling of Well No. 1 are assumed to act as the confining layer. There are no other known surface water or groundwater intakes in use within the Cape Romanzof watershed.

Groundwater recharge is from infiltration of precipitation within the drainage basin. Little or no regional flow exists across drainage boundaries. Surface runoff and groundwater flow follow the downward slopes of the valley and exit the main valley to the west.

The groundwater supply well (Well No. 1) and groundwater monitoring wells at Lower Camp sites provide information about the area's hydrogeology. The three water-bearing geologic units identified at Cape Romanzof LRRS are as follows:

- Colluvium on the steep valley sides and adjacent parts of the valley floor,
- Alluvium/glacial deposits underlying the central part of the valley floor, and
- Weathered bedrock underlying the colluvium and alluvial/glacial deposits.

The most significant water-bearing zones appear to be the alluvial/glacial deposits and fractures in the weathered and fresh bedrock. Well No. 1 produces groundwater from weathered and fresh bedrock, although groundwater was also encountered in alluvial/glacial deposits while drilling Well No. 1. Shallow, unconfined groundwater occurs within the colluvium, although the permeability of the colluvium is variable, and the water-bearing zones are not expected to be laterally-extensive.

2.5.4 Surface Water Hydrology

Fowler (Nilumat) Creek, a perennial stream, drains the main Cape Romanzof LRRS valley. It flows four miles from a constructed reservoir at the head of the valley to Kokechik Bay. Stream recharge is primarily from the reservoir, sheet run-off, and small tributaries from nearby valleys. Numerous ponds and surface water bodies exist for short periods of time (usually one to five days) after precipitation events. Fowler Creek, the reservoir, and a small pond approximately 300 ft north of the reservoir are the only perennial bodies of water close to the installation. The Fowler Creek watershed has an approximate area of 8.5 square miles. Fowler (Nilumat) Creek supports several species of fish, including Dolly Varden and pink salmon.

2.5.5 Ecology

Flora across the LRRS is dominated by species that can withstand the extreme winds and poor quality, shallow soil conditions. Vegetation cover is characterized by dwarf shrub meadows, alpine tundra, and barren ground. Low-growing shrub species identified at Cape Romanzof include the dwarf arctic birch, crowberry, lowbush cranberry, various willow, white mountain avens, and narrow-leaf Labrador tea (USAF, 1993). Other, herbaceous species identified at the LRRS include various sedges and grasses (i.e., bluejoint), coastal paintbrush, Alaska spring beauty, mountain avens, rush, buttercup, dock, lousewort, and various lichens and mosses (USAF, 1993). Numerous other shrub and herbaceous species may occur within the area based on species ranges.

Anadromous fish species of the Cape Romanzof LRRS area include Dolly Varden, chum salmon, and pink salmon, all of which are found in Fowler Creek. Near-shore marine fish species identified in Kokechik Bay include tomcod, Irish lord sculpin, starry flounder, yellowfin sole,

and borealis smelt (USAF, 1993). A small commercial and subsistence herring fishery is conducted annually in Kokechik Bay. Resident freshwater fish species include pike, whitefish, and burbot. Various invertebrate species, including blue mussels and Alaska razor clams, inhabit the intertidal zone and near-shore area and are harvested for subsistence (Yukon Kuskokwim Health Corporation [YKHC], 2002).

Marine mammals inhabiting coastal waters off the Yukon-Kuskokwim Delta National Wildlife Refuge include numerous seal species (ribbon, ringed, bearded, and spotted), whale species (killer, bowhead, fin, beluga, minke, and gray), porpoises (harbor and Dall), Steller sea lions, and walrus. Seals, walruses, and beluga whales are the primary users of the coastal and marine habitats of the Refuge (USAF, 1993). Terrestrial mammals that may inhabit the area at Cape Romanzof LRRS include voles, beaver, musk ox, caribou, fox (arctic and red), river otter, mink, and wolverine (USAF, 1993).

An avifaunal inventory at Cape Romanzof LRRS was conducted by the United States Fish and Wildlife Service (USFWS) and the USAF in 1996, 1997, and 2000 (McCaffery and Harwood, 1997). Results of this study documented at least 132 species at the LRRS, on adjacent lands, and in the marine waters surrounding the peninsula. This effort identified 12 species of sea ducks (including spectacled and Steller's eiders and harlequin duck), seven species of cliff-nesting raptors (including rough-legged hawk, peregrine falcon, and gyrfalcon), and 11 species of cliff-nesting seabirds (including various cormorants, gulls, murres, and puffins). Additionally, 40 species of neotropical migrants (from the biogeographical region of the New World, southward from the Tropic of Cancer) and 10 species of paleotropical migrants (from the biogeographical region including the Oriental and Ethiopian regions) were observed throughout the study areas (McCaffery and Harwood, 1997). The varied habitats present around Cape Romanzof including tundra, cliffs, shrubs, and shorelines provide for a large diversity of avifaunal species both native to Alaska and migrant species.

The State of Alaska, Department of Fish and Game (ADFG) maintains a listing of endangered species in Alaska. Currently, five endangered species are identified by ADFG, none of which is known to occur at the Cape Romanzof LRRS. As of 2011, the ADFG no longer maintains a Species of Special Concern list (ADFG, 2012).

The USFWS maintains lists of endangered and threatened species, species proposed for listing, and candidate species for consideration. Nine endangered species and five threatened species are listed by the USFWS. There are three whale species listed as endangered by the USFWS known to be present in the Bering Sea, which may traverse the shoreline near Cape Romanzof; they include the bowhead (*Balaenoptera mysticetus*), fin (*Balaenoptera physalus*) and humpback (*Megaptera novaeangliae*) (USFWS, 2012). The federally listed threatened Steller's eider (*Polysticta stelleri*) and spectacled eider (*Somateria fischeri*) may both be found off the coast in the vicinity of Hooper Bay (USFWS, 2012). Based on the historical mapping of rookeries, it is unlikely that the federally listed endangered western population of Steller sea lions (*Eumetopias jubatus*) would be found in the vicinity of Cape Romanzof (Allen and Angliss, 2009) The Kittlitz's murrelet (*Brachyramphus brevirostris*) is listed by the USFWS as a candidate species, and may occur at Cape Romanzof (ADFG, 2012). Observations during the avifaunal inventory failed to identify this uncommon species despite the presence of suitable habitat and much effort by field researchers (McCaffery and Harwood, 1997).

2.5.6 Subsistence Activities

Subsistence can be defined as "hunting, fishing and gathering for the primary purpose of acquiring traditional food" (Bureau of Land Management [BLM], 2003). Subsistence activities are a culture base and provide a sense of identity to the Inupiat people. Subsistence stores supply not only nutritional value, but are also used for clothing, tools and transportation. Cultural and family ties are preserved through obtaining, sharing and bartering such resources (BLM, 2003).

Residents of nearby Hooper Bay and Scammon Bay participate in subsistence activities in the vicinity of the Lower Camp, at the beach area, and in nearby Kokechik Bay. Subsistence activities include gathering Pacific herring eggs (roe) from eelgrass and kelp in the Bay, fishing near the beach area for resident (tomcod) and migratory species, hunting marine mammals, hunting furbearers and birds on land, and gathering terrestrial vegetation. Additionally, blue mussels and Alaska razor clams are harvested for subsistence in the nearshore area.

2.6 NATURE AND EXTENT OF CONTAMINATION

The 2009 RI focused on four source areas within the Cape Romanzof LRRS that were impacted by chemical contaminants due to past USAF activities. Data from prior studies were reviewed and samples of potentially contaminated media were collected from the following four source areas:

- LF003 (Landfill No. 2);
- SS010 (Spill/Leak No. 4 at the Weather Station Building);
- SS016 (Upper Tram Terminal Area); and
- SS017 (Lower Tram Terminal Area).

These source areas and the relevant COCs and regulatory cleanup levels that apply to the sites are described in the subsections below.

2.6.1 Applicable Cleanup Levels

The State of Alaska has promulgated soil and groundwater cleanup levels in 18 AAC 75 *Oil and Hazardous Substances Pollution Control Regulations* (ADEC, 2012a).

Soil: ADEC 18 AAC 75.340 provides four methods that may be used for developing soil cleanup levels. Method One applies only to petroleum contamination; Method Two applies to both petroleum and non-petroleum contamination and is generally applicable at all contaminated sites in Alaska, unless site-specific Method Three or Method Four cleanup levels are specifically approved; Method Three allows development of site-specific cleanup levels using standard equations provided in ADEC guidance; and Method Four allows development of risk-based cleanup levels from a site-specific risk assessment. Method Two cleanup levels were used for soils at Cape Romanzof LRRS Sites.

Soil: Method Two tabulated soil cleanup levels are provided in 18 AAC 75.341 Tables B1 and B2 (under 40-inch precipitation zone) (ADEC, 2011) (hereafter referred to as ADEC Method Two cleanup levels) for protection of three exposure pathways: migration to groundwater,

outdoor inhalation, and direct contact (ingestion and dermal contact)[1]. The Method Two cleanup levels are protective for unlimited use and unrestricted exposure[2] and are appropriate for use at Cape Romanzof LRRS.

Groundwater: Tabulated groundwater cleanup levels provided in ADEC 18 AAC 75.345 (b)(1) Table C (hereinafter referred to as ADEC Table C cleanup levels) apply to all groundwater in Alaska that is or may be a potential drinking water source and are considered protective for drinking water. ADEC Table C groundwater cleanup levels are appropriate for SS010 groundwater.

Sediments: With respect to cleanup levels, sediments are distinguished from soil by the degree to which they are submerged in water. The substrate in wetlands or streambeds that is submerged more than half of the year is considered sediment; the substrate in areas that are never or only occasionally submerged is considered soil. According to this distinction, the sediment sample locations in LF003 are considered soil, and soil cleanup levels are appropriate for these samples.

Surface Water: ADEC 18 AAC 75.345(f) stipulates that groundwater closely connected hydrologically to nearby surface water may not cause a violation of the water quality standards in 18 AAC 70 for surface water or sediment. Alaska's Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (December 2008) lists the promulgated water quality standards for these substances.

When multiple chemicals are detected at a site, Alaska's contaminated site regulations require evaluating the cumulative risk. Alaska's Cumulative Risk Guidance (ADEC, 2008b) states that the potential for cumulative risk must be evaluated for any chemicals detected above one-tenth of the lowest of the direct contact/ingestion or inhalation Method Two soil cleanup level or Table C groundwater cleanup level. In accordance with ADEC's Cumulative Risk Guidance, bulk hydrocarbons (DRO, GRO, and RRO) are not included in cumulative risk calculations.

To establish compliance with cleanup levels and cumulative risk requirements during the RI/FS, screening levels for soil were established as the lower of Method Two migration to groundwater cleanup levels or one-tenth of the lower of the Method Two direct contact/ingestion or inhalation cleanup levels. Screening levels for groundwater were established as one-tenth of Table C cleanup levels. However, screening levels for bulk hydrocarbons are set at the lowest of the Method Two migration to groundwater, inhalation, or ingestion cleanup levels and Table C groundwater cleanup levels, because bulk hydrocarbons are not included in cumulative risk calculations.

[1] For bulk hydrocarbons (i.e., GRO, DRO, and RRO), Method Two cleanup levels are provided for the migration to groundwater, inhalation, and ingestion pathways. Throughout this ROD, when text refers to both bulk hydrocarbons and individual chemicals, the ingestion and direct contact pathways will be referenced as ingestion/direct contact, where the "ingestion" pathway is applicable to bulk hydrocarbons listed in Table B2, and the "direct contact" pathway is applicable to individual chemicals listed in Table B1.

[2] Method Two soil cleanup levels are considered protective of human health; ecological protectiveness is evaluated on a site-by-site basis. The ecological risk evaluation indicated that contamination from the subject sites has not adversely affected the environment, nor would it be expected to do so in the future.

2.6.2 Landfill No. 2 (LF003)

During a 1989 to 1991 RI/FS, soil, sediment, surface water and groundwater samples were collected at LF003 (USAF, 1991). The findings indicated a presence of total petroleum hydrocarbons (TPH) contamination in soil and sediment, and PCBs with TPH contamination in surface water, generally located in the vicinity of the landfill and associated drainage channels. Groundwater contamination included benzene, toluene, ethylbenzene, and xylenes (BTEX) and volatile organic compounds (VOCs) in monitoring wells upgradient and cross gradient to the landfill.

From 1993 to 1994 site cleanup and capping activities occurred. Debris identified during the 1989 RI/FS work was placed into the landfill and covered with an 18-inch layer of fill, which was compacted. Sheets of impermeable liner and geotextile material were laid over the landfill, then an additional 18 inches of fill was placed over the liners, and finally a seed mixture was applied to the new surface. Additionally, active surface drainage was diverted away from the area (USAF, 1995). In 1994, two monitoring wells were removed and sealed. The area was monitored after rainfalls, and no new leach areas were identified. Old leachate sites were observed to be drying up (USAF, 1995).

Long-term monitoring was conducted from 1996 through 2004, during which time groundwater, surface water, and sediment samples were analyzed. DRO, RRO, VOCs, semi-volatile organic compounds (SVOCs) and metals concentrations exceeded cleanup levels in groundwater, surface water and sediment. PCB concentrations exceeded cleanup levels in surface water and sediment samples during these monitoring events. Historical monitoring results for Cape Romanzof LRRS are illustrated on Figure 2-1.

A limited site investigation was conducted in 2000. Environmental samples were collected at various sites at Cape Romanzof LRRS. Two sets of surface water and associated sediment samples were collected along Fowler (Nilumat) Creek both up and down stream of the drainages running adjacent to LF003. Surface water sample results were non-detect for all constituents. Analytical results of sediment samples indicated the presence of DRO and RRO at both locations. The upstream location had DRO at 23.8 mg/kg and RRO at 91.4 mg/kg, and the downstream location had DRO at 24.8 mg/kg and RRO at 98 mg/kg. PCBs were not analyzed during this effort.

In 2002, an Interim ROD was signed for LF003. The selected remedy in the Interim ROD was landfill closure (with associated capping and LTM of groundwater and effluent), and PCB hotspot removals. Interim remedial action objectives (RAOs) for LF003 were defined for PCBs in surface water at 0.0005 milligrams per liter (mg/L), in accordance with 18 AAC 70 *Water Quality Standards* (ADEC, 2011), and PCBs in sediment at 10 mg/kg, in accordance with 18 AAC 75 *Oil and Other Hazardous Substances Pollution Control* (8 April 2012). These interim RAOs were updated and renamed preliminary RAOs in the 2004 *Environmental Monitoring Report* (USAF, 2005b). These updates incorporated regulatory changes in cleanup levels, and represent the most protective concentrations of human health and the environment. An effort to implement the Interim ROD was undertaken in 2004; however, it was determined that additional delineation was required. This delineation was completed during efforts in 2005 and ultimately during the 2008 RI.

In 2003, the USAF conducted Clean Sweep projects at Cape Romanzof LRRS which included a limited PCB contaminated soil investigation at LF003 (USAF, 2004b). A visual and auditory inspection of the seep thought to be depositing sediments at SD-2 indicated the seep switched from above ground but below a boulder field to underground. Therefore, three sediment samples were collected at LF003, from SD-2, a location approximately 120 ft downstream from SD-2 where the seep was accessible, and from the upgradient drainage ditch. Analytical results indicated PCB concentrations of 60.2 mg/kg at SD-2, and 395 mg/kg at the further downstream location.

In 2004, a focused investigation of surface water and sediments was conducted in the vicinity of SD-2. This effort included grid sampling around SD-2 and interval sampling along the seep to the confluence with Fowler (Nilumat) Creek. In total, results of twenty-eight screening samples directed the collection of eighteen soil samples. Nine samples were collected from the grid established surrounding SD-2, five samples were collected along the seep route, and four samples were collected from seep discharge at Fowler (Nilumat) Creek. Thirteen analytical samples had detections of PCB Aroclor 1260, and nine samples exceeded the regulatory limit of 1 mg/kg in soils. PCB concentrations ranged from non-detect to 195 mg/kg in soils. PCB concentration in surface water exceeded ADEC Table C cleanup levels of 0.0005 mg/L (ADEC, 2012a; 2008a) with results ranging from 0.039 mg/L to 0.079 mg/L. Results of this investigation indicate PCB contamination is present in the vicinity of SD-2, along the seep route down slope towards Fowler (Nilumat) Creek, and one of four sediment samples at Fowler (Nilumat) Creek contained Aroclor 1260 at 0.457 mg/kg (USAF, 2005a).

The site was again investigated in 2008 as part of an RI, to identify areas of contamination, estimate the volume of any impacted soil and sediment, and identify remediation strategies. Two small areas of surface soil with PCB contamination were identified adjacent to the southeast and southwest landfill perimeter. PCB contamination was identified in sediment within a seasonal drainage channel emanating from the northwest toe of the landfill perimeter.

Table 2-3 presents the COCs identified at LF003, the relevant cleanup levels, and complete exposure pathways. The affected media include surface soil, sediment, and surface water. Surface water is contaminated as a result of the contaminated surface soil and sediment. Once contaminated soils are removed surface water will no longer present a risk to human health and the environment. Figures 2-2 show the surface water, sediment and soil contaminant concentrations at Site LF003. Excavation at LF003 will follow the outlined areas of sediment and surface soil exceedances in Figure 2-2 until confirmation samples indicate COCs no longer exceed cleanup levels. LTM of surface water and sediments after remediation may be required to ensure the remedy was affective.

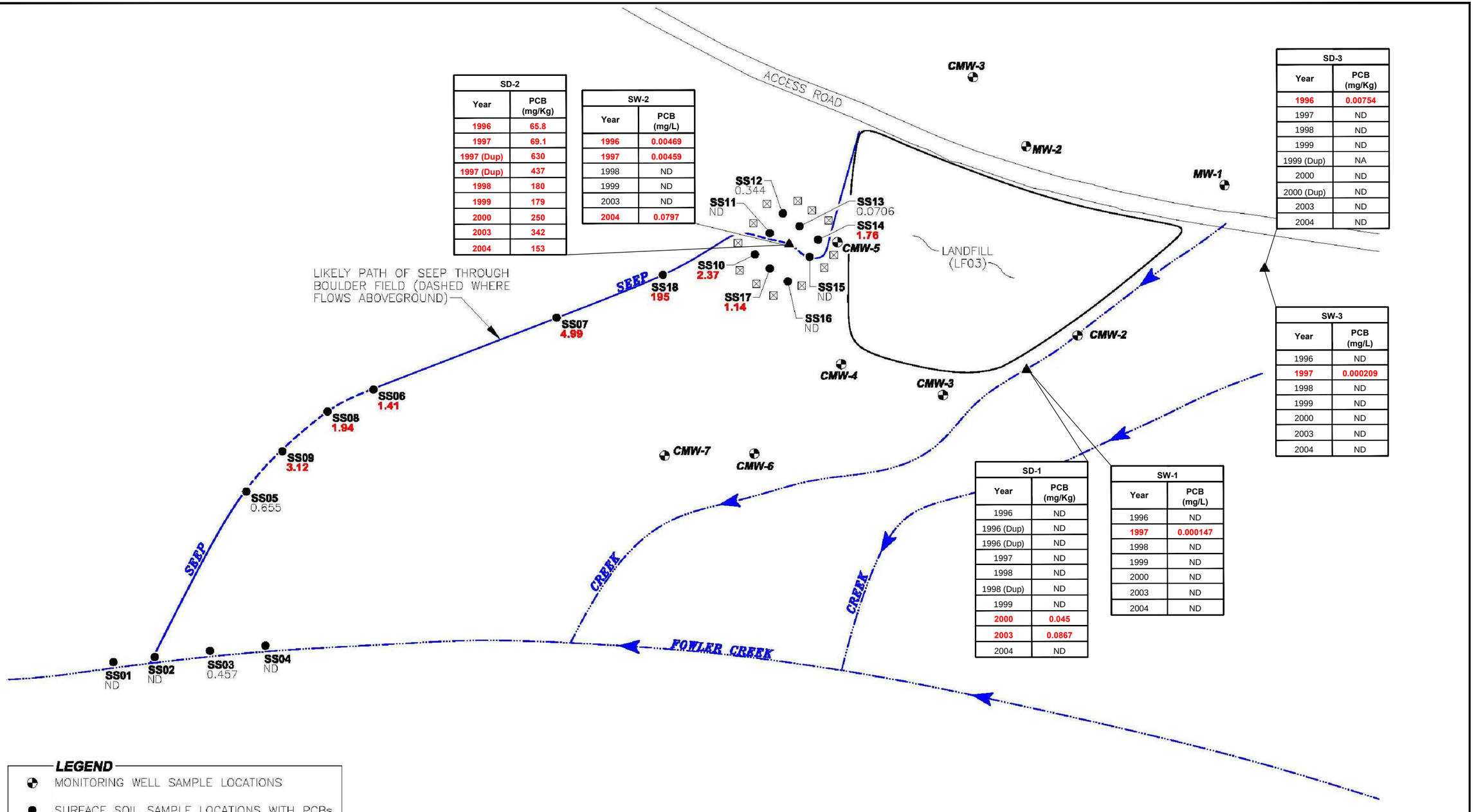
Table 2-3 LF003 Source Area Chemicals of Concern and Relevant Cleanup Levels

Area	Media	Estimated Volume	ARAR[1]	COC	Cleanup Level	Maximum Concen-tration	Complete Exposure Pathways
Six areas near these sample locations: 1) SS-010, 2) SS-014, 3) SS-048, 4) SS-061, 5) SS-024, and 6) SS-075	Surface Soil	1) 37 cy, 2) 29 cy, 3) 67 cy, 4) 8 cy, 5) 8 cy and 6) 78 cy (227 cy total)	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	110 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
Seep at North West Corner of Landfill	Sediment	20 cy	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	230 mg/kg	Dermal absorption; ingestion
Seep at North West Corner of Landfill	Surface Water[2]	Unknown	18 AAC 70.020 and Alaska Water Quality Criteria Manual[2] 18 AAC 75.345 Table C	PCB	0.014 µg/L 0.5 µg/L	79 µg/L	Direct Contact for freshwater aquatic receptors and human health ingestion receptors.

Notes:

[1] 18 AAC 75 Method Two Soil Cleanup Levels, Tables B1 and B2 Under 40-Inch Zone, as amended through April 8, 2012 (18 AAC 75.341).
[2] ADEC, 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. December 12.

AAC	Alaska Administrative Code	cy	cubic yards
ADEC	Alaska Department of Environmental Conservation	mg/kg	milligrams per kilogram
ARAR	applicable or relevant and appropriate requirement	PCB	polychlorinated biphenyls
COC	chemical of concern		



SD-2	
Year	PCB (mg/Kg)
1996	65.8
1997	69.1
1997 (Dup)	630
1997 (Dup)	437
1998	180
1999	179
2000	250
2003	342
2004	153

SW-2	
Year	PCB (mg/L)
1996	0.00469
1997	0.00459
1998	ND
1999	ND
2003	ND
2004	0.0797

SD-3	
Year	PCB (mg/Kg)
1996	0.00754
1997	ND
1998	ND
1999	ND
1999 (Dup)	NA
2000	ND
2000 (Dup)	ND
2003	ND
2004	ND

SW-3	
Year	PCB (mg/L)
1996	ND
1997	0.000209
1998	ND
1999	ND
2000	ND
2003	ND
2004	ND

SD-1	
Year	PCB (mg/Kg)
1996	ND
1996 (Dup)	ND
1996 (Dup)	ND
1997	ND
1998	ND
1998 (Dup)	ND
1999	ND
2000	0.045
2003	0.0867
2004	ND

SW-1	
Year	PCB (mg/L)
1996	ND
1997	0.000147
1998	ND
1999	ND
2000	ND
2003	ND
2004	ND

LEGEND

- MONITORING WELL SAMPLE LOCATIONS
- SURFACE SOIL SAMPLE LOCATIONS WITH PCBs RESULTS IN mg/Kg
- SURFACE WATER/SEDIMENT SAMPLE LOCATIONS
- SCREENING LOCATIONS
- PCBs POLYCHLORINATED BIPHENYLS
- ND NOT DETECTED

NOTE:
BOLD/RED TEXT INDICATES AN EXCEEDANCE OF CLEANUP LEVELS.

N W E S

100 0 50 100
SCALE (FEET)

SOURCE: USAF 2005b – Figure 2–3

DATE: 21 FEB 2013	United States Air Force
PROJ. NO.: 20077.043.159	**LF003**
FILE: see plot stamp	**HISTORICAL RESULTS**
DRAWN BY: SJ	Cape Romanzof LRRS Alaska
	FIGURE 2-1

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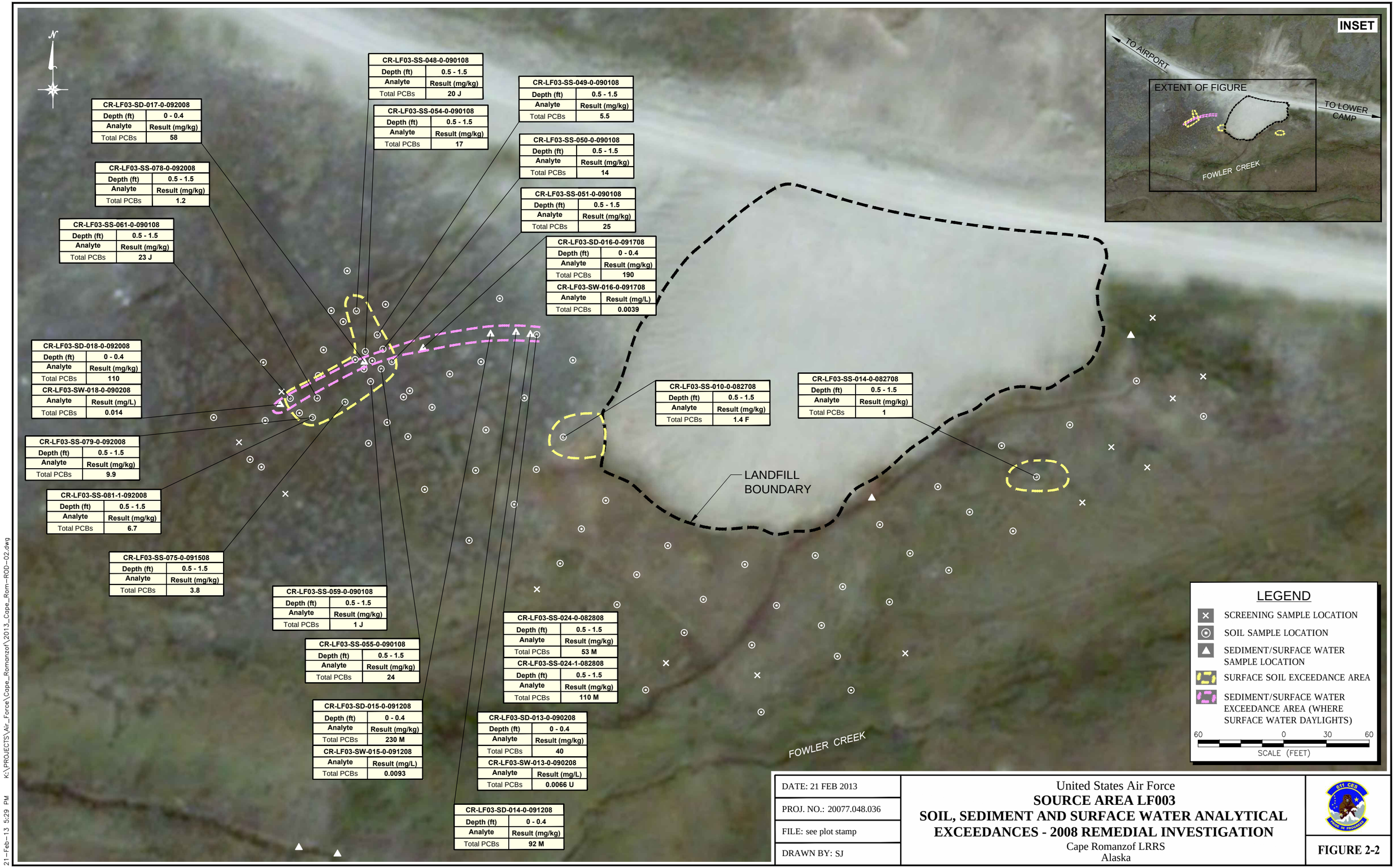

DATE: 21 FEB 2013	United States Air Force
PROJ. NO.: 20077.048.036	**SOURCE AREA LF003**
FILE: see plot stamp	**SOIL, SEDIMENT AND SURFACE WATER ANALYTICAL EXCEEDANCES - 2008 REMEDIAL INVESTIGATION**
DRAWN BY: SJ	Cape Romanzof LRRS Alaska

611 CES
POWER IN PROGRESS

FIGURE 2-2

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2.6.3 Weather Station Building (SS010)

This site was investigated as part of the 1989 RI. An attempt was made to obtain a groundwater sample, but the well (No. 2) was previously abandoned (removed), so no groundwater sample was collected (USAF, 1990). Although fuel storage tanks were reportedly located approximately 200 ft away and downgradient from the well, there was no evidence of contamination. The site was withdrawn from the investigation program (USAF, 1990) and granted No Further Response Action Planned (NFRAP) status by the ADEC in 1993.

In 1990, as part of additional RI/FS activities, a well (No. 3) was constructed and placed 200 ft northeast of the Weather Station Building, uphill and upgradient from the fuel tanks. One groundwater sample was collected and analyzed (USAF, 1992a). BTEX was not detected and TPH was detected at very low levels. Based on these results the site was again granted NFRAP status by the ADEC. In 2006, workers installing an underground utility line reported a strong fuel odor while excavating a trench through the pad near the Weather Station Building. All excavated soil was placed back in the trench and no analytical samples were collected.

The site was again investigated in 2008 as part of an RI, to identify areas of contamination, estimate the volume of any impacted soil, and identify remediation strategies. Two small areas of surface soil with DRO contamination were identified along the utility trench to the Weather Station Building, and southwest of the building in an area generally downgradient of the site during the 2008 RI fieldwork (USAF, 2009a). A larger area of subsurface contamination was also identified at the former location of a 25,000-gallon AST. The RI recommended that the area be considered for in-situ soil treatment or removal and treatment to practical extents.

Groundwater from well No. 2 was reportedly contaminated with fuel oil in 1964 (USAF, 1990); however, the source of contamination was never identified and no quantitative data have ever been successfully collected. No water wells were present in the area during the 2008 RI, and attempts to install groundwater monitoring wells were unsuccessful due to large, subsurface boulders present throughout the site. At this time, only the 1990 RI/FS analytical data exist to assess groundwater quality at SS010. These data indicate that fuel concentrations in groundwater do not likely exceed 18 AAC 75.345 cleanup levels at former Well No. 3. Former Well No. 3 was located approximately 200 ft northwest of the fuel-contaminated area at SS010 and may be of limited value in assessing current groundwater conditions at the site.

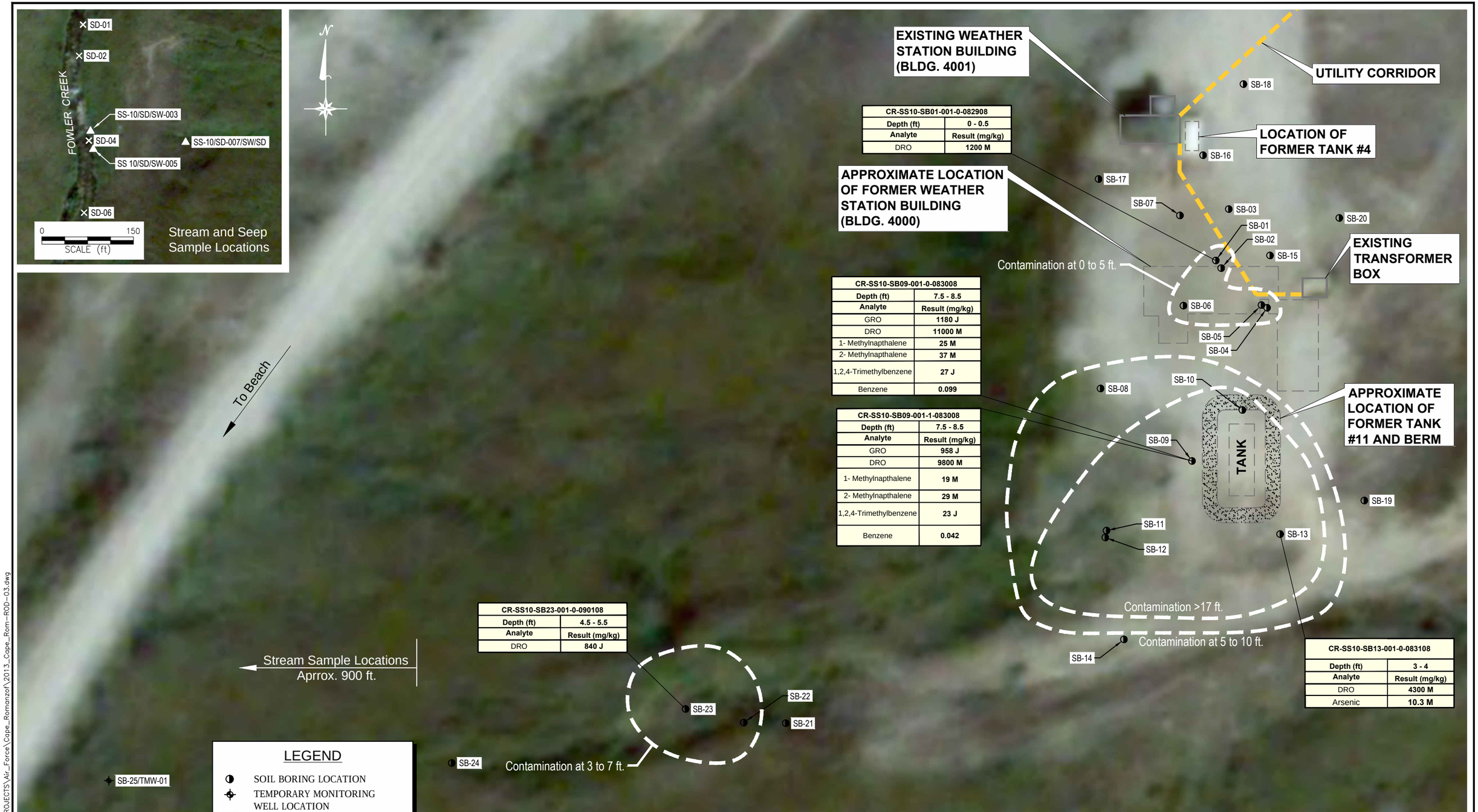
Table 2-4 presents the COCs identified at SS010, the relevant cleanup levels, and complete exposure pathways. The affected media include subsurface soil and groundwater. Refer to Figure 2-3 for locations of monitoring and sampling areas at SS010; groundwater was not sampled during the 2008 RI fieldwork.

Table 2-4 SS010 Chemicals of Concern and Relevant Cleanup Levels

Area	Media	Estimated Volume	ARAR[1,2]	COC	Cleanup Level	Maximum Concen-tration	Complete Exposure Pathways
Near Tank #11 (7-17 feet bgs),	Subsurface Soil	3,518 cy	18 AAC 75 Method Two Cleanup Levels	DRO	10,250 mg/kg	11,000 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
General Area of SS010	Ground-water	Not determined	18 AAC 75.345 Ground-water Cleanup Levels	Fuel (possible GRO, DRO, or RRO)	See Note #2 below	No quantitative data available	Not determined

Notes:
[1] 18 AAC 75 Method Two Soil Cleanup Levels, Tables B1 and B2 Under 40-Inch Zone; as amended through April 8, 2012 (18 AAC 75.341).
[2] For groundwater: 18 AAC 75.345– Table C, Groundwater cleanup levels: 2.2 mg/L for GRO, 1.5 mg/L for DRO, and 1.1 mg/L for RRO.

AAC Alaska Administrative Code
ADEC Alaska Department of Environmental Conservation
ARAR applicable or relevant and appropriate requirement
bgs below ground surface
cy cubic yards
COC chemical of concern
DRO diesel-range organics
GRO gasoline-range organics
mg/kg milligrams per kilogram
mg/L milligrams per liter
RRO residual-range organics



CR-SS10-SB01-001-0-082908	
Depth (ft)	0 - 0.5
Analyte	Result (mg/kg)
DRO	1200 M

CR-SS10-SB09-001-0-083008	
Depth (ft)	7.5 - 8.5
Analyte	Result (mg/kg)
GRO	1180 J
DRO	11000 M
1- Methylnapthalene	25 M
2- Methylnapthalene	37 M
1,2,4-Trimethylbenzene	27 J
Benzene	0.099

CR-SS10-SB09-001-1-083008	
Depth (ft)	7.5 - 8.5
Analyte	Result (mg/kg)
GRO	958 J
DRO	9800 M
1- Methylnapthalene	19 M
2- Methylnapthalene	29 M
1,2,4-Trimethylbenzene	23 J
Benzene	0.042

CR-SS10-SB23-001-0-090108	
Depth (ft)	4.5 - 5.5
Analyte	Result (mg/kg)
DRO	840 J

CR-SS10-SB13-001-0-083108	
Depth (ft)	3 - 4
Analyte	Result (mg/kg)
DRO	4300 M
Arsenic	10.3 M

DATE: 21 FEB 2013	United States Air Force
PROJ. NO.: 20077.043.159	**SOURCE AREA SS010**
FILE: see plot stamp	**SOIL ANALYTICAL EXCEEDANCES**
DRAWN BY: SJ	**2008 REMEDIAL INVESTIGATION**
	Cape Romanzof LRRS
	Alaska
	FIGURE 2-3

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2.6.4 Upper Tram Terminal Area (SS016) and Lower Tram Terminal Area (SS017)

Both Upper and Lower Tram Terminal sites were investigated under a PA/SI in 1999. The purpose of the PA/SI was to determine if petroleum-based lubrication was used on tramway cable. Surface soil sampling was conducted at the Upper and Lower Tram Terminal Areas to determine whether petroleum-based oils caused soil contamination at these sites. PCB contamination appears to be coincident with petroleum contamination at both the Upper (SS016) and Lower (SS017) Tramways. Three areas were identified to have PCB, DRO, and RRO that exceeded cleanup levels (USAF, 2000).

An effort was made in 2002 to conduct a removal of contaminated soils at the Tramway Terminals (USAF, 2003). Contaminated soil was excavated from the Upper Tram Terminal Building (SS016), the Lower Tram Terminal Building (SS017) and the Lower Tram Terminal Waste Disposal Pit. The contaminated soil was disposed of at an off-site disposal facility. Soil samples were collected from the footprint of each excavated area. DRO and PCB detections still exceeded cleanup levels in the three areas. Excavations at all three locations were not backfilled due to the presence of the potentially contaminated sandblast material.

In 2008, RI field activities were conducted at site SS016 in order to identify areas of contamination, estimate volume of impacted soil, and identify remediation strategies. The RI identified seven areas where surface soil exceeds cleanup levels for PCB or lead. The following are the areas where PCBs exceeded cleanup levels: 1) 240 square ft along the south of the facility, east of the entrance to the arctic walkway, 2) 1,787 square ft near the tram docking area, 3) 2,540 square ft near the elevated walkway. Lead was detected above cleanup levels at four locations along the northern wall of the facility.

In 2008, RI field activities were performed at SS017 to determine the extent and nature of remaining surface and subsurface PCB and lead soil contamination. Analytical samples collected at SS017 were analyzed for PCBs and lead only. In this investigation, surface soil was considered to be soil at a depth of 2 ft or less bgs and subsurface soil was considered to be between 2 ft bgs and the surface of the underlying bedrock. Contamination was delineated at these areas both in the surface and subsurface soils.

At SS017, approximately 179 cy of surface soil are estimated to be contaminated with PCBs. An additional 11.7 cy of subsurface soils are estimated to be contaminated with PCBs. In all, a total volume of 190.7 cy of soil (surface and subsurface) are estimated to be contaminated with PCBs at levels greater than 1 part per million (ppm) at SS017. All soils with PCBs at concentrations >50 ppm shall be handled in accordance with the TSCA regulations. The volume of lead contaminated subsurface and surface soil is not determined.

Table 2-5 presents the COCs identified during the 2000 PA/SI and the 2008 RI at SS016 and SS017, along with the relevant cleanup levels and complete exposure pathways. The affected media include surface soil at SS016 and surface and subsurface soil at SS017. Refer to Figures 2-4 and 2-5 for locations of monitoring and sampling areas at SS016 and SS017, respectively.

Table 2-5 SS016 and SS017 Chemicals of Concern and Relevant Cleanup Levels

Area	Media	Estimated Volume	ARAR[1,2]	COC	Cleanup Level	Maximum Concen-tration	Complete Exposure Pathways
SS016							
Three areas: 1) South of facility, 2) Tram docking area, and 3) Elevated walkway	Surface Soil	1) 18 cy, 2) 133 cy, & 3) 188 cy 339 cy total	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	6,600 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
Four areas: SS-009, SS-010, SS-016, and SS-032	Surface Soil	Not determined	18 AAC 75 Method Two Cleanup Levels	Lead	400[3] mg/kg	617 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
Four areas: 1) Tram docking area (near SS-020), 2) elevated access ramp (near SS-013), 3) SS-021, & 4) SS-017	Surface Soil	1) 94 cy, 2) 69 cy, 3) 5.5 cy, & 4) 11 cy 179 cy total	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	68 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
SS-003	Surface Soil	Not determined	18 AAC 75 Method Two Cleanup Levels	Lead	400[3] mg/kg	1,500 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
Three areas: 1) SB-004, 2) SB-005, & 3) SB-007	Sub-surface Soil	1) 5.5 cy, 2) 3.6 cy, & 3) 3.1 cy 11.7 cy total	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	13.6 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
SB-004	Sub-surface Soil	Not determined	18 AAC 75 Method Two Cleanup Levels	Lead	400[3] mg/kg	1,440 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods

Notes:

[1] 18 AAC 75 Method Two Soil Cleanup Levels, Table B1 Under 40-Inch Zone; as amended through April 8, 2012 (18 AAC 75.341).
[2] For groundwater: 18 AAC 75.345 – Table C, Groundwater Cleanup Levels: 2.2 mg/L for GRO, 1.5 mg/L for DRO, and 1.1 mg/L for RRO.
[3] Based on 18 AAC 75.341 Table B1 notes for lead: lead cleanup levels are based on land use; for residential land use, the soil cleanup level is 400 mg/kg; for commercial or industrial land use, as applied in 18 AAC 75.340(e)(3), the soil cleanup level is 800 mg/kg. The more conservative cleanup level will be used to address lead contamination at Cape Romanzof LRRS.

AAC	Alaska Administrative Code	COC	chemical of concern
ARAR	applicable or relevant and appropriate requirement	cy	cubic yards
bgs	below ground surface	mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyls		

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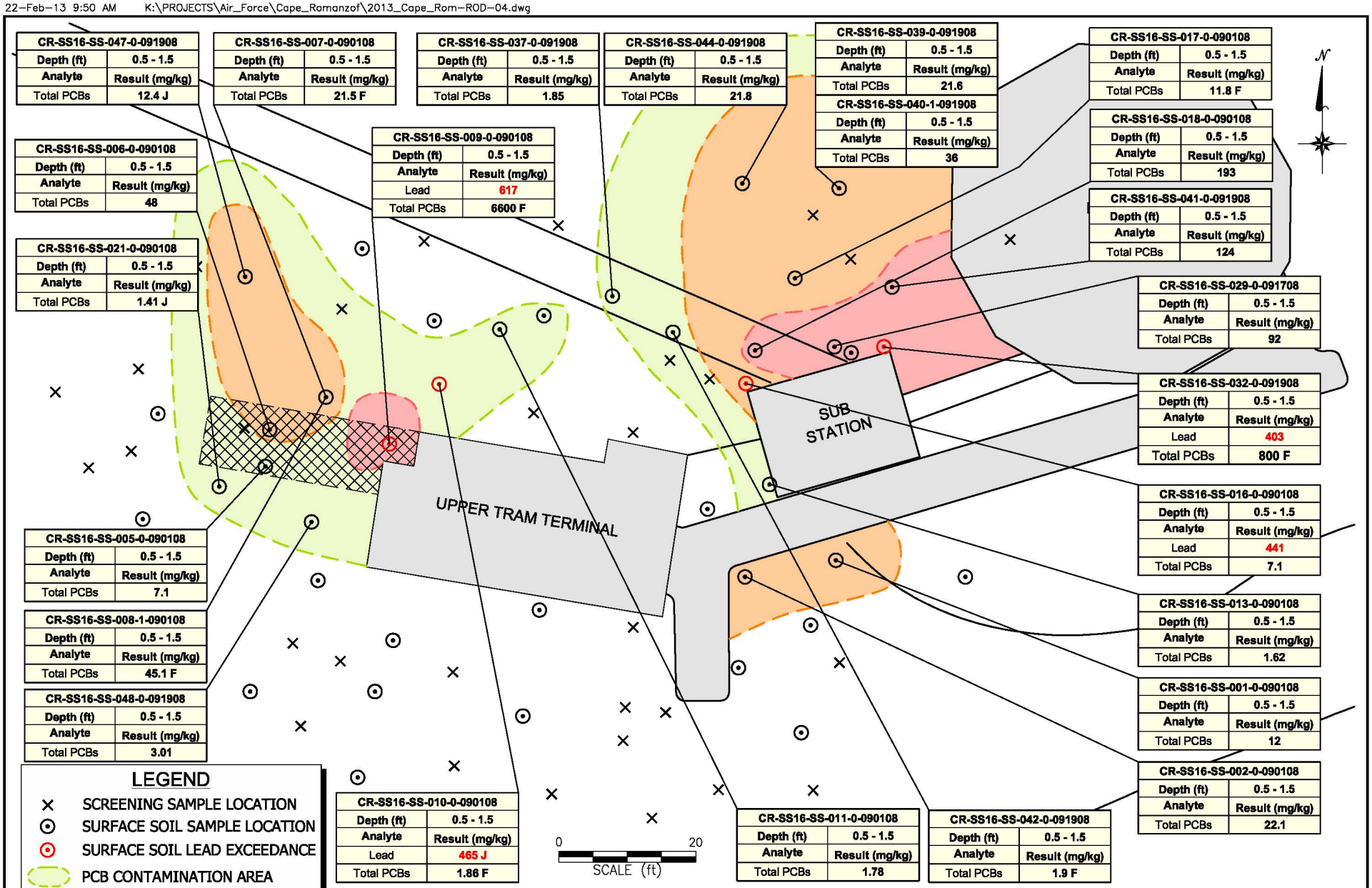

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United States Air Force

SOURCE AREA SS016 - UPPER TRAMWAY TERMINAL SOIL ANALYTICAL EXCEEDANCES 2008 REMEDIAL INVESTIGATION

Cape Romanzof LRRS
Alaska

611 CES PRIDE IN PROGRESS

FIGURE 2-4

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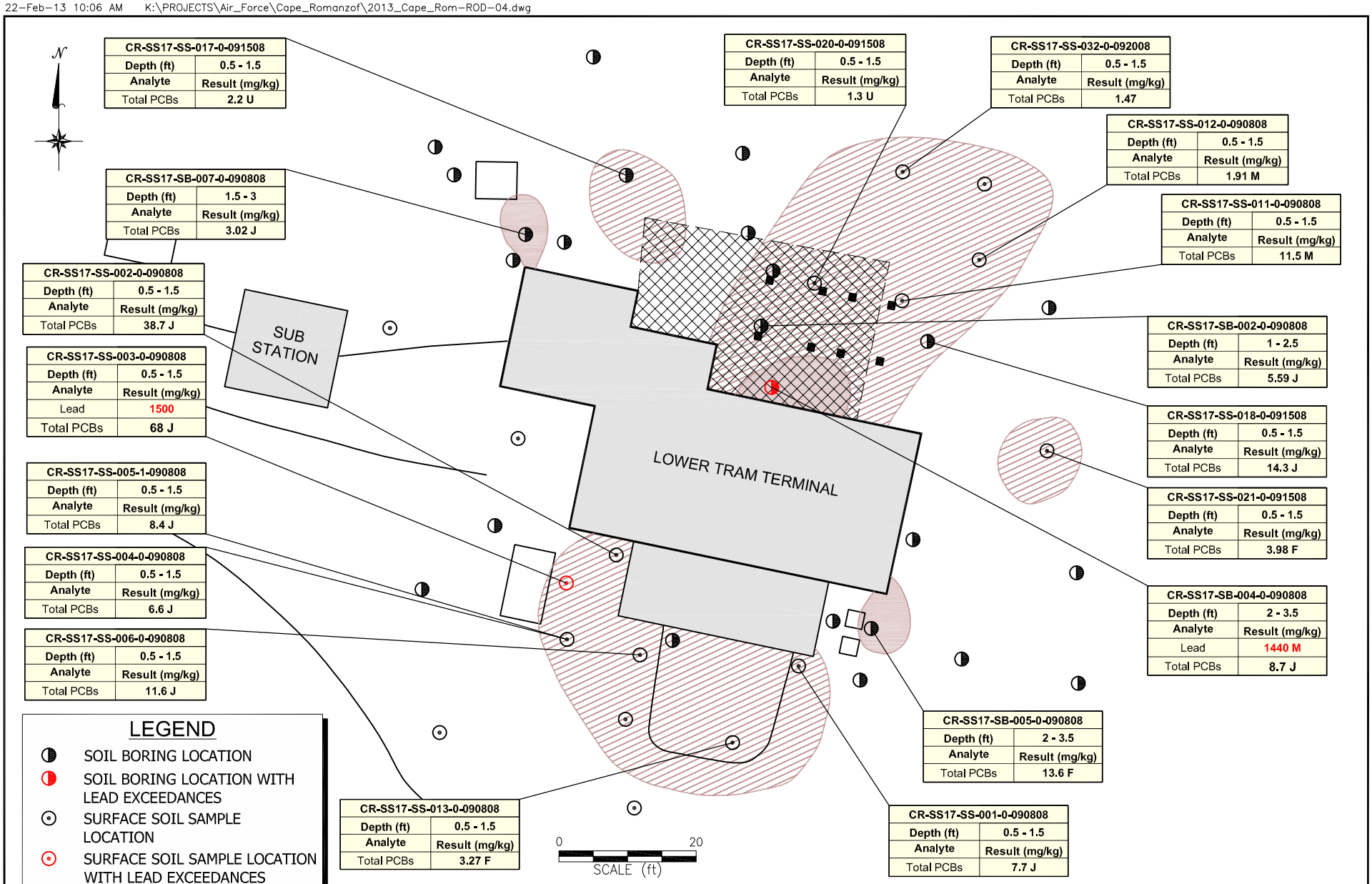

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United States Air Force

SOURCE AREA SS017 - LOWER TRAMWAY TERMINAL
SOIL ANALYTICAL EXCEEDANCES
2008 REMEDIAL INVESTIGATION

Cape Romanzof LRRS
Alaska

FIGURE 2-5

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2.6.5 Conceptual Site Model

As part of the 2009 RI, a Baseline Human Health Risk Assessment (BHHRA) and an Ecological Risk Assessment (ERA) were performed at Cape Romanzof LRRS (USAF, 2009a). From the BHHRA and ERA, conceptual site models (CSMs) were developed to depict the potential human and ecological exposure pathways for LF003, SS010, SS016, and SS017. Exposure pathways are ways in which chemicals may travel to reach a receptor. Examples include exposure due to ingestion of water, inhalation of vapors, and dermal contact with soil. Receptors are the exposed population. Examples include visitors, construction workers, and wildlife. The BHHRA and ERA are summarized in Sections 2.8.3 and 2.8.4, respectively.

The CSMs are included in Appendix A of this ROD. The CSMs illustrate complete and incomplete exposure pathways following ADEC's *Policy Guidance on Developing Conceptual Site Models* (ADEC, 2005). Potential exposure media, complete exposure pathways, and current and future receptors were identified in the CSM.

2.7 CURRENT AND POTENTIAL FUTURE LAND USE AND RESOURCE USES

2.7.1 Land Use

The current land use of LF003, SS010, SS016, and SS017 is industrial use supporting temporary residents. Cape Romanzof LRRS is currently used as an active MARS facility. It contains one residential structure for approximately four year-round workers and additional seasonal workers. There is no road access from nearby villages to Cape Romanzof LRRS; therefore, frequent use by community members is not anticipated. However, members of nearby villages use the surrounding lands and oceans for subsistence purposes.

As the lead agency, the USAF has the authority to determine the future anticipated land use of the sites. The USAF has determined that the most likely future land use of Sites LF003, SS010, SS016, and SS017 over the foreseeable future is the same as the current land use. There are no plans for residential use at Sites LF003, SS010, SS016, and SS017. This determination is based on the assumption that Cape Romanzof will remain in use as an active MARS facility.

The land surrounding Cape Romanzof LRRS is a federally protected environment, the Yukon Delta National Wildlife Refuge. The use of the surrounding land is expected to remain the same for the foreseeable future.

2.7.2 Ground and Surface Water Beneficial Uses

Groundwater is used as the drinking water source for Cape Romanzof LRRS. The water supply well, Well No. 1 at Lower Camp, produces groundwater from confined water-bearing zones at 82 to 102 ft deep and 146 to 148 ft deep. There are no other known groundwater intakes in use within the Cape Romanzof watershed. A groundwater use determination was developed for site SS010 (in accordance with ADEC requirements set forth in 18 AAC 75.350). This determination illustrated that groundwater at SS010 was not a reasonable drinking water source in accordance with the three criteria laid out in 18 AAC 75.350 and is included in Appendix E.

Surface water drainage at Lower Camp is generally by overland flow to intermittently flowing streams feeding into Fowler (Nilumat) Creek, which then flows westward into Kokechik Bay.

Fowler (Nilumat) Creek supports several species of fish, including Dolly Varden and pink salmon. Fowler (Nilumat) Creek is used by Cape Romanzof workers for recreational fishing. Kokechik Bay is used by nearby communities for subsistence purposes.

2.8 SUMMARY OF SITE RISKS

This section summarizes the relevant portions of the BHHRA and ERA that were performed for Cape Romanzof LRRS, and which provide the basis for the remedial action described in this ROD. Based on the results of these assessments, which identify the presence of unacceptable risks to the recreational and subsistence population at Cape Romanzof LRRS, remedial action is being taken to reduce these risks. This section also summarizes the COCs associated with unacceptable site risk, the potentially exposed populations, and exposure pathways of primary concern. A BHHRA and an ERA were performed at all four contaminated source areas during the 2009 RI (USAF, 2009a). The COCs are briefly described in Section 2.8.1. The remainder of this section pertains to the BHHRA and ERA results.

2.8.1 Identification of COCs through Monitoring Events

The chemical-specific screening criteria were the basis for developing chemicals of potential concern (COPCs), evaluating risk, and assessing the need for further action at potentially contaminated sites at the Cape Romanzof LRRS. The primary chemical applicable or relevant and appropriate requirements (ARARs) used for each potentially contaminated medium are presented in Table 2-6. An analyte was considered a COPC if it exceeded the screening criteria and didn't meet ARARs. Compounds identified as COPCs were then evaluated in further detail to determine if they merited classification as a COC. This included a calculation of the cumulative risk following ADEC guidance (ADEC, 2012; 2008a).

Table 2-6 Primary Chemical-Specific ARARs Used to Identify Chemicals of Potential Concern, Evaluate Risk, and Determine the Need for Further Action

Media	Primary Chemical ARAR
Soil (including tundra, beach sands, and gravel pads) and Sediment (from aquatic habitat)	18 AAC 75.341, Tables B1 and B2 (ADEC, 2012a) *Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances* (ADEC, 2008a)
Groundwater	18 AAC 75.345 – Table C, Groundwater cleanup levels (ADEC, 2012a)

Notes:

[1] Soil samples collected from permanent water bodies or ephemeral drainages judged to be viable aquatic habitat were classified as sediment and screened against sediment criteria.
AAC – Alaska Administrative Code
ADEC – Alaska Department of Environmental Conservation
ARAR – applicable or relevant and appropriate requirement

As listed in Table 2-6, the primary soil ARARs used in the identification of COCs were derived from 18 AAC 75.341, specifically Method Two Cleanup Levels for the Under 40-Inch Zone (ADEC, 2012a). (The various ADEC methods for determining cleanup levels at a site are discussed in more detail in Section 2.6.1 – Applicable Cleanup Levels.) Method Two Cleanup Levels for the Under 40-Inch Zone are human health, risk-based cleanup levels based on residential exposure scenarios, assuming a yearly exposure frequency of 200 days. They are

based on a cancer risk management standard of 1 in 100,000 (1×10^{-5}) and a non-carcinogenic risk standard of 1.0, as set forth in 18 AAC 75.325(h). The non-carcinogenic risk standard is referred to as the hazard index (HI). Soils with contaminants below Method Two cleanup levels are considered protective of human health under conditions of long-term exposure in a residential setting.

Method Two Cleanup Levels for the Under 40-Inch Zone exist for "direct contact" and "inhalation" exposure pathways, or in some cases both, depending upon the characteristics of the contaminant. "Direct contact" means the potential exposure pathway to hazardous substances through both ingestion of contaminated soil and dermal absorption of a contaminant in soil. "Inhalation" means a potential exposure pathway due to volatilization of substances in the soil. In screening for COCs and identifying exceedances, the most conservative (lowest) of the two cleanup levels was used.

When applying ADEC Method Two cleanup levels, 18 AAC 75.325(g) states that the cumulative risk from hazardous substances at a site must not exceed ADEC's cumulative carcinogenic risk management standard of 1 in 100,000 and not exceed the cumulative non-carcinogenic HI of 1 across all exposure pathways. Per 18 AAC 75.340(k), a chemical that is detected at one-tenth or more of the Method Two direct contact or inhalation cleanup level must be included when calculating cumulative risk under 18 AAC 75.325(g). Therefore, cumulative risk calculations were performed for soil contamination at a site whenever at least one contaminant was greater than or equal to one-tenth the Method Two soil cleanup level for the Under 40-Inch Zone. The cumulative risk determinations were performed according to the ADEC's *Cumulative Risk Guidance* document (ADEC, 2008b).

Applying Method Two cleanup levels and calculating cumulative risk based on residential exposure scenarios overestimates the current risk and probably the future risk posed by the contaminants at Cape Romanzof LRRS. Cape Romanzof LRRS is currently used as an active MARS facility. The LRRS contains residential structures for four year-round workers and additional seasonal workers. Residential use of the area, which includes subsistence hunting is considered as an upper bound exposure scenario. Therefore, the use of Method Two cleanup levels and the calculation of cumulative risk using residential exposure scenarios are considered conservative and protective screening tools to assess the need for actions at sites within this facility.

Preliminary Remediation Goals (PRGs): PRGs are the numerical concentration goals for the contaminants identified as COCs at a site. These PRGs can be risk-based or ARAR-based values. PRGs for this facility were determined based on complete exposure pathways identified in the RA and resulting CSM for each site, which are included in the 2009 RI. Groundwater cleanup levels, 18 AAC 75.345, Table C, and Method Two soil cleanup levels presented in 18 AAC 75.341, Tables B1 and B2 (ADEC, 2012a) were found to be protective of human health and the environment and were selected as PRGs for contaminated groundwater, surface soil, subsurface soil, and sediment at the site. For the purpose of this ROD, PRGs refer to the numeric cleanup levels presented in 18 AAC 75.

In addition, criteria, advisories, or guidance documents that do not meet the definition of ARARs, but may assist in determining what actions are necessary to be protective or otherwise

useful in developing an appropriate action, are described as information "to be considered" (TBC). TBC criteria are to be used on an "as appropriate" basis and are intended to complement the use of ARARs, not to compete with ARARs. For example, many regulatory agencies issue guidance documents and advisories to assist in compliance with environmental laws and regulations. These guidelines are commonly used to determine cleanup requirements at contaminated sites where specific, enforceable laws or regulations are absent. ERAs and BHHRAs are also commonly employed to help determine appropriate remedial actions.

2.8.2 Summary of Human Health Risk Assessment

The BHHRA 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. This section of the ROD summarizes the approaches used and the results of the BHHRA for this site. The BHHRA is divided into the following sections: identification of COCs (hazard assessment), exposure assessment, toxicity assessment, and risk characterization. Potential risks for both current and future site occupants are discussed. Key assumptions and uncertainties associated with the BHHRA are also identified. The chemicals, exposure pathways, and populations associated with unacceptable risk are highlighted, as they serve as the primary basis for remedial action.

2.8.2.1 Identification of Chemicals of Concern

This section identifies those chemicals (i.e., COCs) associated with unacceptable risk at the site and that are the basis for the proposed remedial action.

The data used in this Risk Assessment were deemed to be of sufficient quality and quantity for their intended use. Table 2-7 presents a summary of the COCs and the related exposure point concentration (EPC – the calculated or assumed concentration of the chemical at the assumed location of exposure) for each of the COCs detected (the concentration that is used to estimate the exposure and risk from each COC in the soil) per contaminated area per matrix. The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the area), the EPC, and how the EPC was derived as well as the screening criteria (concentration above which the chemical is believed to possibly present a risk to human health and the environment and thus require further evaluation). The table indicates that PCBs are the most frequently detected COC in soil and sediment at these four areas. The 95% upper confidence level (UCL) on the arithmetic mean was used as the exposure point concentration for PCBs.

Table 2-7 Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations at LF003, SS010, SS016 and SS017

Media	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Screening Criteria
		Min	Max				
LF003							
Surface Soil	PCBs	0.007	195	mg/kg	70/98	16.4 (95% UCL)	1 mg/kg[2]
Sediment	PCBs	0.0093	230	mg/kg	7/17	163.8 (95% UCL)	1 mg/kg[2]
SS010							
Subsurface Soil	DRO	6.4	11,000	mg/kg	6/28	8,467 (95% UCL)	10,250 mg/kg[2]
Groundwater[1]	GRO	-	-	mg/L	-	-	2.2
Groundwater[1]	DRO	-	-	mg/L	-	-	1.5
Groundwater[1]	RRO	-	-	mg/L	-	-	1.1
SS016							
Surface Soil	PCB	0.028	6,600	mg/kg	47/48	1,573 (95% UCL)	1 mg/kg[2]
Surface Soil	Lead	5.01	617	mg/kg	31/31	204.9 (95% UCL)	400 mg/kg[3]
SS017							
Surface Soil	PCB	0.007	68	mg/kg	50/73	12.99 (95% UCL)	1 mg/kg[2]
Surface Soil	Lead	4.77	1,500	mg/kg	70/70	587.9 (95% UCL)	400 mg/kg[3]
Subsurface Soil	PCB	0.007	68	mg/kg	50/73	20.17 (95% UCL)	1 mg/kg[2]
Subsurface Soil	Lead	4.77	1,500	mg/kg	70/70	252.7 (95% UCL)	400 mg/kg[3]

Notes:

[1] Groundwater sampling at S010 during the 2008 RI fieldwork was not conducted. All attempts to install a groundwater well were unsuccessful due to the subsurface geology at the site. Petroleum contamination of groundwater is suspected due to anecdotal historic evidence (USAF, 2009).

[2] 18 AAC 75 Method Two Cleanup Levels for the Under 40-Inch Zone (ADEC, 2012)

[3] Based on 18 AAC 75.341 Table B1 notes for lead: lead cleanup levels are based on land use; for residential land use, the soil cleanup level is 400 mg/kg; for commercial or industrial land use, as applied in 18 AAC 75.340(e)(3), the soil cleanup level is 800 mg/kg. The more conservative cleanup level will be used to address lead contamination at Cape Romanzof LRRS.

mg/kg milligrams per kilogram
DRO diesel-range organics
GRO gasoline-range organics
PCB polychlorinated biphenyl
RRO residual-range organics
UCL upper confidence level

2.8.2.2 Exposure Assessment

This section documents the populations and exposure pathways that were quantitatively evaluated in the BHHRA. CSMs show complete and incomplete potential human exposure pathways for each of the four contaminant areas. The CSMs identify and evaluate exposure to four receptor groups: current recreational/subsistence user, future residential/subsistence user, future short-term workers, and future long-term workers. Residents of nearby Hooper Bay and Scammon Bay currently participate in subsistence activities in the vicinity of the Lower Camp, at the beach area, and in nearby Kokechik Bay. Future subsistence/residential users are those that may set up residence in the area in the future. Short-term workers are identified as those that may work on short-term projects and would be on the facility less than a year. Long-term workers are identified as those that may work at the site for up to 25 years. Table 2-8 presents potential exposure media, complete exposure routes, and current and future human receptors.

Table 2-8 Potential Exposure Media, Complete Exposure Routes, and Current and Future Receptors

Media	Complete Exposure Routes[1]	Current or Future Receptors			
		Recreational/ Subsistence Users	Residential/ Subsistence User	Short-Term Workers	Long-Term Workers
Soil (Surface / Subsurface)	Incidental Soil Ingestion	Current (C)	Future (F)	C/F	C/F
	Dermal Absorption of Contaminants from Soil	C	F	C/F	C/F
	Inhalation of Airborne Suspended Particles From Surface Soils	C	F	C/F	C/F
Sediment	Incidental Sediment Ingestion	C	F	C/F	C/F
	Dermal Absorption of Contaminants from Sediment	C	F	C/F	C/F
Surface Water	Incidental Water Ingestion	C	F	C/F	C/F
	Dermal Absorption of Contaminants from Water	C	F	C/F	C/F
	Inhalation	C	F	C/F	C/F
Biota	Ingestion of Wild Foods (polychlorinated biphenyls [PCBs] only)	C	F	Incomplete	Incomplete

Notes:

[1] While this list shows all possible complete exposure routes among the four sites, not all exposure routes are complete for all media and all receptors; these vary by site and are presented in detail in the CSMs in Appendix A.

2.8.2.3 Toxicity Assessment

This section describes the carcinogenic and non-carcinogenic toxicity criteria used to calculate the potential risk for each COC. Carcinogenic toxicity is the tendency of a chemical to cause cancer. Non-carcinogenic toxicity includes all other adverse health effects of a chemical. Risk estimates are calculated in the RI for each COC identified at each site using toxicity criteria for ingestion (oral intake, swallowing), inhalation (breathing into the lungs), and dermal (absorption through the skin) routes of exposure.

For carcinogenic COCs, the toxicity criteria is the slope factor, a number which, when multiplied by the daily dose of the chemical, yields the expected incidence of cancer in a population. For example, the PCB dermal contact/ingestion slope factor of 2 $(mg/kg\text{-}day)^{-1}$ multiplied by a daily dose of 0.001 mg/kg-day would yield a cancer incidence of 0.002 which would be 2,000 cancers in a population of 1 million.

For non-carcinogenic chemicals the toxicity criteria is the reference dose (RfD). The RfD is the maximum daily dose of the chemical that is not expected to cause any adverse effect on human health. The RfD is calculated from actual dosing data (experimental animals or humans) by dividing the observed dose that produces no effects by "uncertainty" or "safety" factors that range from 3 to 3,000, depending on the relevance and quality of the study used, to yield a daily dose that has a high certainty of being safe for humans because it is lower than the observed "safe" dose by a factor of 3 to 3,000.

2.8.2.4 Risk Characterization

This section of the BHHRA combines the results of the exposure assessment with the toxicity criteria identified for the COCs and pathways. Carcinogenic risks and non-carcinogenic impacts for each COC are presented for all populations and media of interest, including both current and future land and other resource use settings. Cumulative risks, including all COCs and pathways, for all relevant pathways and populations are also described. These risk estimates are summarized for cancer risk in Table 2-9 and for non-cancer risk in Table 2-10. The results of the BHHRA are interpreted within the context of the CERCLA acceptable risk range.

The major uncertainties affecting the RA are also presented in this section, including uncertainties related to sampling and analysis, environmental fate and transport modeling, the use of default exposure assumptions, and those associated with the toxicity criteria.

For carcinogens, risks are generally expressed as the incremental probability of an individual's likelihood of developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Risk = CDI x SF

Where:

Risk = a unit-less probability (e.g., 2 x 10^{-5}) of an individual's likelihood of developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that usually are expressed in scientific notation (e.g., 1x 10^{-6}). An excess lifetime cancer risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. The USEPA's generally acceptable risk range for site-related exposure is 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000).

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a RfD derived for a similar exposure period. An RfD represents a daily individual intake that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of site-related daily intake to the RfD is called a hazard quotient (HQ).

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where:

CDI = chronic daily intake

RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

An HQ less than or equal to 1 indicates that a receptor's dose of a single contaminant is less than or equal to the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely.

The HI is generated by adding the HQs for all COCs and pathways at a site that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which an individual may reasonably be exposed. An HI less than or equal to 1 indicates that adverse effects are unlikely from additive exposure to site chemicals. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

Table 2-9 Risk Characterization Summary – Carcinogens

Medium	Chemical of Concern	Total Combined Cancer Risk (ingestion, inhalation, and direct contact) by Receptor			
		Adult/Child (recreational/ residential land use direct exposure)	Subsistence User (ingestion of plants/small mammals/fish)	Short-Term Worker	Long-Term Worker
Site LF003					
Surface Soil	PCBs	3.0×10^{-5} (combined adult/child)	3.2×10^{-4} (combined adult/child)	4.6×10^{-7}	1.6×10^{-5}
Sediment	PCBs	6.9×10^{-5} (adult) / 6.9×10^{-5} (child)	0.25644 (adult) / 1.51182 (child)	NA	NA
Site SS016					
Surface Soil	PCBs	1.7×10^{-3} (adult) / 8.2×10^{-4} (child)	1.9×10^{-2} (adult) / 1.1×10^{-2} (child)	4.4×10^{-5}	1.6×10^{-3}
Site SS017					
Surface Soil	PCBs	9.4×10^{-6} (adult) / 6.8×10^{-6} (child)	1.6×10^{-4} (adult) / 9.1×10^{-5} (child)	3.6×10^{-7}	1.3×10^{-5}
Subsurface Soil	PCBs	1.5×10^{-5} (adult) / 1.1×10^{-5} (child)	NA	5.6×10^{-7}	2.0×10^{-5}

Notes:

NA Not applicable
PCB polychlorinated biphenyl

Table 2-10 Risk Characterization Summary – Non-Carcinogens

Medium	Chemical of Concern	Total Combined Non-Cancer HI (ingestion, inhalation, and direct contact) by Receptor			
		Adult/Child (recreational/ residential land use direct exposure)	Subsistence User (ingestion of plants/small mammals/fish)	Short-Term Worker	Long-Term Worker
Site SS010					
Surface Soil	Bulk Hydrocarbon (DRO and GRO)	0.979 (combined adult/child)	0.38 (combined adult/child)	NA	NA

Notes:

[1] Groundwater sampling at SS010 during the 2008 RI fieldwork was not conducted. A groundwater well was installed and failed due to its inability to recharge.

DRO diesel-range organics
GRO gasoline range organics
HI Hazard Index
NA Not applicable

2.8.3 Summary of Ecological Risk Assessment

This section summarizes the approaches and findings of the ERA performed at Cape Romanzof LRRS in conjunction with the 2009 RI (USAF, 2009a). An ERA is used to evaluate the likelihood of adverse ecological effects as a result of exposure to physical (i.e., site cleanup activities) or chemical (release of hazardous substances) stressors, which are defined as physical, chemical, or biological entities that can induce adverse responses at a site. The framework for an ERA consists of three phases (problem formulation, analysis, and risk characterization), with analysis consisting of characterization of exposure and characterization of effects. The purpose for conducting the ERA is to 1) identify and characterize the current and potential threats to the environment from hazardous substance release, 2) evaluate the ecological impacts of alternative remediation strategies, and 3) establish cleanup levels that will protect the natural resources at risk. An ERA is distinctive from a BHHRA in three areas: an ERA can consider effects beyond the individual or species level and may examine a variety of assessment endpoints (i.e., explicit expression of the environmental value, such as a species, habitat type, resource), an entire population, community or ecosystem; the ecological values to be protected are selected from a wide range of possibilities; and ERAs consider nonchemical stressors to the environment (such as loss of wildlife habitat).

2.8.3.1 Identification of Chemicals of Concern

This section identifies those chemicals associated with unacceptable risk at the site and that are the basis for the proposed remedial action. Although other chemicals were detected at the site, these COCs are the primary risk-driving chemicals. The detection frequency, range of detected concentrations, and the EPCs for chemicals and media of concern are all identified.

The 2009 ERA performed for LF003, SS010, SS016, and SS017 found unacceptable ecological risks: PCB contamination present at LF003 in soil, sediment, and surface water; DRO, RRO, and GRO at SS010 in soil; and PCB and lead contamination in soil at SS016 and SS017 exceeded

ecotoxicity screening levels based on food chain exposures. A summary of the ecological COCs and the associated concentrations in soil and sediment at LF003, SS010, SS016, and SS017 are listed in Table 2-11.

Table 2-11 Summary of LF003, SS010, SS016, and SS017 COCs Compared to Ecological Benchmarks (2009 ERA)

Site	Chemical of Concern (COC)	Minimum Conc. (mg/kg)	Maximum Conc. (mg/kg)	Frequency of Detection	USEPA Region 5 ESL	USEPA EcoSSL			
						Plants	Inverte-brates	Birds	Mammals
	Exposure Medium: Soil (Surface and Subsurface)								
LF003	PCBs	0.007	195	70/98	**0.00032 (0.02*)**	**40****	--	--	--
SS010	DRO	6.4	11,000	6/28	**20***	--	--	--	--
	GRO	0.343	1,180	8/28	**20***	--	--	--	--
	RRO	90	390	2/28	**20***	--	--	--	--
SS016	PCB	0.028	6,600	47/48	**0.00032 (0.02*)**	--	--	--	--
	Lead	5.01	617	31/31	**0.0537**	**120**	1,700	**11**	**56**
SS017	PCB	0.007	68	50/73	**0.00032 (0.02*)**	--	--	--	--
	Lead	4.77	1500	73/73	**0.0537**	**120**	1,700	**11**	**56**
	Exposure Medium: Sediment								
LF003	PCBs	0.0093	230	7/17	**0.0598**	--	--	--	--
	Exposure Medium: Surface Water (µg/L)								
LF003	PCBs	0.0709	14	5/17	**0.00012**	--	--	--	--

Notes:

Bold ESL and EcoSSL values were exceeded by the maximum concentration detected at the site.
* USEPA Region 4 soil screening benchmark for gasoline or total PCBs.
** Oak Ridge National Laboratory plant screening benchmark.

COC	chemical of concern
Conc.	concentration
DRO	diesel-range organics
EcoSSL	ecological soil screening level
ESL	ecological screening level
GRO	gasoline-range organics
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
NA	not applicable
PCBs	polychlorinated biphenyls
RRO	residual-range organics
USEPA	United States Environmental Protection Agency

2.8.3.2 Ecological Exposure Assessment

This section of the ERA describes the ecological setting on and near the site and types of habitat present, including any ecologically sensitive areas that have been identified. The key species at the site are identified, including any federal or state designated rare, endangered, or threatened species (refer to Section 2.5.6). Complete exposure pathways and chemical-specific exposure point concentrations for each receptor of interest are also presented. The results of any field

studies that have been conducted, as well as the assumptions, approaches, and results of any exposure modeling are presented.

The 2009 ERA was based on general assessment endpoints that are explicit statements of the ecological values to be protected. Because it is not practical to estimate risks to every species potentially present at the site, one or more indicator species can be selected in association with each assessment endpoint to allow quantitative evaluation of risks. Generally, receptors evaluated for risk are surrogate species for a larger topographic group, population, or community (USAF, 2009a). Table 2-12 lists the surrogate receptor groups used in the Cape Romanzof ERS, along with toxicity reference values (TRVs) and ecological soil screening levels (EcoSSLs) for PCBs. The Ecological CSMs are included in Appendix A.

Table 2-12 Surrogate Receptor Group TRVs and EcoSSLs (2009 ERA)

Surrogate Receptor Group	Toxicity Reference Value (TRV) (mg dw/kg bw-d)		EcoSSL (mg/kg-dw)	
	Low	High	Low	High
Mammalian herbivore (vole)	12	42.7	3,075	10,933
Mammalian ground insectivore (shrew)	12	42.7	7.0	24.8
Mammalian carnivore (weasel)	12	42.7	74.3	264
Mammalian piscivore (river otter)	12	42.7	17.9	63.8
Avian herbivore (dove)	0.06	0.847	2.1	29
Avian ground insectivore (woodcock)	0.06	0.847	0.034	0.47
Avian carnivore (hawk)	0.06	0.847	1.4	19
Avian piscivore (belted kingfisher)	0.06	0.847	0.12	1.7

Notes:

Data from the 2009 RI (USAF, 2009a).
mg/kg milligrams per kilogram
EcoSSL ecological soil screening level
TRV toxicity reference value

2.8.3.3 Ecological Effects Assessment

This section summarizes the results of any toxicity tests or field studies conducted to evaluate adverse ecological effects. In addition, the assessment and measurement endpoints developed for this site are presented.

Few wildlife species in Alaska have been used as test species in toxicity studies. In most cases, toxicity data that are appropriate for direct application as TRVs are not available. Uncertainty factors are applied to allow for extrapolation to appropriate endpoints, exposure durations and indicator species. Therefore, the sources of uncertainty are addressed by applying uncertainty factors. TRVs used and EcoSSLs that were developed for the Cape Romanzof sites are shown in Table 2-12.

2.8.3.4 Summary of Ecological Risk Characterization

This section presents a brief summary of the environmental risks identified at the site and COC concentrations that are expected to protect ecological receptors.

The ERA performed for LF003, SS010, SS016, and SS017 found unacceptable risks associated with Cape Romanzof LRRS. However, this potential risk is limited to a few locations (e.g., hot spots) within each source area, developed areas (e.g., tram docking and maintenance areas, access ramp, and walkways) within source areas SS016 and SS017, and drainage seeps. PCB contamination has not been found in Fowler Creek. Overall, the potential risk to ecological receptors from exposure to chemicals of potential ecological concern (COPECs) is expected to be limited as the forage habitat provided by the source areas is limited.

The risk values presented in the 2009 ERA should not be taken as exact estimates of actual risk because the ERA used extremely conservative assumptions. In addition, quantitative evaluation of ecological risks is limited by uncertainty which could have affected the conclusions of the ERA (USAF, 2009a).

The results suggest that the regulatory cleanup level of 1 mg/kg for PCBs is likely to be protective of the limited ecological receptors present at Cape Romanzof LRRS (USAF, 2009a).

2.8.4 Basis for Action

The response actions selected in this ROD are necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

At LF003 concentrations of PCBs in surface soil and sediment exceed ADEC Method Two cleanup levels. At SS010 concentrations of DRO in soil and GRO, DRO, and RRO in groundwater exceed ADEC Method Two cleanup levels and 18 AAC 75.345 ADEC groundwater cleanup levels. Surface soil concentrations of PCBs and lead at SS016 and surface and subsurface soil PCB and lead concentrations at SS017 exceed ADEC Method Two cleanup levels. Primarily, concentrations of PCBs and lead at Cape Romanzof LRRS above 1.0 mg/kg and 400 mg/kg respectfully pose an unacceptable cancer risk to human health and the environment. For these reasons, the sites warrant remedial action under CERCLA and/or Alaska state law.

2.9 REMEDIAL ACTION OBJECTIVES

RAOs provide a general description of what the cleanup will accomplish. These goals typically serve as the design basis for the remedial alternatives that are presented in Section 2.10. RAOs were established for sites LF003, SS010, SS016, and SS017 in the Cape Romanzof LRRS Initial Screening of Alternatives and Feasibility Study (USAF, 2011).

The RAOs for human health under both CERCLA and Alaska state law are as follows:

- Prevent ingestion of, dermal contact with, inhalation of dust from, and uptake by biota of contaminants from soil, sediment or groundwater containing COC concentrations in excess of PRGs and/or resulting in a cancer risk greater than $1x10^{-5}$ or HI greater than 1 by preventing exposure to soils containing PCBs >1 mg/kg and lead >400 mg/kg.
- Prevent migration of groundwater containing COCs to nearby surface water body (i.e., Fowler Creek) that could result in surface water concentrations in excess of PRGs and/or presenting a cancer risk greater than $1x10^{-5}$ or HI greater than 1 by preventing exposure to groundwater containing GRO >2.2 mg/L, DRO >1.5 mg/L, and RRO >1.1 mg/L.

The RAO for environmental protection under both CERCLA and Alaska state law is as follows:

- Prevent the possible migration of COCs in soil, sediment, or groundwater to surface water resulting in surface water concentrations exceeding Alaska water quality standards.

These RAOs address the risks identified in the RA by setting forth objectives to prevent exposure to COCs in soil, sediment, and groundwater and migration of COCs to surface water. RAOs are protective of human health and the environment.

2.10 DESCRIPTION OF ALTERNATIVES

The remedial alternatives considered for the Cape Romanzof LRRS were developed and evaluated in the 2010 Initial Screening of Alternatives (USAF, 2010) and the Feasibility Study (USAF, 2011) and are summarized in Table 2-13. Each alternative is described in detail in the following subsections. The descriptions include remedy components, common elements and distinguishing features, and expected outcomes.

Table 2-13 Summary of Remedial Alternatives Evaluated for Cape Romanzof LRRS

Alternative Designation	Alternative Description
LF003: Landfill No. 2 (Surface Soil Alternatives)	
LF03SS1	No Action
LF03SS2	Institutional Controls, Engineering Controls, and Containment
LF03SS3	PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls, Engineering Controls, and Containment
LF03SS4	PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal
LF03SS5	PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal
LF03SS6	PCB Soil (≥1 mg/kg): Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal
LF003: Landfill No. 2 (Sediment Alternatives)	
LF03SD1	No Action
LF03SD2	Institutional Controls and Engineering Controls
LF03SD3	Excavation, Off-site Disposal, and Long-Term Monitoring
LF03SD4	Excavation, Ex-Situ Treatment, and On-Site Disposal
SS010: Spill/Leak No. 4 at the Weather Station Building (Subsurface Soil Alternatives)	
SS10SB1	No Action
SS10SB2	Institutional Controls
SS10SB3	Institutional Controls, In-Situ Treatment, and LTM
SS10SB4	Excavation, Ex-Situ Treatment, and On-Site Disposal
SS10SB5	Excavation and Off-Site Disposal
SS010: Spill/Leak No. 4 at the Weather Station Building (Groundwater)	
SS10GW1	No Action
SS10GW2	Institutional Controls, Natural Attenuation, and LTM
SS10GW3	Institutional Controls, In-Situ Treatment, and LTM
SS10GW4	Ex-Situ Treatment and On-Site Disposal
SS016: Upper Tram Terminal Area (Surface Soil Alternatives)	
SS16SS1	No Action
SS16SS2	Institutional Controls, Engineering Controls, and Containment

Table 2-13 Summary of Remedial Alternatives Evaluated for Cape Romanzof LRRS (Continued)

Alternative Designation	Alternative Description
SS16SS3	PCB Soil Hot Spots (≥10 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls and Engineering Controls
SS16SS4	PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-Site Disposal
SS017: Lower Tram Terminal Area (Surface Soil Alternatives)	
SS17SS1	No Action
SS17SS2	Institutional Controls, Engineering Controls, and Containment
SS17SS3	Excavation, Ex-Situ Treatment, and On-Site Disposal
SS17SS4	Excavation and Off-Site Disposal
SS017: Lower Tram Terminal Area (Subsurface Soil Alternatives)	
SS17SB1	No Action
SS17SB2	Institutional Controls and Engineering Controls
SS17SB3	Excavation, Ex-Situ Treatment, and On-Site Disposal
SS17SB4	Excavation and Off-Site Disposal

Notes:

LTM long-term monitoring
mg/kg milligrams per kilogram
PCB polychlorinated biphenyls

2.10.1 Description of Remedy Components

A total of 31 alternatives were developed to address remediation at Cape Romanzof LRRS. This section provides an overview of the components of those alternatives. The major components, as they logically occur in the remediation process, of the alternatives developed for each medium at the sites were developed in the 2010 Initial Screening of Alternatives (USAF, 2010) and presented in the 2012 Proposed Plan (USAF, 2012).

2.10.1.1 Landfill No. 2 (LF003) – Surface Soil Alternatives

The components of the alternatives developed for PCB-contaminated surface soil at LF003 (LF03SS) are summarized in Table 2-14 and described in the following paragraphs.

Table 2-14 LF003 Surface Soil Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives					
			LF03SS1	LF03SS2	LF03SS3	LF03SS4	LF03SS5	LF03SS6
No action	None	No action	X					
Institutional controls	Property law mechanisms	Property records		X	X		X	
Engineering controls	Physical access restrictions	Signs		X	X		X	

Table 2-14 LF003 Surface Soil Alternatives Components (Continued)

General Response Actions	Remedial Technology	Process Options	Alternatives					
			LF03SS1	LF03SS2	LF03SS3	LF03SS4	LF03SS5	LF03SS6
Containment	Capping	Soil, asphalt, gravel, or multi-layer		X	X			
Excavation	Shallow excavation (<30 ft)	Backhoe or front end loader			X	X	X	X
Ex-situ treatment	Thermal treatment	High temperature incineration or thermal desorption				X		
Disposal	On-site/off-site disposal	Backfill/ landfill			X	X	X	X

Notes:

Refer to Table 2-13 for description of alternatives (LF03SS1, etc.).

- **Alternative LF03SS1 – No Action**

The no-action alternative is required to be evaluated under NCP as a baseline condition. In this alternative, no action would be taken to remediate surface soil at LF003. Soil contaminated with PCBs above cleanup levels protective of human health and the environment (≥1 mg/kg) would remain on-site, likely remaining a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions.

- **Alternative LF03SS2 – Institutional Controls, Engineering Controls, and Containment**

In this alternative, a soil cap would be placed over all surface soil contaminated with PCBs at concentrations above cleanup levels protective of human health and the environment. The purpose of the cap would be to prevent direct contact with the contaminated soil. Signs would be erected where surface soil is located at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated surface soil is present and that contact or intrusive soil activities should be avoided. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Periodic site inspections would be performed to check the condition of the cap and signs; maintenance would be completed as needed.

- **Alternative LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and ≤10 mg/kg): Institutional Controls, Engineering Controls and Containment**

In accordance with ADEC regulations, soils with PCB concentrations greater than 10 mg/kg would need to be removed, and remaining impacted soils would require a cap and ICs. Removal of soils adjacent to the seep and sediments at the same time would meet ADEC regulations as well. This alternative proposes two actions, depending on the level of contamination, to be executed together:

– Surface soil with concentrations of PCBs ≥10 mg/kg would be excavated, properly containerized, loaded onto barges, and shipped off-site to a commercially operated landfill permitted to accept PCB-contaminated waste for disposal. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

– Surface soil at LF003 with concentrations of PCBs ≥1 mg/kg and <10 mg/kg would be capped with soil. The purpose of the cap would be to prevent direct contact with the contaminated soil (to protect human health and the environment) and to reduce the off-site leaching of contaminants.

Surface water runoff channels currently flow along the sides of the landfill. The long-term effectiveness of the containment cap could be compromised by potential surface water erosion. Therefore, surface controls, such as eroded soil control barriers, would be used to prevent the offsite migration of run-off water that may contain contaminated sediment. Signs would be erected at the property and around the capped areas to provide notification of the presence of contamination and to warn against intrusive activities. Potential environmental impacts caused by erosion from excavation and construction could be mitigated by revegetating the area. Periodic site inspections would be performed to check the condition of the cap and signs; maintenance would be completed as needed.

- **Alternative LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal**

In this alternative, surface soil where contaminants are present above cleanup levels protective of human health and the environment (1 mg/kg) would be excavated and treated on-site using high temperature incineration to destroy PCB contamination. The treated soil would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reach the cleanup level, the soil would be disposed of on-site. Soil from a local borrow source would be used to backfill the excavation. Cap inspections and maintenance will be required annually for the first five years along with a five-year review at which time the frequency inspections and reports may be reduced.

- **Alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal**

In this alternative, surface soil within source area LF003, where PCBs are present above 1 mg/kg (above cleanup levels protective of human health and the environment), would be excavated and disposed off-site at a commercially operated landfill permitted to accept PCB-contaminated waste. The soil would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill for disposal. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation. Cap inspections and maintenance will be required annually for the first five years along with a five-year review at which time the frequency inspections and reports may be reduced.

- **Alternative LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal**

In this alternative, the entire landfill (debris and any contaminated soil and sediment within the landfill) would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill permitted to accept PCB-contaminated waste for disposal.

The removal of the entire contents of the landfill would remove the suspected source of the PCB contamination in LF003 area soils, sediment, and surface water. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

2.10.1.2 Landfill No. 2 (LF003) – Sediment Alternatives

The components of the alternatives developed for PCB-contaminated sediment at LF003 (LF03SD) are summarized in Table 2-15 and described in the following paragraphs.

Table 2-15 LF003 Sediment Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives			
			LF03SD1	LF03SD2	LF03SD3	LF03SD4
No Action	None	No action	X			
Institutional Controls	Property law mechanisms	Property records		X	X	
Engineering Controls	Physical access restrictions	Signs		X	X	
Containment	Capping	Soil, asphalt, gravel, or multi-layer				
Excavation	Shallow excavation (<30 ft.)	Backhoe or front end loader			X	X
Ex-situ treatment	Thermal treatment	High temperature incineration or thermal desorption				X
Disposal	On-site/off-site disposal	Backfill/landfill			X	X

Notes:

Refer to Table 2-13 for a brief description of alternatives (LF03SD1, etc.).

- **Alternative LF03SD1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate sediment at Source Area LF003. Sediment contamination with PCBs above cleanup levels protective of human health and the environment (≥1 mg/kg) would remain on-site. Sediment contaminated with PCBs would likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

- **Alternative LF03SD2 – Institutional Controls and Engineering Controls**

In this alternative, signs would be erected where sediment is located at concentrations above cleanup levels protective of human health and the environment (1 mg/kg). The signs would warn that contaminated sediment is present and that contact or intrusive soil activities should be avoided. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Additionally, surface controls such as sediment control barriers, would be used to prevent the off-site migration of contaminated sediments or run-off possibly containing contaminated sediment to the surface water that flows around the landfill or surface water further away (Fowler Creek).

Periodic site inspections would be performed to check the condition of the signs and sediment control barriers; maintenance would be completed as needed. Sediment contaminated with PCBs above cleanup levels protective of human health and the environment would remain on site.

- **Alternative LF03SD3 – Excavation, Off-Site Disposal, and Long-Term Monitoring**

In this alternative, sediment within source area LF003 where PCBs are present above cleanup levels protective of human health and the environment (1 mg/kg) would be excavated and disposed off-site at a landfill permitted to accept PCB-contaminated sediment. The sediment would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill for disposal. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

In addition, eroded soil control barriers would be constructed on-site to prevent the off-site migration of runoff water that may contain contaminated sediment in order to protect the surface water that flows around the landfill and further away (Fowler Creek). While the excavation would remove the sediment currently present, it may not remove the source of the PCBs, which is thought to be the landfill itself. Therefore, it is possible that contaminated sediment could migrate from the landfill or other unknown source over time via the seep and into the surface water near the toe of the landfill. Periodic maintenance would be required to remove collected sediment, which would be analyzed to check for PCB contamination and collected and disposed of in accordance with applicable regulations. A notice would be placed on the property records to notify current and potential owners of the presence of the sediment control measures and signs would be placed at the site to alert personnel that PCB-contaminated sediment may be present at the sediment control barriers.

Over time, it is expected that as the PCBs continue to leach from the source area, the concentrations found in the sediment will decrease as the source concentrations decrease. When PCB concentrations in sediment migrating from the source and captured by eroded soil control barriers are determined to meet applicable cleanup levels, the eroded soil control barriers will be removed and monitoring will be discontinued.

- **Alternative LF03SD4 – Excavation, Ex-Situ Treatment, and On-Site Disposal**

In this alternative, sediment contaminated with PCBs above cleanup levels (1 mg/kg) would be excavated. Excavated sediment containing PCBs would be treated on-site using high temperature

incineration to destroy the PCBs. The treated sediment would be sampled and analyzed to confirm the technology is working. When the samples meet the cleanup level, the treated sediment would be dried and used to backfill the area. In addition, eroded soil control barriers would be placed permanently on site to prevent the offsite migration of run-off water that may contain contaminated sediment in order to protect the surface water around the toe of the landfill and further away (Fowler Creek). As described for Alternative LF03SD3, contaminated sediment may continue to migrate from the source area via the seep. Periodic maintenance would be required to remove collected sediment, which would be analyzed to check for PCB contamination levels and collected and disposed of (or treated) if it exceeded clean up levels. Over time, it is expected that as the PCBs continue to migrate from the source area, the concentrations of PCBs found in the sediment will eventually decrease as the source concentrations decrease.

2.10.1.3 Spill/Leak No. 4 at the Weather Station Building (SS010) – Subsurface Soil Alternatives

The components of the alternatives developed under State of Alaska laws and regulations for DRO-contaminated subsurface soil at SS010 (SS10SB) are summarized in Table 2-16 and described in the following paragraphs.

Table 2-16 SS010 Subsurface Soil Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives				
			SS10SB1	SS10SB2	SS10SB3	SS10SB4	SS10SB5
No action	None	No action	X				
Institutional controls	Property law mechanisms	Property records		X	X		
Excavation	Shallow excavation (<30 ft.)	Backhoe or front end loader				X	X
Ex-situ treatment	Biological treatment	Biopiles or land spreading				X	
Disposal	On-site/off-site disposal	Backfill/landfill				X	X
In-situ treatment	Biological	Enhanced bioremediation			X		

Notes:
Refer to Table 2-13 for description of alternatives (SS10SB1, etc.).

- **Alternative SS10SB1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate subsurface soil at Source Area SS010. Subsurface soil contaminated with DRO above cleanup levels protective of human health and the environment would remain on-site. Contaminated soil would likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

- **Alternative SS10SB2 – Institutional Controls**

In this alternative, notations regarding residual contamination and land use restrictions (such as, restriction on future excavation; dig permit and work clearance request / approval forms will be required, and approval from ADEC on work plans prior to future excavation or off-site movement of soil) will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. Subsurface soil contaminated above cleanup levels protective of human health and the environment would remain on site. However, over time, natural degradation (attenuation) of the contaminants will likely occur. Without LTM, which is not proposed under this alternative, there is no way to determine whether or not the DRO contamination has degraded to below cleanup levels. Future analysis of subsurface soil would likely be required for site closure.

- **Alternative SS10SB3 – Institutional Controls, In-Situ Treatment, and LTM**

In this alternative, subsurface soil within the SS010 source area where contaminants are present above cleanup levels protective of human health and the environment would be treated in-situ using enhanced bioremediation. Notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

Soil sample collection and analysis (LTM) would occur periodically to ensure effectiveness of the treatment.

- **Alternative SS10SB4 – Excavation, Ex-Situ Treatment, and On-Site Disposal**

In this alternative, subsurface soil within source area SS010 that is contaminated above cleanup levels protective of human health and the environment would be excavated, and then treated biologically (land spreading). This alternative would remediate as much soil as possible/practical. The treated soil would be sampled and analyzed to confirm treatment goals were met, after which time the soil would then be used to backfill the excavation or disposed on-site.

- **Alternative SS10SB5 – Excavation and Off-Site Disposal**

In this alternative, all subsurface soil in Source Area SS010 that is contaminated above cleanup levels protective of human health and the environment would be excavated, loaded onto barges, and disposed off-site at a landfill permitted to accept fuel-contaminated soil. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

2.10.1.4 Spill/Leak No. 4 at the Weather Station Building (SS010) – Groundwater Alternatives

The components of the alternatives developed for potentially fuel-contaminated groundwater at SS010 (SS10GW) are summarized in Table 2-17 and described in the following paragraphs.

Table 2-17 SS010 Groundwater Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives			
			SS10GW1	SS10GW2	SS10GW3	SS10GW4
No action	None	No action	X			
Institutional controls	Property law mechanisms	Property records		X	X	
In-situ treatment	Biological treatment	Enhanced bioremediation			X	
Ex-situ treatment	Physical treatment	Pump and treat				X
		Granulated activated carbon (GAC)/ liquid phase carbon adsorption				X
Collection/ discharge	On-site discharge	Discharge to ground surface				X

Notes:

Refer to Table 2-13 for description of alternatives (SS10GW1, etc.).
GAC granulated activated carbon

- **Alternative SS10GW1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate groundwater at the fuel-contaminated areas within Source Area SS010. Contaminated groundwater would remain in place and be left to naturally degrade with no enhancements or follow-up monitoring.

- **Alternative SS10GW2 – Institutional Controls, Natural Attenuation and LTM**

In this alternative, potentially contaminated groundwater would remain on-site. However, over time, natural degradation (attenuation) of the contaminants is expected to occur and LTM would be conducted to provide data necessary to determine when the contamination is below cleanup levels. Notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. As part of the update to the Base Master Plan, the USAF will produce maps showing locations of residual contamination.

Three monitoring wells would be installed, one at the source area and two downgradient of the contaminated subsurface soil, so that groundwater could be sampled and analyzed to determine if contamination migrates from the site. The subsurface soil is suspected to be the potential source of any contamination in area groundwater. The ultimate goal is to prevent contamination from migrating to surface water (Fowler Creek) via groundwater. In the event that groundwater contamination is discovered, potential risk to surface water quality at Fowler Creek would be assessed and, if necessary, remedial action would be taken. If contaminants are discovered at concentrations above cleanup levels, but groundwater contamination does not pose an unacceptable risk to surface water quality at Fowler Creek, periodic sampling and analysis of groundwater in the monitoring wells (LTM) would be performed at the site to assess changes in groundwater contaminant concentrations over time. Additionally, the seeps and sediments

adjacent to Fowler Creek (downgradient of the site) would be monitored to ensure that contamination does not reach this water body. When contaminant concentrations meet cleanup levels, monitoring would be ceased and ICs would be removed.

- **Alternative SS10GW3 – Institutional Controls, In-Situ Treatment, and LTM**

In this alternative, groundwater within source area SS010 with contaminants above cleanup levels would be treated in-situ using bioremediation. The enhanced bioremediation process would include the injection of a chemical oxygen releaser directly into contaminated groundwater. The oxygen releaser would provide oxygen gradually over time promoting the degradation of hydrocarbons by naturally occurring microbes. This alternative would likely be in place for an extended period of time, requiring multiple treatment applications. Confirmation monitoring (LTM) would be performed at the site to determine when contaminant concentrations have met cleanup levels.

- **Alternative SS10GW4 – Ex-Situ Treatment and On-Site Disposal**

In this alternative, groundwater within source area SS010 with contaminants above cleanup levels would be treated ex-situ using pump and treat and granulated activated carbon (GAC) technology. The treated water would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reach the cleanup level, the clean water would be discharged to the ground surface away from the source area.

2.10.1.5 Upper Tram Terminal Area (SS016) – Surface Soil Alternatives

The components of the alternatives developed for PCB and Lead-contaminated surface soil at SS016 (SS16SS) are summarized in Table 2-18 and described in the following paragraphs.

Table 2-18 SS016 Surface Soil Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives			
			SS16SS1	SS16SS2	SS16SS3	SS16SS4
No action	None	No action	X			
Institutional controls	Property law mechanisms	Property records		X	X	X
Engineering controls	Physical access restrictions	Signs		X	X	X
Containment	Capping	Soil, asphalt, gravel, or multi-layer		X		X
Excavation	Shallow excavation (<30 ft)	Backhoe or front end loader			X	
Ex-situ treatment	Physical Treatment	Soil washing			X	
Disposal	On-site/off-site disposal	Backfill/landfill			X	X

Notes:
Refer to Table 2-13 for description of alternatives (SS16SS1, etc.).

- **Alternative SS16SS1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate surface soil at Source Area SS016. Soil contaminated with PCBs above cleanup levels protective of human health and the environment (≥1 mg/kg for unlimited land use) would remain on-site. Soil contaminated with PCBs would likely remain a risk for the foreseeable future. No monitoring would be performed at this facility to assess site conditions over time.

- **Alternative SS16SS2 – Institutional Controls, Engineering Controls, and Containment**

In this alternative, a cap would be placed over surface soil contaminated with PCBs and Lead at concentrations above cleanup levels protective of human health and the environment (≥1 mg/kg and 400 mg/kg respectfully for unlimited land use). Given the steep, boulder-covered exposed slope at this site, gravel is the preferred type of cap to install; asphalt would be too labor- and equipment-intensive for such a remote area and soil would be blown away by the wind; however, large rock or shot-crete may also be feasible cap cover material. The purpose of the cap would be to prevent direct contact with the contaminated soil. Surface controls, such as eroded soil control barriers, would be used to prevent the offsite migration of runoff water that may contain contaminated soil. Additionally, signs would be erected at the location where surface soil is located at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated surface soil is present and that contact or intrusive soil activities should be avoided. Notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

Periodic site inspections would be performed to check the condition of the cap and signs; maintenance would be completed as needed.

- **Alternative SS16SS3 – PCB Soil Hot Spots (≥10 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls and Engineering Controls**

In accordance with ADEC regulations, soils with PCB concentrations greater than 10 mg/kg (above cleanup levels protective of human health and the environment) would need to be removed, and remaining impacted soils would require a cap and ICs. This alternative proposes two actions, depending on the level of contamination, to be executed together:

– Surface soil at SS016 with "hot spots" of concentrations of PCBs ≥10 mg/kg would be excavated. Three of the four lead-contaminated soil areas are located within these hot spots, and would be excavated along with the PCB soil. This excavated soil would then be treated ex-situ by soil washing. The treated soil would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reach the cleanup level, the soil would be disposed of on-site as clean fill. Soil from a local borrow source would be used to backfill the excavation.
– Surface soil at SS016 with concentrations of PCBs ≥1 and <10 mg/kg would be left in place (untreated) and not excavated due to the safety hazards intrinsic in attempting cleanup

activities near or along the steep, boulder-covered slope at this source area. The remaining area of lead-contaminated soil is located within one of the areas of PCB soil ≥1 and <10 mg/kg. Surface controls, such as eroded soil control barriers, would be used to prevent the offsite migration of run-off water that may contain contaminated soil. In addition, signs would be erected at these areas. The signs would warn that contaminated surface soil is present and that contact or intrusive soil activities should be avoided. Notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

Periodic site inspections would be performed to check the condition of the signs; maintenance would be completed as needed.

- **Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-Site Disposal**

In this alternative, surface soil with PCB concentrations ≥1 mg/kg would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill that is permitted to accept PCB-contaminated waste for disposal. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

All lead-contaminated soil areas are located within the PCB-contaminated areas and would be excavated with the PCB-contaminated soil. Confirmation sampling would include analysis for PCBs and lead to confirm that all soil with PCB and lead concentrations exceeding the cleanup level was removed.

Once confirmation sampling assures that all PCB-contaminated soil ≥1 mg/kg has been removed and disposed, the site will be recommended for closure. Because this site is located within an area comprised of large boulders and is on a steep slope, which could result in areas where PCB soil ≥1 mg/kg is left in place due to safety or logistical issues associated with removal. If this is the case, areas where soil with PCBs ≥1 mg/kg would be capped with clean soil/gravel and warning signs indicating the presence of PCBs would be erected. Notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

Periodic maintenance of the signs and cap would be performed as long as soil concentrations remain above 1 mg/kg.

2.10.1.6 Lower Tram Terminal Area (SS017) – Surface Soil Alternatives

The components of the alternatives developed for PCB- and lead-contaminated surface soil at SS017 (SS17SS) are summarized in Table 2-19 and described in the following paragraphs.

Table 2-19 SS017 Surface Soil Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives			
			SS17SS1	SS17SS2	SS17SS3	SS17SS4
No action	None	No action	X			
Institutional controls	Property law mechanisms	Property records		X		
Engineering controls	Physical access restrictions	Signs		X		
Containment	Capping	Soil, asphalt, gravel, or multi-layer		X		
	Surface water controls	Eroded soil control barriers		X		
Excavation	Shallow excavation (<30 ft.)	Backhoe or front end loader			X	X
Ex-situ treatment	Physical Treatment	Soil washing			X	
Disposal	On-site/off-site disposal	Backfill/landfill			X	X

Notes:
Refer to Table 2-13 for description of alternatives (SS17SS1, etc.).

- **Alternative SS17SS1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate surface soil at Source Area SS017. Soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment would remain on-site. Soil contaminated with PCBs and lead would likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

- **Alternative SS17SS2 – Institutional Controls, Engineering Controls, and Containment**

In this alternative, a soil cap would be placed over surface soil contaminated with PCBs and lead at concentrations above cleanup levels protective of human health and the environment. The purpose of the cap would be to prevent direct contact with the contaminated soil. Surface controls, such as eroded soil control barriers, would be used to prevent the off-site migration of runoff water that may contain contaminated sediment. Signs would be erected where surface soil is located at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated surface soil is present and that contact or intrusive soil activities should be avoided. Notations regarding residual contamination and land use restrictions would be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. Potential environmental impacts caused by erosion from construction could be mitigated by revegetating the area. Periodic site inspections would be performed to check the condition of the cap and signs; maintenance would be completed as needed.

- **Alternative SS17SS3 – Excavation, Ex-Situ Treatment, and On-Site Disposal**

In this alternative, surface soil within source area SS017 where PCB and lead contamination are present above cleanup levels protective of human health and the environment would be excavated and treated on-site using soil washing technology to treat the PCBs and lead. The treated soil would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reach the cleanup level, the soil would be disposed of on-site as clean fill. Soil from a local borrow source may also be used to backfill the excavation.

- **Alternative SS17SS4 – Excavation and Off-Site Disposal**

In this alternative, surface soil within source area SS017 with PCBs and lead contamination present above cleanup levels protective of human health and the environment would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill permitted to accept PCB-contaminated waste. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Soil from a local borrow source would be used to backfill the excavation.

2.10.1.7 Lower Tram Terminal Area (SS017) – Subsurface Soil Alternatives

The components of the alternatives developed for PCB-contaminated subsurface soil at SS017 (SS17SB) are summarized in Table 2-20 and described in the following paragraphs.

Table 2-20 SS017 Subsurface Soil Alternatives Components

General Response Actions	Remedial Technology	Process Options	Alternatives			
			SS17SB1	SS17SB2	SS17SB3	SS17SB4
No action	None	No action	X			
Institutional controls	Property law mechanisms	Property records		X		
Engineering controls	Physical access restrictions	Signs		X		
Excavation	Shallow excavation (<30 ft.)	Backhoe or front end loader			X	X
Ex-situ treatment	Physical Treatment	Soil washing			X	
Disposal	On-site/off-site disposal	Backfill/landfill			X	X

Notes:

Refer to Table 2-13 for description of alternatives (SS17SB1, etc.).

- **Alternative SS17SB1 – No Action**

The no-action alternative is required to be evaluated under the NCP as a baseline condition. In this alternative, no action would be taken to remediate subsurface soil at Source Area SS017. Subsurface soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment would remain on site. Soil contaminated with PCBs and lead would

likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

- **Alternative SS17SB2 – Institutional Controls and Engineering Controls**

In this alternative, signs would be erected where subsurface soil is located at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated subsurface soil is present and that contact and intrusive soil activities should be avoided. Notations regarding residual contamination and land use restrictions would be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. Periodic site inspections would be performed to check the condition of the signs; maintenance would be completed as needed.

- **Alternative SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal**

In this alternative, subsurface soil within source area SS017 where PCBs and lead are present above cleanup levels protective of human health and the environment would be excavated and treated using soil washing to treat the PCBs and lead. The treated soil would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reach the cleanup level, the soil would be disposed of on-site as clean fill. Soil from a local borrow source may also be used to backfill the excavation.

- **Alternative SS17SB4 – Excavation and Off-Site Disposal**

In this alternative, subsurface soil within source area SS017 with PCBs and lead contamination present above cleanup levels protective of human health and the environment would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill permitted to accept PCB-contaminated waste. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy.

2.10.2 Common Elements and Distinguishing Features of Each Alternative

Tables 2-21 through 2-27 provide a summary of elements common to each alternative and distinguishing features that make each alternative unique.

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Table 2-21 Common Elements and Distinguishing Features of Alternatives for Surface Soil at LF003

	Alternative LF03SS1 – No Action	Alternative LF03SS2 – Institutional Controls. Engineering Controls, and Containment	Alternative LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and ≤10 mg/kg): Institutional Controls, Engineering Controls, and Containment	Alternative LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal	Alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal	Alternative LF03SS6 – PCB Soil (≥1 mg/kg): Excavation of the Entire Landfill (debris and soil removal) and Off-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for institutional controls (ICs)	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Handling of PCBs, requirements for transportation and offsite disposal of solid waste, State of Alaska requirements for ICs.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Requirements for PCB handling, treatment and on-site disposal.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Handling of PCBs and requirements for transportation and off-site disposal of solid waste.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Handling of PCBs and requirements for transportation and off-site disposal of solid waste.
Long-term reliability of remedy	NA, no remedy is proposed; PCBs are stable and do not readily degrade even over long periods of time.	PCBs would be capped, reducing mobility. However, PCBs are stable and do not readily degrade. The response objective does not include actual reduction of contaminant mass in soil. Signs and cap require maintenance indefinitely, thus reducing the reliability of the alternative.	All soil with PCBs ≥10 mg/kg would be permanently removed from the site, and PCBs ≥1 mg/kg and ≤10 mg/kg would be capped, reducing mobility. Remaining PCBs would not readily degrade. Signs and cap require maintenance indefinitely, thus reducing the reliability of the alternative.	The response objective (excavation and incineration) would permanently remove all PCB contamination above cleanup levels from the soil.	The response objective would permanently remove all contaminated soil from the site. ICs/ECs would not be required.	The response objective would permanently remove all contaminated soil from the site, as well as remove the potential source area of contamination, the landfill). ICs/ECs would not be required.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 227 cy of PCB-contaminated soil would be left in place.	Approximately 227 cy of PCB-contaminated soil would remain on-site, managed by ICs, ECs and capping. Hazard in material would remain the same, but risk to human health and the environment would be reduced.	Hazard would be reduced on-site due to removal of soil with PCBs ≥10 mg/kg. PCBs ≥1 mg/kg and ≤10 mg/kg would remain on-site managed by ICs, ECs, and capping. Without treatment, soil sent for off-site disposal would retain hazard.	No untreated waste would be left on-site; hazards would be permanently eliminated.	No untreated waste would be left on-site; on-site hazard would be permanently eliminated due to removal of PCB-contaminated soil. Without treatment, soil sent for off-site disposal would retain hazard.	On-site hazard would be permanently eliminated due to removal of PCB-contaminated soil, and the possibility of additional contaminant migration would be eliminated by removal of the landfill debris and soil. Without treatment, soil and debris sent off-site for disposal would retain hazard.
Estimated time for design and construction	NA	1 year	1 year	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	Undetermined	1 year	1 year	1 year
Estimated capital cost	NA	$723,212	$860,236	$1,867,601	$789,630	$40,551,246
Estimated annual O&M cost	NA	$15,619 (per yr. for 30 yrs.)	$15,619 (per yr. for 30 yrs.)	$26,639 (per yr. for 1 yr.)	$26,639 (per yr. for 1 yr.)	$26,639 (per yr. for 1 yr.)
Estimated total present worth	NA	$1,191,785	$1,328,809	$1,894,240	$816,269	$40,577,885
Discount rate	NA	7%	7%	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	30[2]	1	1	1
Use of presumptive remedies and/or innovative technologies	None	None	None	High Temperature Incineration	None	None

Notes:
[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B.
[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
cy cubic yards
EC engineering control
IC institutional control
NA not applicable
O&M Operations and maintenance
PCB polychlorinated biphenyls

Table 2-22 Common Elements and Distinguishing Features of Alternatives for Sediment at LF003

	Alternative LF03SD1 – No Action	Alternative LF03SD2 – Institutional Controls and Engineering Controls	Alternative LF03SD3 – Excavation, Off-Site Disposal, and Long-Term Monitoring	Alternative LF03SD4 – Excavation, Ex-Situ Treatment, and On-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) and groundwater and surface water cleanup levels defined in 18 AAC 75.345. Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) and groundwater and surface water cleanup levels defined in 18 AAC 75.345. Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) and groundwater and surface water cleanup levels defined in 18 AAC 75.345. Location Specific ARARs: None Action Specific ARARs: Handling of PCBs, requirements for transportation and offsite disposal of solid waste, State of Alaska requirements for ICs.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) and groundwater and surface water cleanup levels defined in 18 AAC 75.345. Location Specific ARARs: None Action Specific ARARs: Handling of PCBs and requirements for on-site disposal of treated soil.
Long-term reliability of remedy	NA, no remedy is proposed; PCBs are stable and do not readily degrade even over long periods of time.	PCBs are stable and do not readily degrade. The response objective does not include actual reduction of contaminant mass in sediment. Signs require maintenance indefinitely. All of these factors reduce the reliability of the alternative.	The response objective would permanently remove all contaminated sediment from the site. An eroded soil control barrier would be installed to prevent potential migration of contaminants from the source area. Over time, source concentrations are expected to decrease. ICs/ECs would be implemented until cleanup levels are met.	The response objective (excavation and incineration) would permanently remove all PCB contamination above cleanup levels from the soil.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 20 cy of PCB-contaminated sediment would be left in place.	Approximately 20 cy of PCB-contaminated sediment would remain on-site, managed by ICs and ECs. Hazard in material would remain the same.	No untreated waste would be left on-site and barriers would prevent migration of contaminants from the source area; on-site hazard would be permanently eliminated due to removal of PCB-contaminated soil. Without treatment, soil sent for off-site disposal would retain hazard.	No untreated waste would be left on-site; hazards would be permanently eliminated.
Estimated time for design and construction	NA	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	Undetermined	1 year
Estimated capital cost	NA	$149,082	$796,694	$1,853,258
Estimated annual O&M cost	NA	$16,869 (per yr. for 30 yrs.)	$9,177 (per yr. for 30 yrs.)	$9,177 (per yr. for 30 yrs.)
Estimated total present worth	NA	$655,146	$1,072,016	$2,128,580
Discount rate	NA	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	30[2]	30[2]
Use of presumptive remedies and/or innovative technologies	None	None	None	High Temperature Incineration

Notes:

[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B.

[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC	Alaska Administrative Code	ARAR	applicable or relevant and appropriate requirement
cy	cubic yards	COC	chemical of concern
EC	engineering control	IC	institutional control
NA	not applicable	NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and maintenance	PCB	polychlorinated biphenyls

Table 2-23 Common Elements and Distinguishing Features of Alternatives for Subsurface Soil at SS010

	Alternative SS10SB1 – No Action	Alternative SS10SB2 – Institutional Controls	Alternative SS10SB3 – Institutional Controls, In-Situ Treatment, and LTM	Alternative SS10SB4 – Excavation, Ex-Situ Treatment, and On-Site Disposal	Alternative SS10SB5 – Excavation and Off-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: In-situ treatment method (enhanced bioremediation) and monitoring requirements	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Handling of contaminated material; requirements for on-site disposal of treated soil.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Handling of contaminated material and requirements for transportation and off-site disposal of solid waste.
Long-term reliability of remedy	NA, no remedy is proposed; DRO in subsurface soil would naturally degrade over time, but compliance with ARARs would not be verified due to lack of long-term monitoring.	The response objective does not include actual reduction of contaminant mass in subsurface soil, although DRO contamination would likely degrade naturally over time. No long-term monitoring would be performed to document reduction in contamination, which reduces the reliability of the alternative.	In-situ treatment would increase the rate of natural remediation processes on-site and would result in no untreated residual contamination and no remaining sources of risk at this site. There would be no need for ICs after response objectives are met.	The response objective (excavation and land spreading) would permanently remove all DRO contamination above cleanup levels from the subsurface soil.	The response objective would permanently remove all contaminated subsurface soil from the site. ICs/ECs would not be required.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 3,518 cy of DRO-contaminated subsurface soil would be left in place.	Approximately 3,518 cy of DRO-contaminated subsurface soil would remain on-site, managed by ICs. Hazard in material would remain the same initially, and would likely decrease over time; however, no LTM is proposed to document the reduction of contamination.	No untreated waste would be left on-site; the oxygenate used in the remediation would be consumed by the biological mechanisms. Hazards would be permanently eliminated.	No untreated waste would be left on-site; hazards would be permanently eliminated.	No untreated waste would be left on-site; on-site hazard would be permanently eliminated due to removal of DRO-contaminated subsurface soil. Without treatment, soil sent for off-site disposal would retain hazard.
Estimated time for design and construction	NA	1 year	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	Undetermined	1 year	1 year
Estimated capital cost	NA	$172,136	$982,110	$889,826	$13,034,984
Estimated annual O&M cost	NA	$16,735 (per yr. for 30 yrs.)	$25,045 (per yr. for 30 yrs.)	$26,639 (per yr. for 1 yr.)	$26,639 (per yr. for 1 yr.)
Estimated total present worth	NA	$674,171	$1,733,456	$916,465	$13,061,623
Discount rate	NA	7%	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	30[2]	1	1
Use of presumptive remedies and/or innovative technologies	None	None	Enhanced Bioremediation	None	None

Notes:

[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B. ARARs do not pertain to petroleum only cleanups, information presented here is included because it was in the Feasibility Study. Petroleum only cleanups projects need to meet the requirements in 18 AAC 75 Article 3 (Site Cleanup Rules) and other applicable state and federal laws.

[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
cy cubic yards
COC chemical of concern
DRO diesel-range organics
EC engineering control
IC institutional control
NA not applicable
O&M operations and maintenance

Table 2-24 Common Elements and Distinguishing Features of Alternatives for Groundwater at SS010

	Alternative SS10GW1 – No Action	Alternative SS10GW2 – Institutional Controls, Natural Attenuation and LTM	Alternative SS10GW3 – Institutional Controls, In-Situ Treatment, and LTM	Alternative SS10GW4 – Ex-Situ Treatment and On-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: 18 AAC 75.345, Table B Groundwater Cleanup Levels and 18 AAC 70 water quality standards Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: 18 AAC 75.345, Table B Groundwater Cleanup Levels and 18 AAC 70 water quality standards Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: 18 AAC 75.345, Table B Groundwater Cleanup Levels and 18 AAC 70 water quality standards Location Specific ARARs: None Action Specific ARARs: In-situ treatment method (enhanced bioremediation) and monitoring requirements	Chemical-specific ARARs: 18 AAC 75.345, Table B Groundwater Cleanup Levels and 18 AAC 70 water quality standards Location Specific ARARs: None Action Specific ARARs: Ex-situ treatment method (pump and treat)
Long-term reliability of remedy	NA, no remedy is proposed; fuel in groundwater would naturally degrade over time, but compliance with ARARs would not be verified due to lack of long-term monitoring.	The response objective does not include actual reduction of contaminant mass in groundwater, although DRO contamination would likely degrade naturally over time. ICs require maintenance indefinitely, which reduces the reliability of the alternative.	In-situ treatment would increase the rate of natural remediation processes on-site. If the source of contamination (subsurface soil) remains untreated, it is possible that the contamination levels could increase. After the contamination source is treated and response objectives are met, there would be no remaining sources of risk at this site and ICs would be removed.	Ex-situ treatment would quickly decrease contaminant levels below chemical-specific ARARs. If the source of contamination (subsurface soil) remains untreated, it is possible that the contamination levels could increase. After the contamination source is treated and response objectives are met, there would be no remaining sources of risk at this site and ICs would be removed.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	No action would be taken and contaminated groundwater would remain on-site. Current hazard would remain.	Groundwater contaminated with fuel would remain on-site and be allowed to remediate naturally. Hazard in groundwater would remain the same initially, and would likely decrease over time, which would be verified by LTM.	The enhanced bioremediation would quickly reduce the hazards associated with contaminated groundwater. If the suspected source of contamination is not treated or removed the potential for additional contamination to leach into the groundwater still exists. Once the source is removed and groundwater treatment completed, the hazard would be permanently eliminated.	The ex-situ treatment would quickly reduce the hazards associated with contaminated groundwater. If the suspected source of contamination is not treated or removed the potential for additional contamination to leach into the groundwater still exists. Once the source is removed and groundwater treatment completed, the hazard would be permanently eliminated.
Estimated time for design and construction	NA	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	Undetermined	Undetermined
Estimated capital cost	NA	$434,645	$1,083,763	$515,074
Estimated annual O&M cost	NA	$20,237 (per yr. for 30 yrs.)	$16,682 (per yr. for 30 yrs.)	$28,722 (per yr. for 30 yrs.)
Estimated total present worth	NA	$1,041,740	$1,584,224	$1,376,725
Discount rate	NA	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	30[2]	30[2]
Use of presumptive remedies and/or innovative technologies	None	None	Enhanced Bioremediation	Pump and Treat

Notes:

[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B. ARARs do not pertain to petroleum only cleanups, information presented here is included because it was in the Feasibility Study. Petroleum only cleanups projects need to meet the requirements in 18 AAC 75 Article 3 (Site Cleanup Rules) and other applicable state and federal laws.

[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated; unknown treatment time frames could extend beyond 30 years as well.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
DRO diesel-range organics
EC engineering control
IC institutional control
NA not applicable

Table 2-25 Common Elements and Distinguishing Features of Alternatives for Surface Soil at SS016

	Alternative SS16SS1 – No Action	Alternative SS16SS2 – Institutional Controls, Engineering Controls, and Containment	Alternative SS16SS3 – PCB Soil (≥10 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil (≥1 mg/kg and <10 mg/kg): Institutional Controls and Engineering Controls	Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Handling of lead and PCBs, State of Alaska requirements for ICs.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: Handling of lead and PCBs and requirements for transportation and off-site disposal of solid waste.
Long-term reliability of remedy	NA, no remedy is proposed; PCBs and lead are stable and do not readily degrade even over long periods of time.	PCB and lead contaminated soil would be capped, reducing contaminant mobility and exposure risk. However, PCBs and lead are stable and do not readily degrade. The response objective does not include actual reduction of contaminant mass in soil. Signs and cap require maintenance indefinitely, thus reducing the reliability of the alternative.	All soil with PCBs ≥10 mg/kg would be treated, thereby permanently removing a portion of the contamination from the site; PCBs ≥1 mg/kg and ≤10 mg/kg and remaining lead would be capped, reducing mobility. Remaining contaminants would not readily degrade, and signs and cap require maintenance indefinitely, both of which reduce the reliability of the alternative.	The goal of this response objective would be to permanently remove all contaminated soil from the site such that ICs/ECs would not be required. However, this site is in an area of large boulders and is on a steep slope; therefore, safety and logistical issues may result in areas of PCBs ≥1 mg/kg left in place. PCBs ≥1 mg/kg would be capped and warning signs placed on-site. Remaining contaminants would not readily degrade, and signs and cap require maintenance indefinitely, both of which reduce the reliability of the alternative.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 339 cy of PCB-contaminated soil would be left in place. Portions of this soil also have lead contamination above chemical-specific ARARs.	Approximately 339 cy of PCB- and lead-contaminated soil would remain on-site, managed by ICs, ECs and capping. Hazard in material would remain the same, but risk to human health and the environment would be reduced.	Hazard would be reduced on-site due to treatment of soil with PCBs ≥10 mg/kg. PCBs ≥1 mg/kg and ≤10 mg/kg and some lead would remain on-site (~151 cy), managed by ICs, ECs, and capping. Overall hazard would be reduced at the site, though not eliminated.	Without treatment, soil sent for off-site disposal would retain hazard. Overall hazard would be reduced at the site due to contaminant removal; however, the amount of the reduction would vary depending on the success of the removal. Ideally, this response action would eliminate hazard on-site.
Estimated time for design and construction	NA	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	Undetermined	1 year if all soil with PCBs ≥1 mg/kg successfully removed; Undetermined if PCBs ≥1 mg/kg left and capped
Estimated capital cost	NA	$545,864	$4,388,794	$769,104
Estimated annual O&M cost	NA	$16,077 (per yr. for 30 yrs.)	$15,619 (per yr. for 30 yrs.)	$26,639 (per yr. for 1 yr.)
Estimated total present worth	NA	$1,028,175	$4,857,366	$795,743 (Cost increase for cap and IC installation and maintenance for 30 years would be $409,643, for total of $1,205,386)
Discount rate	NA	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	30[2]	1 year if all soil with PCBs ≥1 mg/kg successfully removed; 30[2] if PCBs ≥1 mg/kg left and capped
Use of presumptive remedies and/or innovative technologies	None	None	None	None

Notes:

[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B.

[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
cy cubic yards
EC engineering control
IC institutional control
NA not applicable
O&M Operations and maintenance
PCB polychlorinated biphenyls

Table 2-26 Common Elements and Distinguishing Features of Alternatives for Surface Soil at SS017

	Alternative SS17SS1 – No Action	Alternative SS17SS2 – Institutional Controls, Engineering Controls, and Containment	Alternative SS17SS3 – Excavation, Ex-Situ Treatment and On-Site Disposal	Alternative SS17SS4 – Excavation and Off-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Requirements for lead and PCB handling, treatment and on-site disposal.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Handling of lead and PCBs and requirements for transportation and off-site disposal of solid waste.
Long-term reliability of remedy	NA, no remedy is proposed; PCBs and lead are stable and do not readily degrade even over long periods of time.	PCB and lead contaminated soil would be capped, reducing contaminant mobility and exposure risk. However, PCBs and lead are stable and do not readily degrade. The response objective does not include actual reduction of contaminant mass in soil. Signs and cap require maintenance indefinitely, thus reducing the reliability of the alternative.	The response objective (excavation and soil washing) would permanently remove all PCB and lead contamination above cleanup levels from the soil. Samples would be collected to confirm chemical-specific ARARs have been met.	The response objective would permanently remove all contaminated soil from the site. ICs/ECs would not be required.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 179 cy of PCB-contaminated soil would be left in place. Portions of this soil also have lead contamination above chemical-specific ARARs.	Approximately 179 cy of PCB- and lead-contaminated soil would remain on-site, managed by ICs, ECs and capping. Hazard in material would remain the same, but risk to human health and the environment would be reduced.	No untreated waste would be left on-site; hazards would be permanently eliminated.	No untreated waste would be left on-site; on-site hazard would be permanently eliminated due to removal of PCB-contaminated soil. Without treatment, soil sent for off-site disposal would retain hazard.
Estimated time for design and construction	NA	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	1 year	1 year
Estimated capital cost	NA	$417,599	$4,224,595	$673,229
Estimated annual O&M cost	NA	$16,077 (per yr. for 30 yrs.)	$26,639 (per yr. for 1 yr.)	$26,639 (per yr. for 1 yr.)
Estimated total present worth	NA	$899,910	$4,251,234	$699,868
Discount rate	NA	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	1	30[2]
Use of presumptive remedies and/or innovative technologies	None	None	None	None

Notes:

[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B.

[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC	Alaska Administrative Code	ARAR	applicable or relevant and appropriate requirement
cy	cubic yards	EC	engineering control
IC	institutional control	NA	not applicable
O&M	Operations and maintenance	PCB	polychlorinated biphenyls

Table 2-27 Common Elements and Distinguishing Features of Alternatives for Subsurface Soil at SS017

	Alternative SS17SB1 – No Action	Alternative SS17SB2 – Institutional Controls and Engineering Controls	Alternative SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	Alternative SS17SB4 – Excavation and Off-Site Disposal
Key ARARs[1] associated with alternative	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: None	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: None Action Specific ARARs: State of Alaska requirement for ICs	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Requirements for lead and PCB handling, treatment and on-site disposal.	Chemical-specific ARARs: Method Two Cleanup Levels for the Under 40-Inch Zone (18 AAC 75.341) Location Specific ARARs: Solid Waste Management (18 AAC 60) Action Specific ARARs: Handling of lead and PCBs and requirements for transportation and off-site disposal of solid waste.
Long-term reliability of remedy	NA, no remedy is proposed; PCBs and lead are stable and do not readily degrade even over long periods of time.	PCBs are stable and do not readily degrade. The response objective does not include actual reduction of contaminant mass in subsurface soil. Signs require maintenance indefinitely. All of these factors reduce the reliability of the alternative.	The response objective (excavation and soil washing) would permanently remove all PCB and lead contamination above cleanup levels from the subsurface soil. ICs/ECs would not be required.	The response objective would permanently remove all contaminated subsurface soil from the site. ICs/ECs would not be required.
Quantity of untreated waste and treatment residuals to be disposed offsite or managed onsite in a containment system and the degree of hazard remaining in such material	NA, approximately 11.7 cy of PCB-contaminated subsurface soil would be left in place. Portions of the subsurface soil also have lead contamination above chemical-specific ARARs.	Approximately 11.7 cy of PCB-contaminated subsurface soil would remain on-site, managed by ICs and ECs. Hazard in material would remain the same.	No untreated waste would be left on-site; hazards would be permanently eliminated.	No untreated waste would be left on-site; on-site hazard would be permanently eliminated due to removal of PCB- and lead-contaminated subsurface soil. Without treatment, soil sent for off-site disposal would retain hazard.
Estimated time for design and construction	NA	1 year	1 year	1 year
Estimated time to reach remediation goals	NA	Undetermined	1 year	1 year
Estimated capital cost	NA	$113,279	$4,218,375	$212,489
Estimated annual O&M cost	NA	$15,872 (per yr. for 30 yrs.)	$26,639 (per yr. for 1 yr.)	$26,639 (per yr. for 1 yr.)
Estimated total present worth	NA	$589,452	$4,245,013	$239,127
Discount rate	NA	7%	7%	7%
Number of years over which cost is projected	NA	30[2]	1	30[2]
Use of presumptive remedies and/or innovative technologies	None	None	None	None

Notes:
[1] A brief description of potential action-specific ARARs that would apply is listed here; the list of the regulations applicable to these actions (with which the USAF would need to comply) is presented in Appendix B.
[2] ICs/ECs and management requirements will extend indefinitely beyond the 30 years for which costs were estimated.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
cy cubic yards
COC chemical of concern
DRO diesel-range organics
EC engineering control
IC institutional control
NA not applicable
O&M operations and maintenance
PCB polychlorinated biphenyls

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2.10.3 Expected Outcome of Each Alternative

Tables 2-28 through 2-34 provide a summary of the expected outcomes of each alternative.

Table 2-28 Expected Outcome of Each Alternative for Surface Soil at LF003

	Alternative LF03SS1 – No Action[1]	Alternative LF03SS2 – Institutional Controls, Engineering Controls, and Containment[1]	Alternative LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls, Engineering Controls, and Containment[1]	Alternative LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal[1]	Alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal[1]	Alternative LF03SS6 – Excavation of the Entire Landfill (debris and soil removal) and Off-Site Disposal[1]
Available uses of land upon achieving cleanup levels	Cleanup levels would not be achieved.	Restricted to commercial/ industrial land use.	Restricted to commercial/ industrial land use.	Unrestricted land use after cleanup levels are met and source contamination is eliminated.	Unrestricted land use after cleanup levels are met and source contamination is eliminated.	Unrestricted land use.
Time frame to achieve available land use	NA	Undetermined	Undetermined	1 year	1 year	1 year
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA	NA	NA
Other impacts or benefits associated with alternative	NA	Containment and ICs/ECs would require long-term monitoring.	Containment and ICs/ECs would require long-term monitoring.	Does not address potential off-site source contamination located at landfill area. Contaminated media would be treated thermally and be available for beneficial reuse onsite.	Does not address potential off-site source contamination located at landfill area.	Permanently removes all source contamination.

Notes:

[1] **A**lternatives for LF003 only apply to soil outside of and downgradient from the landfill within LF003.

EC engineering control
IC institutional control
mg/kg milligrams per kilogram
NA not applicable (cleanup levels never achieved)
PCB polychlorinated biphenyls

Table 2-29 Expected Outcome of Each Alternative for Sediment at LF003

	Alternative LF03SD1 – No Action[1]	Alternative LF03SD2 – Institutional Controls and Engineering Controls[1]	Alternative LF03SD3 – Excavation, Off-Site Disposal, and Long-Term Monitoring[1]	Alternative LF03SD4 – Excavation, Ex-Situ Treatment, and On-Site Disposal[1]
Available uses of land upon achieving cleanup levels	Cleanup levels would not be achieved.	Restricted to commercial/ industrial land use.	Unrestricted land use after cleanup levels are met and source contamination is eliminated.	Unrestricted land use after cleanup levels are met and source contamination is eliminated.
Time frame to achieve available land use	NA	Undetermined	30 years or until cleanup levels are met.	1 year or until cleanup levels are met
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA
Other impacts or benefits associated with alternative	NA	ICs/ECs would require long-term monitoring.	Contaminants would be permanently removed from the site once off-site source contamination is eliminated.	Contaminants would be permanently removed from the site once off-site source contamination is eliminated. Contaminated media would be treated thermally and be available for beneficial reuse onsite.

Notes:

[1] **A**lternatives for LF003 only apply to soil outside of and downgradient from the landfill within LF003.
EC engineering control
IC institutional control
NA not applicable (cleanup levels never achieved)

Table 2-30 Expected Outcome of Each Alternative for Subsurface Soil at SS010

	Alternative SS10SB1 – No Action	Alternative SS10SB2 – Institutional Controls	Alternative SS10SB3 – Institutional Controls, In-Situ Treatment, and LTM	Alternative SS10SB4 – Excavation, Ex-Situ Treatment, and On-Site Disposal	Alternative SS10SB5 – Excavation and Off-Site Disposal
Available uses of land upon achieving cleanup levels	No mechanism to determine if/when cleanup levels would be achieved.	Restricted to commercial/ industrial land use.	Unrestricted land use after cleanup levels are met.	Unrestricted land use.	Unrestricted land use.
Time frame to achieve available land use	NA – Would not know if/when cleanup levels achieved.	Undetermined	30 years or until cleanup levels are met.	1 year	1 year
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA	NA
Other impacts or benefits associated with alternative	Would not know if/when cleanup levels achieved.	ICs would require long-term monitoring.	Time frame to achieve cleanup is uncertain and could be lengthy; however, contaminants would be permanently removed from the site.	Contaminants would be permanently removed from the site. Contaminated media would be treated thermally and be available for beneficial reuse onsite.	Contaminants would be permanently removed from the site.

Notes:

IC institutional control
LTM long-term monitoring
NA not applicable

Table 2-31 Expected Outcome of Each Alternative for Groundwater at SS010

	Alternative SS10GW1 – No Action	Alternative SS10GW2 – Institutional Controls, Natural Attenuation and LTM	Alternative SS10GW3 – Institutional Controls, In-Situ Treatment, and LTM	Alternative SS10GW4 – Ex-Situ Treatment and On-Site Disposal
Available uses of land upon achieving cleanup levels	No mechanism to determine if/when cleanup levels would be achieved.	Unrestricted land use after cleanup levels are met.	Unrestricted land use after cleanup levels are met.	Unrestricted land use after cleanup levels are met.
Time frame to achieve available land use	NA – Would not know if/when cleanup levels achieved.	30 years or until cleanup levels are met.	30 years or until cleanup levels are met.	30 years or until cleanup levels are met.
Available uses of groundwater upon achieving cleanup levels	NA – Would not know if/when cleanup levels achieved.	Unrestricted	Unrestricted	Unrestricted
Time frame to achieve available groundwater use	NA – Would not know if/when cleanup levels achieved.	30 years or until cleanup levels are met.	30 years or until cleanup levels are met.	30 years or until cleanup levels are met.
Other impacts or benefits associated with alternative	Would not know if/when cleanup levels achieved.	ICs would require long-term monitoring Existing and known contaminants would remediate naturally, but would not be treated.	ICs would require long-term monitoring Contaminants would be permanently removed from the site by treatment, which would occur more quickly than natural attenuation.	Contaminants would be permanently removed from the site by treatment, which would occur more quickly than natural attenuation.

Notes:
IC institutional control
LTM long-term monitoring
NA not applicable

Table 2-32 Expected Outcome of Each Alternative for Surface Soil at SS016

	Alternative SS16SS1 – No Action	Alternative SS16SS2 – Institutional Controls, Engineering Controls, and Containment	Alternative SS16SS3 – PCB Soil (≥10 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil (≥1 mg/kg and <10 mg/kg): Institutional Controls and Engineering Controls	Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the extent feasible, and Off-Site Disposal
Available uses of land upon achieving cleanup levels	Cleanup levels would not be achieved.	Restricted to commercial/ industrial land use.	Restricted to commercial/ industrial land use.	Unrestricted land use if all soil with PCBs ≥1 mg/kg successfully removed; restricted to commercial/industrial use if PCBs ≥1 mg/kg left and capped.
Time frame to achieve available land use	NA	Undetermined	Undetermined	1 year if all soil with PCBs ≥1 mg/kg successfully removed; Undetermined if PCBs ≥1 mg/kg left and capped.
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA
Other impacts or benefits associated with alternative	NA	Containment and ICs/ECs would require long-term monitoring.	Containment and ICs/ECs would require long-term monitoring.	If soil removal is successful, contaminants would be permanently removed from the site.

Notes:

EC	engineering control
IC	institutional control
mg/kg	milligrams per kilogram
NA	not applicable
PCB	polychlorinated biphenyl

Table 2-33 Expected Outcome of Each Alternative for Surface Soil at SS017

	Alternative SS17SS1 – No Action	Alternative SS17SS2 – Institutional Controls, Engineering Controls, and Containment	Alternative SS17SS3 – Excavation, Ex-Situ Treatment, and On-Site Disposal	Alternative SS17SS4 – Excavation and Off-Site Disposal
Available uses of land upon achieving cleanup levels	Cleanup levels would not be achieved.	Restricted to commercial/ industrial land use.	Unrestricted land use.	Unrestricted land use.
Time frame to achieve available land use	NA	Undetermined	1 year	1 year
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA
Other impacts or benefits associated with alternative	NA	Containment and ICs/ECs would require long-term monitoring.	Contaminants would be permanently removed from the site. Contaminated media would be treated and be available for beneficial reuse onsite.	Contaminants would be permanently removed from the site.

Notes:

EC engineering control
IC institutional control
NA not applicable

Table 2-34 Expected Outcome of Each Alternative for Subsurface Soil at SS017

	Alternative SS17SB1 – No Action	Alternative SS17SB2 – Institutional Controls and Engineering Controls	Alternative SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	Alternative SS17SB4 – Excavation and Off-Site Disposal
Available uses of land upon achieving cleanup levels	Cleanup levels would not be achieved.	Restricted to commercial/ industrial land use.	Unrestricted land use.	Unrestricted land use.
Time frame to achieve available land use	NA	Undetermined	1 year	1 year
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA
Other impacts or benefits associated with alternative	NA	ICs/ECs would require long-term monitoring.	Contaminants would be permanently removed from the site. Contaminated media would be treated and be available for beneficial reuse onsite.	Contaminants would be permanently removed from the site.

Notes:

EC engineering control
IC institutional control
NA not applicable

2.11 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP, the alternatives for Cape Romanzof LRRS were evaluated using the nine criteria described in Section 121(a) & (b) of CERCLA and 40 CFR Section 300.430(e)(9)(i) as cited in 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 remedial 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; and
- Compliance with, or an applicable waiver of, 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; and
- Cost.

Modifying criteria, which may be considered to the extent that information is available during the FS, but can be fully considered only after public and regulator comments, are as follows:

- Community acceptance; and
- State/support agency acceptance.

This section summarizes how well each alternative satisfies each evaluation criterion and indicates how it compares to the other alternatives under consideration.

The detailed individual analysis compares the specific alternatives against the two threshold and five balancing criteria in order to determine how well each satisfies the criterion. A rating scale was developed in the 2011 FS to qualitatively demonstrate the degree to which each criterion is satisfied at each site. Therefore, each alternative was rated against each criterion and assigned one of the following results: "Highly effective alternative/fully meets criterion," "Moderately effective alternative/partially meets criterion," "Ineffective alternative/does not meet criterion," or "NA – not applicable." "NA" was only assigned to the balancing criteria for the No Action alternatives, because this alternative typically fails to meet the two threshold criteria and is considered not viable for further analysis (USAF, 2011). Rationale for providing the individual ratings is discussed in the subsections below. Costs of individual alternatives could be reduced by combining the selected alternatives for several source areas into a single integrated package.

The comparative analysis evaluates the relative performance of each alternative in relation to each of the seven evaluation criteria. These ratings are depicted in the tables in the following subsections, which present a summary of the ratings for the alternatives with the following symbols:

H – Highly effective alternative / Fully meets criterion;

M – Moderately effective alternative / Partially meets criterion; and

I – Ineffective alternative / Does not meet criterion.

2.11.1 LF003 Surface Soil Alternatives

The following subsections compare the six selected remedial alternatives for surface soil at Landfill No. 2 (LF003) to each other based on their ratings against the evaluation criteria. Table 2-35 summarizes the ratings for each alternative.

Table 2-35 LF003 Surface Soil Alternatives Individual Analysis Ratings

Alternative	Overall protection of human health and the environment	Compliance with ARARs	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume	Short-term effectiveness	Implementability	Costs (Estimated TPV)
LF03SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
LF03SS2 – Institutional Controls, Engineering Controls, and Containment	PASS	PASS	M	I	H	H	$1,191,785
LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls, Engineering Controls, and Containment	PASS	PASS	M	I	H	H	$1,328,809
LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal	PASS	PASS	H	H	H	M	$1,894,240
LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	$816,269
LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal	PASS	PASS	H	I	M	M	$40,577,885

Notes:

H	Highly effective alternative / fully meets criterion
M	Moderately effective alternative / partially meets criterion
I	Ineffective alternative / does not meet criterion
ARAR	applicable or relevant and appropriate requirement
TPV	total present value
NA	not applicable
mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyl

2.11.1.1 Overall Protection of Human Health and the Environment

The no action alternative (LF03SS1) does not provide protection of human health and the environment and therefore fails to meet the criterion. Chemical-specific ARARs would not be met and risks would remain at their current level.

All action alternatives meet this criterion; therefore, they pass this analysis. Normal safety precautions would mitigate risk to workers under all three alternatives. The differences between these alternatives are as follows:

- For both Alternative LF03SS2 and LF03SS3 (where PCB soil ≥1 mg/kg would be left on-site), property use restrictions and signs would provide limited protection for human health. Containment (i.e., capping) would prevent direct contact with contaminated materials as well as reduce the mobility of contaminants, but capping would not reduce

the toxicity or volume of contaminated material. Neither alternative would treat the contamination. PCBs are not likely to degrade below cleanup levels (1 mg/kg).

- Under Alternative LF03SS3, excavation of soil contaminated with PCBs ≥10 mg/kg would provide protection to human health and the environment. The mobility and volume but not the toxicity of the ≥10 mg/kg PCB soil would be reduced through excavation and removal from the site.
- Alternatives LF03SS4 and LF03SS5 fully protect human health and the environment by removing from the site or treating soil contaminated with PCBs above 1 mg/kg. Both would meet chemical-specific ARARs. Normal safety precautions would mitigate risk to workers. The differences between these alternatives are as follows:
    - LF03SS4 (excavation, ex-situ treatment, and on-site disposal) treats the contamination, thereby reducing its toxicity, mobility, and volume and providing a more permanent remedy than LF03SS5 (excavation and off-site disposal) or LF03SS6 (excavation of landfill debris and soil and off-site disposal).
    - LF03SS5 would reduce the mobility of contamination by enclosing contaminated soil in a landfill, but it would not reduce the toxicity or volume of contamination.
- Alternative LF03SS6 would permanently remove PCB-contaminated debris, soil, and sediment from the site. However, the excavation of a landfill will involve significant characterization of an unknown volume and extent of waste. This work would expose workers to unknown risks and would introduce greater risks to the environment through the potential for spills. This alternative would reduce the mobility of contamination by removing it from the site, but since it would not be treated, the toxicity or volume of contamination would not be reduced.

2.11.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative LF03SS1 (no action) fails to meet this criterion because it does nothing to reduce the risk of contamination.

Alternatives LF03SS2 and LF03SS3 (where soil with PCBs ≥1 mg/kg would be left in place) pass this analysis because, although they do not reduce the PCB contamination on-site to below cleanup levels (1 mg/kg), the installation of controls and capping helps prevent contact with the contamination. PCBs are not expected to degrade in a reasonable timeframe.

Alternatives LF03SS4, LF03SS5, and LF03SS6 all pass this analysis because each either treats the contamination or removes the contaminated soil from the site, thereby resulting in soil below the cleanup level remaining on site.

2.11.1.3 Long-Term Effectiveness and Permanence

Alternative LF03SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives LF03SS2 and LF03SS3 partially meet this criterion in that they are moderately effective because they both involve containment (capping) of soil contaminated with PCBs

above cleanup levels, thereby reducing the risk to human health and the environment. Capping prevents physical contact with the contaminated soil and prevents dust contaminated with PCBs from blowing from the site. Engineering and institutional controls would mitigate some risk. Monitoring of the cap would be required indefinitely and this technology does not treat any contamination, so some risk remains.

Alternatives LF03SS4, LF03SS5, and LF03SS6 all fully meet this criterion in that they are highly effective. The differences between these alternatives are as follows:

- Alternative LF03SS4 treats and thereby reduces the PCB contamination on-site to cleanup levels (1 mg/kg). The use of high-temperature incineration as a treatment results in little residual waste and the treated soil would be sampled and analyzed. Only after cleanup levels were confirmed would the soil be disposed of on-site.
- Alternatives LF03SS5 and LF03SS6 remove the contaminated soil from the site thereby resulting in long-term effectiveness and permanence of the remedial action in that all risk is removed at the site. However, these alternatives would relocate contaminated soil to an off-site landfill rather than treat contamination.

2.11.1.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative LF03SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives LF03SS2, LF03SS3, LF03SS5, and LF03SS6 do not meet this criterion in that they are ineffective because they do not reduce the toxicity, mobility, or volume through treatment but rather through soil removal. The differences between these alternatives are as follows:

- Alternatives LF03SS2 and LF03SS3 (for PCB soil ≥1 and <10 mg/kg) both involve containment (capping) of soil contaminated with PCBs above the ADEC Method Two cleanup level (1 mg/kg), which reduces the mobility of the contamination, but neither the toxicity nor volume.
- Alternative LF03SS3 (for PCB soil ≥10 mg/kg), removes permanently (treats) all PCB contaminated soil of the highest concentrations, thereby reducing toxicity, volume and mobility of the PCB contamination. Soil remaining on-site would exceed the PCB soil cleanup levels. PCBs are not expected to readily degrade through natural processes and no LTM is proposed.
- Alternatives LF03SS5 and LF03SS6 would remove contamination from the site to cleanup levels (1 mg/kg) through excavation, thereby reducing the mobility of the contamination at the site. Neither alternative involves treatment of the soil to destroy the PCBs; therefore, neither the toxicity nor volume of contamination would be reduced. However, Alternative LF03SS6 would permanently remove the suspected source of the PCB contamination (the landfill), which would be beneficial to the protection of human health and the environment.

Alternative LF03SS4 (excavation, ex-situ treatment, and on-site disposal) fully meets this criterion because it excavates and then treats the contaminated soil, thereby resulting in the permanent reduction of toxicity, mobility, and volume of the PCB-contaminated soil. The high-

temperature incineration would permanently remove the PCB contamination and leave behind very little waste.

2.11.1.5 Short-Term Effectiveness

Alternative LF03SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives LF03SS2, LF03SS3, LF03SS4, LF03SS5, and LF03SS6 all fully meet this criterion in that they are highly effective. They all introduce risk to workers based on the use of heavy equipment and exposure to airborne dust, likely to be created during capping or excavation and/or transportation of the contaminated soil. All of these risks can be mitigated, however, through normal safety precautions such as proper site control, dust control, proper use of personal protective equipment (PPE), and/or proper transportation techniques. Additionally, for Alternative LF03SS4, the incineration of the soil would result in smoke, which, for workers, would need to be mitigated with proper use of PPE and proper operation of the incinerator to ensure a clean and complete burn of PCBs. Environmental impacts could result from airborne dust, spills during transportation of contaminated soil, smoke (air quality) during incineration (Alternative LF03SS4 only). These impacts could be mitigated by proper dust control and proper transportation techniques, and for Alternative LF03SS4, proper operation of the incinerator. Due to the short duration of the remedial actions under these alternatives, the period of risk would be limited.

2.11.1.6 Implementability

Alternative LF03SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives LF03SS2 (institutional controls, engineering controls, and containment), LF03SS3 (PCB soil ≥10 mg/kg: excavation and off-site disposal; PCB soil ≥1 and <10 mg/kg: institutional controls, engineering controls and containment), and LF03SS5 (excavation and off-site disposal) fully meet this criterion in that they are highly effective. The alternatives are readily implementable and require no construction of additional facilities. The services required to implement the alternatives may be procured locally or from Anchorage. Confirmation sampling following the excavation of the soil (LF03SS3 and LF03SS5) would document the effectiveness of the remedies. Additional remedial actions would not be required with these alternatives.

Alternatives LF03SS4 (excavation, ex-situ treatment, and on-site disposal) and LF03SS6 (excavation of landfill debris and soil and off-site disposal) partially meet this criterion in that they are moderately effective. Site conditions (including the remote location) increase construction and operation difficulties. Confirmation sampling following the excavation/treatment of the soil/waste would document the effectiveness of the remedies. The differences between these alternatives are as follows:

- Alternative LF03SS4 would require large amounts of equipment and fuel to be mobilized to the site and the construction of additional structures to support incineration. Most likely, the services and equipment required to implement incineration of soil would be procured from Anchorage.

- The excavation of a landfill under Alternative LF03SS6 will involve significant characterization of an unknown volume and extent of waste. Wastes would need to be segregated and disposed of appropriately. The services required to implement the excavation and subsequent transportation of the contaminated waste to a disposal facility may be procured locally or from Anchorage.

2.11.1.7 Cost

Table 2-36 presents the cost comparison for all LF003 surface soil action alternatives.

No costs are associated with the no action alternative (LF03SS1).

The least costly alternative is LF03SS5, which excavates all contaminated soil, disposes of soil in an off-site landfill, and does not include land use controls, treatment, or monitoring, which would increase the cost primarily due to the long-term time commitment.

The second and third least costly alternatives are LF03SS2 and LF03SS3 (which are within approximately $140,000 of one another). Alternative LF03SS2 involves construction of an approximately 6,000-square foot soil cap and land use controls, which requires follow-on monitoring for up to 30 years. Alternative LF03SS3 excavates only soil contaminated ≥10 mg/kg PCBs (73 cy) and caps the remainder (approximately 3,800 square ft / 154 cy), with implementation of land use controls, which requires follow-on monitoring for up to 30 years.

Alternative LF03SS4 is the next most expensive alternative, which involves ex-situ thermal treatment. Thermal treatment becomes cost-effective with a minimum volume of 5,000 cy of material. This site has only approximately 227 cy of contaminated soil, making it less economical.

Alternative LF03SS6 (excavation and disposal of the entire landfill contents) is significantly more costly than the other alternatives primarily due to the expected (yet unknown) large quantity of contaminated debris, soil and sediment that must be excavated and disposed of off-site. While these costs may be reduced significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs will still remain significantly higher than all other alternatives.

Table 2-36 Cost Comparison of LF003 Surface Soil Alternatives

Alternative	Total Present Value
LF03SS2 – Institutional Controls, Engineering Controls, and Containment	$1,191,785
LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls, Engineering Controls and Containment	$1,328,809
LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal	$1,894,240
LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal	$816,269
LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal	$40,577,885

2.11.2 LF003 Sediment alternatives (LF03SD)

The following subsections compare the four selected remedial alternatives for sediment at the Landfill No. 2 (LF003) to each other, based on their ratings against the evaluation criteria. Table 2-37 summarizes the ratings for each alternative.

Table 2-37 LF003 Sediment Alternatives Individual Analysis Ratings

Alternative	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 (Estimated TPV)
LF03SD1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
LF03SD2 – Institutional Controls and Engineering Controls	FAIL	FAIL	NA	NA	NA	NA	$655,146
LF03SD3 – Excavation, Off-Site Disposal, and Long-Term Monitoring	PASS	PASS	M	I	H	M	$1,072,016
LF03SD4 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	M	M	H	M	$2,128,580

Notes:

ARAR	applicable or relevant and appropriate requirement
H	Highly effective alternative / fully meets criterion
M	Moderately effective alternative / partially meets criterion
I	Ineffective alternative / does not meet criterion
NA	not applicable
TPV	total present value

2.11.2.1 Overall Protection of Human Health and the Environment

The no action alternative (LF03SD1) and LF03SD2 (institutional controls and engineering controls) does not provide protection of human health and the environment and therefore does not meet the criterion. Chemical-specific ARARs would not be met and risks would remain at their current level.

Alternatives LF03SD3 (excavation and off-site disposal) and LF03SD4 (excavation, ex-situ treatment, and on-site disposal) meet this criterion; therefore, they pass this analysis. Both alternatives would excavate and remove the contaminated sediment currently present. These alternatives meet chemical-specific ARARs with regard to removal of the contaminated sediment currently present, thereby providing protection for human health and the environment. Alternative LF03SD4 would treat contaminated sediment, whereas LF03SD3 would place contaminated sediment into an off-site landfill.

Neither alternative LF03SD3 nor LF03SD4 would remove the source of the PCBs, which is thought be the landfill itself. It is anticipated that contaminated sediment will continue to migrate from the landfill via the seep. However, since the source of PCB-contaminated sediment will not be permanently removed from the site, risk remains. The eroded soil control barriers that would be installed for both alternatives would help protect human health and the environment by collecting (and allowing for subsequent disposal of) run-off water that may contain contaminated sediment, in addition to sediment itself, in order to protect surface water (Fowler Creek).

2.11.2.2 Compliance with ARARs

Alternative LF03SD1 (no action) fails to meet this criterion. Contaminants in sediment currently exceed chemical-specific ARARs and are not expected to degrade over time. Site risks would remain at current levels.

Alternative LF03SD2 (institutional controls and engineering controls) also fails to meet this criterion. Contaminants in sediment currently exceed chemical-specific ARARs and are not expected to degrade over time. While ICs/ECs would reduce risk of exposure to some extent, the exposure pathway would still exist and results in this alternative's failure to meet the criterion.

Alternatives LF03SD3 (excavation and off-site disposal) and LF03SD4 (excavation, ex-situ treatment, and on-site disposal) meet this criterion; therefore, they pass this analysis. Both alternatives would remove contamination from the site, thereby meeting chemical-specific ARARs at the site. Analytical confirmation samples would documents that chemical-specific ARARs were met. While the excavation would remove the contaminated sediment currently present, it will not remove the source of the lead and PCBs, which is thought to be the landfill itself. Because this alternative would not permanently remove the suspected source of lead- and PCB-contaminated sediment from the site, COC levels would likely rebound after initial excavation.

2.11.2.3 Long-Term Effectiveness and Permanence

Alternatives LF03SD1 (no action) and LF03SD2 (institutional controls and engineering controls) did not meet the two threshold criteria; therefore, these are not viable alternatives and further evaluation under this criterion is not applicable.

Alternatives LF03SD3 and LF03SD4 partially meet this criterion in that they are moderately effective primarily because although the excavation would remove the contaminated sediment currently present, it will not remove the source of the PCBs, which is thought to be the landfill itself. For this reason, COC levels of PCBs in sediment would likely rebound after initial excavation:

- Alternative LF03SD3 would excavate and remove the contaminated sediment and dispose of it off-site, thereby leaving no untreated collected waste on-site after post-treatment residuals.
- Alternative LF03SD4 treats and thereby reduces the PCB contamination on-site to cleanup levels (1 mg/kg). The use of high-temperature incineration as a treatment results in little residual waste and the treated sediment would be sampled and analyzed. Only after cleanup levels were confirmed would the sediment be disposed of on-site.

2.11.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives LF03SD1 (no action) and LF03SD2 (institutional controls and engineering controls) did not meet the two threshold criteria; therefore, these are not viable alternatives and further evaluation under this criterion is not applicable.

Alternative LF03SD3 (excavation and off-site disposal) does not meet this criterion. This alternative would reduce the mobility of the contamination through excavation, though excavation is not considered a treatment. This alternative does not involve treatment of the sediment to destroy the PCBs; therefore, neither the toxicity nor volume of contamination would be reduced.

Alternative LF03SD4 (excavation, ex-situ treatment, and on-site disposal) fully meets this criterion because it excavates and then treats the contaminated sediment, thereby resulting in the permanent reduction of toxicity, mobility, and volume of the PCB-contaminated sediment. The high-temperature incineration would permanently remove the PCB contamination and leave behind very little waste.

2.11.2.5 Short-Term Effectiveness

Alternatives LF03SD1 (no action) and LF03SD2 (institutional controls and engineering controls) did not meet the two threshold criteria; therefore, these are not viable alternatives and further evaluation under this criterion is not applicable.

Alternative LF03SD3 (excavation and off-site disposal) and Alternative LF03SD4 (excavation, ex-situ treatment, and on-site disposal) fully meet this criterion in that they are highly effective. They both introduce risk to workers based on the use of heavy equipment and exposure to airborne dust, likely to be created during excavation and/or transportation of the contaminated soil. All of these risks can be mitigated, however, through normal safety precautions such as proper site control, dust control, proper use of PPE, and/or proper transportation techniques. Environmental impacts could result from airborne dust and/or spills during transportation of contaminated soil. These impacts could be mitigated by proper dust control and proper

transportation techniques. Due to the short duration of the remedial actions under these alternatives, the period of risk would be limited.

The differences between alternatives LF03SD3 and LF03SD4 are as follows: Under Alternative LF03SD4, the remedial action of high-temperature incineration of sediment would result in smoke, which, for workers, would need to be mitigated with proper use of PPE and proper operation of the incinerator to ensure a clean and complete burn of PCBs. Additional environmental impacts under this alternative could result from smoke (air quality) during incineration, which would be mitigated by proper operation of the incinerator to ensure a clean and complete burn. Due to the short duration of the remedial actions under these alternatives, the period of risk would be limited.

2.11.2.6 Implementability

Alternatives LF03SD1 (no action) and LF03SD2 (institutional controls and engineering controls) did not meet the two threshold criteria; therefore, these are not viable alternatives and further evaluation under this criterion is not applicable.

Alternatives LF03SD3 (excavation and off-site disposal) and LF03SD4 (excavation, ex-situ treatment, and on-site disposal) partially meet this criterion in that they are moderately effective. Site conditions (including the remote location) increase construction and operation difficulties. The sediment is located within a boulder field, and accessing the sediment would require the transportation and use of heavy equipment to relocate the boulders. For this same reason, the small volume (20 cy) of sediment may be difficult to collect. Confirmation sampling following the excavation of the soil (both alternatives) would document the effectiveness of the remedies. The services required to implement the alternatives may be procured locally or from Anchorage.

The differences between these alternatives are as follows: Alternative LF03SD3 requires no construction of additional facilities whereas Alternative LF03SD4 would require equipment and fuel to be mobilized to the site and the construction of additional structures to support the incineration technology for a small volume of sediment.

2.11.2.7 Costs

Table 2-38 presents the cost comparison for all LF003 sediment action alternatives.

No costs are associated with the no-action alternative (LF03SD1).

The least costly alternative is LF03SD2 because it involves only land use control installation and maintenance, both of which are relatively inexpensive actions; however, this alternative was determined not to be a viable alternative.

The second least costly alternative is LF03SD3 because it involves excavation of all contaminated sediment and disposal, but not treatment.

The most expensive alternative is LF03SD4, because it involves mobilization of additional equipment to Cape Romanzof for treatment of the sediment. Thermal treatment becomes cost-effective with a minimum volume of 5,000 cy of material, whereas this site has only 16 bank cy of contaminated sediment. While these costs may be reduced significantly through economy of

scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs will still remain significantly higher than all other alternatives.

Table 2-38 Cost Comparison of LF003 Sediment Action Alternatives

Alternative	Total Present Value
LF03SD2 – Institutional Controls and Engineering Controls	$655,146
LF03SD3 – Excavation, Off-Site Disposal, and Long-Term Monitoring	$1,072,016
LF03SD4 – Excavation, Ex-Situ Treatment, and On-Site Disposal	$2,128,580

2.11.3 SS010 Subsurface Soil Alternatives (SS10SB)

The following subsections compare the five selected remedial alternatives for subsurface soil at Spill/Leak No. 4 at the Weather Station Building (SS010) to each other, based on their ratings against the evaluation criteria. Table 2-39 summarizes the ratings for each alternative.

Table 2-39 SS010 Subsurface Soil Alternatives Individual Analysis Ratings

Alternative	Overall protection of human health and the environment	Compliance with Alaska State Laws and Regulations	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness	Implementability	Cost (Estimated TPV)
SS10SB1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS10SB2 – Institutional Controls	PASS	PASS	M	I	M	H	$674,171
SS10SB3 – Institutional Controls, In-Situ Treatment and LTM	PASS	PASS	H	H	M	M	$1,733,456
SS10SB4 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	H	$916,465
SS10SB5 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	$13,061,623

Notes:

H	Highly effective alternative / fully meets criterion
M	Moderately effective alternative / partially meets criterion
I	Ineffective alternative / does not meet criterion
ARAR	applicable or relevant and appropriate requirement
LTM	long-term monitoring
NA	not applicable
TPV	total present value

2.11.3.1 Overall Protection of Human Health and the Environment

The no action alternative (SS10SB1) does not provide protection of human health and the environment and therefore fails to meet the criterion.

The four action alternatives all meet this criterion; therefore, they pass this analysis. The differences between the alternatives are as follows:

- Alternative SS10SB2 (institutional controls) would not treat the DRO contamination in the subsurface soil, nor would the alternative document the effect of natural degradation of fuel contamination over time; therefore, compliance with Alaska state laws and regulations would not be able to be confirmed. Property use restrictions would provide protection for human health and the environment by preventing intrusive activities that could expose contaminated material present at least 2 ft bgs. Risk to the environment would be low due the non-invasive aspect of this alternative.
- Under Alternative SS10SB3, the DRO-contaminated soil would be treated in-situ with enhanced bioremediation, resulting in a reduction of the total mass of contaminated subsurface soil, thereby reducing toxicity, mobility, and volume. This process should be complete within five (5) years, after which the soil would meet applicable cleanup levels. The oxygenate that would be used in the remediation would be consumed by the biological mechanisms; there would be no residual chemicals. Handling chemicals (oxygenates) would pose a risk to workers, but could be mitigated with the use of proper PPE and proper chemical handling techniques. Property use restrictions would provide protection for human health by preventing intrusive activities that could expose contaminated material present at least 2 ft bgs. Risk to the environment would be low due the non-invasive aspect of this alternative.
- Alternative SS10SB4 would permanently remove all unacceptable levels of soil contamination from the site and actively treat the contamination (with land spreading) to reduce toxicity, mobility, and volume. This process should be complete within five (5) years, after which the soil would meet cleanup levels. Risk to workers would exist due to potential for creation of contaminated airborne dust during excavation, handling, and treatment of contaminated soil. This risk could be reduced through dust mitigation and with proper use of PPE by workers. Risk to the environment would exist due to potential for airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques. Environmental impacts caused by erosion and dust from excavation could be mitigated by revegetating the area.
- Alternative SS10SB5 involves no treatment of contamination but it permanently removes the contamination from the site. Therefore, the mobility is reduced but not the volume or toxicity of the contaminated soil. After excavation of the contamination, the remaining soil would meet cleanup levels. Since this alternative involves no active treatment of contamination, worker's exposure to risk is somewhat lower than Alternatives SS10SB3 or SS10SB4 because the workers would spend less time on-site handling the contaminated soil. Potential environmental impacts caused by erosion from excavation and construction could be mitigated by revegetating the area.

2.11.3.2 Compliance with Alaska State Laws and Regulations

The no action alternative (SS10SB1) fails to meet this criterion. It does not comply with Alaska state laws and regulations. The site risks would remain at the current level.

Alternatives SS10SB2 (institutional controls), SS10SB3 (institutional controls, in-situ treatment and LTM), SS10SB4 (excavation, ex-situ treatment and on-site disposal), and SS10SB5 (excavation and off-site disposal) all pass this analysis thereby meeting this criterion. The differences between these alternatives are as follows:

- Alternative SS10SB2 would prevent access to the contamination through the enforcement of Land Use Controls. Over time, fuel contamination is expected to naturally degrade to levels that will be in compliance with Alaska state laws and regulations.

- Alternatives SS10SB3 and SS10SB4 would treat the contaminated subsurface soil. Confirmation sampling following the treatment would document the effectiveness of the remedy, with compliance with Alaska state laws and regulations expected to be achieved within approximately five (5) years.

- Alternative SS10SB5 would permanently remove but not treat the DRO-contaminated subsurface soil from the site and comply with Alaska state laws and regulations when confirmation samples prove the effectiveness of the excavation.

2.11.3.3 Long-Term Effectiveness and Permanence

Alternative SS10SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS10SB2 (institutional controls) partially meets this criterion. Though contaminants in subsurface soil are expected to permanently degrade over time through natural processes, the lack of LTM that would provide for assessment of the effectiveness of the remedy would reduce the score for this alternative.

Alternatives SS10SB3 (institutional controls, in-situ treatment and LTM), SS10SB4 (excavation, ex-situ treatment and on-site disposal), and SS10SB5 (excavation and off-site disposal) fully meet this criterion in that they are highly effective. The differences between these alternatives are as follows:

- Alternatives SS10SB3 and SS10SB4 would both treat the contaminated subsurface soil (via bioremediation and land spreading, respectively), and when samples confirm that DRO-contaminated soil is below cleanup levels and compliance with Alaska state laws and regulations have been met, no residual contamination and no risk would remain. The oxygenate chemicals used for Alternative SS10SB3 would be consumed and no residuals would remain.

- Alternative SS10SB5 would excavate and dispose of the contaminated soil off-site, but would not treat it. When samples confirm that treatment is complete, and compliance with Alaska state laws and regulations have been met, no residual contamination and no risk would remain on-site.

2.11.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SS10SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS10SB2 (institutional controls) does not meet this criterion. This alternative proposes no treatment and does not include actual reduction of the toxicity, mobility, and volume of the DRO-contaminated subsurface soil. Although natural attenuation would occur over time, no LTM is planned to document contaminant concentrations.

Alternative SS10SB5 (excavation and off-site disposal) does not meet this criterion. This alternative would reduce the mobility of the contamination through excavation and disposal off-site, but since this does not involve treatment, neither the toxicity nor volume of contaminated soil would be reduced.

Alternatives SS10SB3 (institutional controls, in-situ treatment and LTM), and SS10SB4 (excavation, ex-situ treatment and on-site disposal) both fully meet this criterion in that they are highly effective. Both alternatives treat the DRO-contaminated subsurface soil (SS10SB3 by bioremediation and SS10SB4 by land spreading), thereby reducing toxicity, mobility, and volume of contaminants in sediment. When samples confirm that treatment is complete and cleanup levels have been met, no residual contamination and no risk would remain. The oxygenate chemicals used for Alternative SS10SB3 would be consumed in the treatment process.

2.11.3.5 Short-Term Effectiveness

Alternative SS10SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS10SB2 (institutional controls), SS10SB3 (institutional controls, in-situ treatment and LTM), and SS10SB4 (excavation, ex-situ treatment and on-site disposal) all partially meet this criterion in that they are moderately effective. Normal safety precautions would mitigate risk to workers. The differences between these alternatives are as follows:

- Alternative SS10SB2 would rely on natural processes to remediate DRO contamination in the subsurface soil. Property use restrictions would be required to provide protection for human health and the environment until cleanup levels were met.
- Under Alternative SS10SB3, the contaminated soil would be treated in-situ with enhanced bioremediation, which should be complete within five (5) years, after which the soil would meet cleanup levels. Property use restrictions would be required to provide protection for human health and the environment until cleanup levels were met. Contaminated material would remain in place during the treatment process, maintaining the current exposure risk, although that risk is low due to the depth of contamination. Handling chemicals (oxygenates) would pose a risk to workers but could be mitigated with the use of proper PPE and proper chemical handling techniques.
- Alternative SS10SB4 would use land spreading to treat the contaminated subsurface soil, which should be complete within five (5) years, after which the soil would meet cleanup levels. Risk to workers would exist due to creation of potential DRO-contaminated airborne dust during excavation, handling, and treatment of contaminated soil. This risk could be reduced through dust mitigation and with proper use of PPE by workers. Risk to the environment would exist due to potential airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques.

Alternative SS10SB5 (excavation and off-site disposal) would fully meet this criterion in that it is highly effective because it removes the contamination from the site. Cleanup levels would be met quickly. This alternative involves no treatment of contamination, so it exposes workers to somewhat lower risk levels than Alternatives SS10SB3 or SS10SB4 because the workers would spend less time on-site handling the contaminated soil. This alternative protects the environment by permanently removing the contaminated soil. Normal safety precautions would mitigate risk to workers. Potential environmental impacts caused by erosion from excavation could be mitigated by revegetating the area.

2.11.3.6 Implementability

Alternative SS10SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS10SB3 partially meets this criterion. Site conditions (including the remote location) increase construction and operation difficulties. This alternative requires construction of additional facilities on-site (i.e., temporary chemical storage tanks and an infiltration gallery). The services required to implement the alternative are not difficult to procure but the equipment required to do so may be considered specialty equipment and can be limited in availability. Confirmation sampling following the treatment process would document the effectiveness of the remedy. The chemical treatment is reliable, though multiple applications could be required.

Alternatives SS10SB2, SS10SB4, and SS10SB5 fully meet this criterion. Site conditions (including the remote location) increase construction and operation difficulties. Otherwise, these alternatives are readily implementable and the chosen technologies are not labor intensive. The differences between these alternatives are as follows:

- Alternative SS10SB2 would not require excavation or construction of additional facilities.
- Under Alternative SS10SB4, the land spreading technique would require minimal maintenance of the soil and no construction of additional facilities. The construction services required to excavate and mound the soil may be procured locally or from Anchorage.
- Alternative SS10SB5 requires no construction of additional facilities. The services required to implement the excavation and subsequent transportation of the contaminated soil to a disposal facility may be procured locally or from Anchorage. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Additional remedial actions would not be required with this alternative.

2.11.3.7 Costs

Table 2-40 presents the cost comparison for all SS010 subsurface soil action alternatives.
No costs are associated with the no-action alternative (SS10SB1).

The two least costly alternatives are SS10SB2 and SS10SB4. The expenses involved with SS10SB2 consist primarily of the development and management of land use controls. Alternative SS10SB4 costs are related primarily to the excavation and ex-situ biological treatment of the fuel contaminated soil (with bio piles or land farming).

The third least costly alternative is SS10SB3. The costs for this alternative are nearly double those of either Alternative SS10SB2 or SS10SB4 because it involves land use controls and treatment of the contaminated soil. While the treatment (bioremediation) requires few chemicals, the labor and analysis associated with LTM over 30 years increases the cost.

Alternative SS10SB5 is the most expensive, at over 10 times the expense of SS10SB2, the cost of which is primarily due to the expense of excavating over 3,500 cy of contaminated soil and off-site disposal. While these costs may be reduced significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs will still remain significantly higher than all other alternatives.

Table 2-40 Cost Comparison of SS010 Subsurface Soil Action Alternatives

Alternative	Total Present Value
SS10SB2 – Institutional Controls	$674,171
SS10SB3 – Institutional Controls, In-Situ Treatment and LTM	$1,733,456
SS10SB4 – Excavation, Ex-Situ Treatment and On-Site Disposal	$916,465
SS10SB5 – Excavation and Off-Site Disposal	$13,061,623

Notes:
LTM long-term monitoring

2.11.4 SS010 Groundwater Alternatives (SS10GW)

The following subsections compare the four selected remedial alternatives for groundwater at Spill/Leak No. 4 at the Weather Station Building (SS010) to each other, based on their ratings against the evaluation criteria. Table 2-41 summarizes the ratings for each alternative. The subsurface soil is suspected to be the potential source of any contamination in area groundwater; if the soil is not treated or removed there exists the potential for contamination to continue to leach into the groundwater.

Table 2-41 SS010 Groundwater Alternatives Individual Analysis Ratings

Alternative	Overall protection of human health and the environment	Compliance with Alaska State Laws and Regulations	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness	Implementability	Cost (Estimated TPV)
SS10GW1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS10GW2 – Institutional Controls, Natural Attenuation, and LTM	PASS	PASS	M	I	M	M	$1,041,740
SS10GW3 – Institutional Controls, In-Situ Treatment and LTM	PASS	PASS	M	M	M	M	$1,584,224
SS10GW4 – Ex-Situ Treatment and On-Site Disposal	PASS	PASS	M	M	H	M	$1,376,725

Notes:

H	Highly effective alternative / fully meets criterion
M	Moderately effective alternative / partially meets criterion
I	Ineffective alternative / does not meet criterion
ARAR	applicable or relevant and appropriate requirement
LTM	long-term monitoring
NA	not applicable
TPV	total present value

2.11.4.1 Overall Protection of Human Health and the Environment

The no action alternative (SS10GW1) does not provide protection of human health and the environment and therefore fails to meet the criterion. Compliance with Alaska state laws and regulations would not be met and risks would remain at their current level.

Alternatives SS10GW2 (institutional controls, natural attenuation and LTM), SS10GW3 (institutional controls, in-situ treatment and LTM), and SS10GW4 (ex-situ treatment and on-site disposal) all meet this criterion, thereby passing the analysis. The subsurface soil is suspected to be the potential source of any contamination in area groundwater; if it is not treated or removed, there exists the potential for additional contamination to leach into the groundwater. Normal safety precautions would mitigate risk to workers. The differences between these alternatives are as follows:

- Alternative SS10GW2 protects human health and the environment by developing and enforcing property use restrictions preventing installation of water wells in areas with contaminated groundwater during the remedial action period and assessing the potential need for additional actions to prevent impacts to surface water in Fowler Creek. The toxicity and volume of contamination in groundwater will likely be reduced through natural degradation and LTM would document the effectiveness of the remedy.
- Under Alternative SS10GW3, human health and the environment would be protected through property use restrictions, which would prevent installation of water wells in areas with contaminated groundwater (during the treatment period), in addition to the treatment

itself. Handling chemicals (oxygenates) would pose a risk to workers, but could be mitigated with the use of proper PPE and proper chemical handling techniques. The toxicity, mobility, and volume of contamination in the groundwater would be reduced through enhanced bioremediation. Confirmation sampling following the treatment would document the effectiveness of the remedy. However, if contamination from subsurface soil migrates into the groundwater after treatment is completed, there is a chance that groundwater contaminant concentrations could exceed cleanup levels in the future. Some risk to human health and the environment would therefore remain on-site.

- Alternative SS10GW4 would partially protect human health and the environment because of the reliability of the ex-situ treatment process and its ability to remove contaminants from the site. Confirmation sampling following the treatment would document the effectiveness of the remedy. However, if contamination from subsurface soil migrates into the groundwater after treatment is completed, there is a chance that groundwater contaminant concentrations could exceed cleanup levels in the future. Some risk to human health and the environment would therefore remain on-site.

2.11.4.2 Compliance with Alaska State Laws and Regulations

The no-action alternative (SS10GW1) fails to meet this criterion. Chemical-specific ARARs would not be met and risks would remain at their current level.

Alternatives SS10GW2 (institutional controls, natural attenuation and LTM), SS10GW3 (institutional controls, in-situ treatment and LTM), and SS10GW4 (ex-situ treatment and on-site disposal) all meet this criterion, thereby passing this analysis. The subsurface soil is suspected to be the potential source of any contamination in area groundwater; if it is not treated or removed, there exists the potential for additional contamination to leach into the groundwater. Table 1-1 lists potential action-specific ARARs which may be applicable should this alternative be implemented. The differences between these alternatives are as follows:

- Alternative SS10GW2 proposes natural attenuation, which, while not considered a treatment, is anticipated to eventually decrease contaminant levels below cleanup levels. This process is likely to take several decades and monitored natural attenuation does not satisfy ADEC preference for using active remediation processes whenever possible. Additionally, if contamination in subsurface soil migrates to groundwater, the natural attenuation process may take longer to achieve remediation goals
- Under Alternative SS10GW3, LTM will document that the enhanced bioremediation treatment at the site achieves compliance with Alaska state laws and regulations within approximately 5 years. Confirmation sampling would document the effectiveness of the remedy and compliance with Alaska state laws and regulations. However, if the suspected source (subsurface soil) of contamination in area groundwater is not treated or removed the potential for additional contamination to migrate to groundwater would exist. This could result in exceedances of cleanup criteria, negatively impacting compliance with Alaska state laws and regulations.
- Under Alternative SS10GW4, pump and treat technology with GAC would efficiently remove COCs from the site (within approximately 10 years). This treatment would take

approximately twice as long as the bioremediation proposed under Alternative SS10GW3. Confirmation sampling following the treatment would document the effectiveness of the remedy, which would result in meeting chemical-specific ARARs. Due to the assumption that subsurface soil may be the source of contamination, some risk to human health and the environment would remain after treatment of the groundwater, which may continue to be contaminated if the source (subsurface soil) remains in place and untreated.

2.11.4.3 Long-Term Effectiveness and Permanence

Alternative SS10GW1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS10GW2, SS10GW3, SS10GW4 partially meet this criterion in that they are moderately effective. The subsurface soil is suspected to be the potential source of any contamination in area groundwater; if it is not treated or removed, there exists the potential for additional contamination to leach into the groundwater. The differences between these alternatives are as follows:

- Alternative SS10GW2 (institutional controls, natural attenuation and LTM) does not involve active treatment, although the toxicity and volume of contamination of fuel in groundwater will likely be reduced through natural degradation and LTM would document the effectiveness of the remedy. There would be a need for institutional controls until response objectives have been met.
- Alternative SS10GW3 (institutional controls, in-situ treatment and LTM) and SS10GW4 (ex-situ treatment and on-site disposal) both involve treatment, which would result in the reduction of contaminant volume in groundwater at the site. There would be a need for institutional controls until response objectives have been met.

2.11.4.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SS10GW1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS10GW2 also does not meet this criterion because natural attenuation is not considered a "treatment," and therefore, this criterion, under strict interpretation, is not met. Once natural attenuation takes place, the process is irreversible and there would be no threat of the contamination returning or regenerating. However, if the source of the contamination (subsurface soil) is not treated or removed, the contamination could continue to leach into the groundwater.

Alternatives SS010GW3 and SS010GW4 partially meet this criterion in that they are moderately effective. The toxicity, mobility, and volume of contamination in the groundwater would be reduced through the treatment proposed under each alternative: SS010GW3 by bioremediation (approximately five years to completion) and SS010GW4 by pump and treat technology (takes approximately 10 years to completion). However, the subsurface soil is suspected to be the potential source of any contamination in area groundwater; if the soil is not treated or removed, there exists the potential for additional contamination to leach into the groundwater.

2.11.4.5 Short-Term Effectiveness

Alternative SS10GW1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS10GW2 and SS10GW3 both partially meet this criterion in that they are moderately effective. Risk to workers would be due primarily to the use of heavy equipment during remedial action. These risks could be reduced through proper site control. Risk to the environment would be low due to the non-invasive aspect of this alternative. The differences between these alternatives are as follows:

- Alternative SS10GW2 includes natural attenuation, which is not considered a treatment and may take up to 30 years to reach cleanup criteria. Risk to human health and the environment would be low due the non-invasive aspect of this alternative. Normal safety precautions would mitigate risk to workers.
- Alternative SS10GW3 involves an in-situ treatment process, which would be effective in reducing COCs. However, the process of using an in-situ chemical oxygen releaser may not be effective in reducing contaminant concentrations to levels below ADEC Table C groundwater cleanup levels for several months or more, thus short term effectiveness is not fully achievable. The hazards associated with applying the chemical are easily mitigated by following standard safety practices including the use of proper PPE. Once applied, the chemical would pose little risk to the site workers or the environment. Impacts to the environment would be minimal during remedial action because only limited sampling would be required. In addition, contaminated media would not be disturbed and would remain in place.

Alternative SS10GW4 fully meets this criterion. Treating contaminated groundwater using an ex-situ pump and treat/GAC system would likely begin to be effective in a short period of time; although the entire process could take up to 10 years. Risk to workers would be due primarily to the use of heavy equipment during remedial action. These risks could be reduced through proper site control. Risk to the environment would be low due the non-invasive aspect of this alternative.

2.11.4.6 Implementability

Alternative SS10GW1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS10GW2, SS10GW3 and SS10GW4 all partially meet this criterion in that they are moderately effective. Site conditions (including the remote location) increase construction and operation difficulties. The differences between these alternatives are as follows:

- Alternative SS10GW2 (institutional controls, natural attenuation and LTM) involves the installation of monitoring wells into rocky substrate, which will likely be difficult, as exemplified by the refusal of the drill rig to penetrate the boulder substrate beyond approximately 20 ft bgs during the 2008 RI. The construction services required to install the monitoring wells may be procured locally or from Anchorage.

- Alternative SS10GW3 (institutional controls, in-situ treatment and LTM) is readily implementable and requires no construction of additional facilities; however, it does require transportation of chemicals to the site and multiple applications of treatments. The installation of monitoring wells into rocky substrate will likely be difficult, as exemplified by the refusal of the drill rig to penetrate the boulder substrate beyond approximately 20 ft bgs during the 2008 RI fieldwork. The services required to implement the LTM program may be procured locally or can easily be procured from Anchorage, and the monitoring program would document the effectiveness of the remedy. The chemical treatment is fairly reliable. If LTM indicates that contaminant migration poses an imminent risk to downgradient groundwater bodies, additional remedial alternatives could be implemented.
- Alternative SS10GW4 would involve pumping contaminated groundwater through a GAC system and discharging the treated water on-site. This alternative would require construction of a treatment system, a system to power the treatment system, a fuel storage area and frequent monitoring of the system. In addition, regular fuel deliveries and inspections of the fueling system would be required.

2.11.4.7 Costs

Table 2-42 presents the cost comparison for all SS010 groundwater action alternatives.

No costs are associated with the no-action alternative (SS10GW1).

The least costly alternative is SS10GW2, which involves allowing the potential fuel contamination to naturally attenuate and a 30-year period of LTM to document the progress of contaminant degradation via installed monitoring wells. This alternative involves no treatment chemicals or additional facility construction.

The next least costly alternative is SS10GW4, which incorporates pump and treat technology, a system that is effective yet requires operation and maintenance for up to 30 years. This alternative would require the construction of a GAC filtration system, which would increase the cost. However, the annual operation and maintenance is the most costly aspect of this alternative.

The most expensive alternative, SS10GW3, which involves treatment (injection of a slurry), the construction of new monitoring wells, and LTM for up to 30 years. The slurry injection and monitoring both drive up the costs for this alternative. This treatment is effective but takes time.

These costs may be reduced significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization.

Table 2-42 Cost Comparison of SS010 Groundwater Action Alternatives

Alternative	Total Present Value
SS10GW2 – Institutional Controls, Natural Attenuation and LTM	$1,041,740
SS10GW3 – Institutional Controls, Engineering Controls and In-Situ Treatment	$1,584,224
SS10GW4 – Ex-Situ Treatment and On-Site Disposal	$1,376,725

Notes:
LTM long-term monitoring

2.11.5 SS016 Surface Soil Alternatives (SS16SS)

The following subsections compare the four selected remedial alternatives for surface soil contaminated with PCBs and lead at the Upper Tram Terminal Area (SS016) to each other, based on their ratings against the evaluation criteria. Table 2-43 summarizes the ratings for each alternative.

Table 2-43 SS016 Surface Soil Alternatives Individual Analysis Ratings

Alternative	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 (Estimated TPV)
SS16SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS16SS2 – Institutional Controls, Engineering Controls, and Containment	PASS	PASS	M	I	M	H	$1,028,175
SS16SS3 – *PCB Soil Hot Spots (≥10 mg/kg):* Excavation, Ex-Situ Treatment and On-Site Disposal; *PCB Soil(≥1 and <10 mg/kg)*: Institutional Controls and Engineering Controls	PASS	PASS	M	M	M	M	$4,857,366
SS16SS4 – *PCB Soil (≥1 mg/kg):* Excavation, to the extent feasible, and Off-Site Disposal	PASS	PASS	M	I	M	M	$795,743/ $1,205,386 [1]

Notes:
[1] If all contaminated soil can be removed, cost is estimated at $795,743; if site conditions (safety and logistics) result in PCBs ≥1 mg/kg left on-site and capped, the cost increase for cap and IC installation and maintenance for 30 years would be $409,643, for a total estimated cost of $1,205,386.

ARAR	applicable or relevant and appropriate requirement	mg/kg	milligrams per kilogram
H	Highly effective alternative / fully meets criterion	NA	not applicable
M	Moderately effective alternative / partially meets criterion	PCB	polychlorinated biphenyl
I	Ineffective alternative / does not meet criterion	TPV	total present value

2.11.5.1 Overall Protection of Human Health and the Environment

The no action alternative (SS16SS1) would not provide protection of human health and the environment and therefore fails to meet the criterion. Soil contaminated with PCBs and lead above cleanup levels (1 mg/kg and 400 mg/kg respectively) protective of human health and the environment would remain on-site and be a risk for the foreseeable future.

Alternatives SS16SS2 (institutional controls, engineering controls, and containment), SS16SS3 (PCB soil hot spots ≥10 mg/kg: excavation, ex-situ treatment, and on-site disposal; and PCB soil ≥1 and <10 mg/kg: institutional controls and engineering controls), and SS16SS4 (PCB soil ≥1 mg/kg and lead ≥400 mg/kg: excavation, to the extent feasible, and off-site disposal) all meet this criterion, thereby passing this analysis. All three alternatives protect human health by denying access to the site via property use restrictions and signs. Lead contamination is located in areas of PCB contamination and would be addressed by the PCB soil remedy. The differences between these alternatives are as follows:

- Alternative SS16SS2 protects human health and the environment by placing a cap over the contaminated soil, which would prevent physical contact with contaminated soil and reduce the amount of dust contaminated with PCBs and lead from blowing from the site. This cap is not impermeable; therefore, it will not prevent water from reaching the contaminated soil, possibly leading to erosion. However, with the use of eroded soil control barriers, run-off water possibly containing contaminated soil would be prevented from migrating beyond the contaminated areas. The toxicity and volume of contamination in shallow soil would not be reduced through natural degradation. Capping the soil, in conjunction with the soil barriers, would reduce the mobility of contaminants. Normal safety precautions would mitigate risk to workers.
- Alternative SS16SS3 protects human health and the environment by treatment of the highest concentrations of PCB and lead contaminated soil (≥10 mg/kg and ≥400 mg/kg respectfully) and capping the remaining PCB-contaminated soil. The driving force for leaving contaminated soil behind is protection of workers from the safety hazards intrinsic in attempting cleanup activities near or along the steep, boulder-covered slope at this source area. Only the most contaminated soil would be excavated, thereby balancing the risk to workers of the remediation effort with the risk to their health. By excavating and treating soil with the highest contamination levels, a portion of the contamination would be permanently removed and treated to reduce toxicity and mobility. However, contaminated soil ≥1 and <10 mg/kg would remain on site. PCB and lead contamination would not be reduced through natural degradation. Normal safety precautions would mitigate risk to workers. Potential environmental impacts caused by erosion from excavation and construction could be mitigated by replacing the boulders and rocks.
- Alternative SS16SS4 protects human health and the environment by excavation and off-site disposal of PCB and lead contaminated soil ≥1 mg/kg and ≥400 mg/kg respectfully. This alternative meets chemical-specific ARARs by removing contaminated soil. Because the site is on a steep, boulder-covered slope, this alternative includes the option to cap contaminated soil in-place when it is determined to be unsafe to excavate. Normal safety precautions would mitigate risk to workers. Potential environmental impacts

caused by erosion from excavation and construction could be mitigated by replacing the boulders and rocks.

2.11.5.2 Compliance with ARARs

The no action alternative (SS16SS1) would not treat the surface soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment (above cleanup levels ≥1 mg/kg and ≥400 mg/kg, respectively). Therefore, contamination would remain on-site and would not be in compliance with ARARs. PCBs and lead are not expected to degrade in a reasonable timeframe.

All three of the action alternatives (SS16SS2, SS16SS3, or SS16SS4) meet this criterion, thereby passing this analysis. Each would leave soil contaminated with PCBs and lead at concentrations above cleanup levels on-site, with the possible exception of SS16SS4, but contaminated areas would have engineering controls to prevent access to the contaminated soil. PCBs and lead are not expected to degrade in a reasonable timeframe. These alternatives, however, balance the hazards of PCB contaminated soil with the protection of the workers at this remote location. The contaminated soil may be left in place (untreated) and not excavated due to the safety hazards intrinsic in attempting cleanup activities near or along the steep, boulder-covered slope at this source area. The difference between these alternatives is as follows:

- Alternative SS16SS2 (institutional controls, engineering controls, and containment) would place a cap over PCB- and lead-contaminated soil. PCBs and lead are not expected to degrade in a reasonable timeframe.

- Alternatives SS16SS3 (PCB soil hot spots ≥10 mg/kg: excavation, ex-situ treatment, and on-site disposal and PCB soil ≥1 and <10 mg/kg: institutional controls and engineering controls) and SS16SS4 (PCB soil ≥1 mg/kg: excavation, to the extent feasible, and off-site disposal) would treat or remove from the site soil contaminated with PCBs (≥10 mg/kg for SS16SS, and ≥1 mg/kg, to the extent feasible, for SS16SS4). Soil from a local borrow source would be used to backfill the excavated areas. Remaining contaminated soil would be capped.

2.11.5.3 Long-Term Effectiveness and Performance

Alternative SS16SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS16SS2 and SS16SS3 both partially meet this criterion in that they are moderately effective. Both would involve the use of institutional and engineering controls to mitigate residual risk of leaving contamination on site, which would require constant monitoring and maintenance indefinitely. Alternative SS16SS4 would be highly effective provided all soil is removed; any soil that cannot be safely removed would be capped and institutional and engineering controls would be implemented. The differences between these alternatives are as follows:

- Alternative SS16SS2 (institutional controls, engineering controls, and containment) does not include actual reduction of the contaminant mass in soil at site SS016; therefore,

residual risk would remain as calculated in the 2009 RI and five-year reviews would be necessary.

- Alternatives SS16SS3 (PCB soil hot spots ≥10 mg/kg: excavation, ex-situ treatment, and on-site disposal and PCB soil ≥1 and <10 mg/kg: institutional controls and engineering controls), and SS16SS4 (PCB soil ≥1 mg/kg: excavation, to the extent feasible, and off-site disposal) would both treat or remove all soil above 10 mg/kg PCBs permanently, but with SS16SS3, PCB soil ≥1 and <10 mg/kg would remain in place while SS16SS4 would attempt to remove all PCB-contaminated soil to ≥1 mg/kg and lead ≥400 mg/kg. Any PCB- and/or lead-contaminated soil remaining would pose some risk because PCBs and lead do not readily attenuate.

2.11.5.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SS16SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS16SS2 and SS16SS4 each reduce some but not all of the three aspects of this criterion, resulting in an ineffective rating. The differences between these alternatives are as follows:

- Alternative SS16SS2 (institutional controls, engineering controls, and containment) does not propose any action that is considered "treatment." Capping partially contains contaminants, thereby decreasing their mobility rather than treating them. The toxicity and volume of the PCB- and lead-contaminated soil would not degrade through natural processes. No LTM would be conducted.
- Alternative SS16SS4 (PCB soil ≥1 mg/kg: excavation, to the extent feasible, and off-site disposal), soils ≥1 mg/kg PCB would be excavated, which is not considered a "treatment." While excavation would effectively reduce the mobility and volume of some of the PCB contamination at the site that poses a threat to the threshold criteria of "overall protection of human health and the environment," without treatment, the toxicity of the contamination would not be reduced.

Alternative SS16SS3 (PCB soil hot spots ≥10 mg/kg: excavation, ex-situ treatment, and on-site disposal and PCB soil ≥1 and <10 mg/kg: institutional controls and engineering controls) presents two separate actions, depending on the PCB concentration. Soils ≥10 mg/kg PCB would be excavated and treated, thereby effectively reducing the toxicity, mobility, and volume of PCB and lead contamination at the site that posed a threat to the threshold criteria of "overall protection of human health and the environment." However, leaving in place soil contaminated with ≥1 and <10 mg/kg PCBs will not be protective of human health and the environment. Therefore, this alternative earns a moderately effective rating.

2.11.5.5 Short-Term Effectiveness

Alternative SS16SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS16SS2, SS16SS3, and SS16SS4 all partially meet this criterion in that they are moderately effective. For all action alternatives, the risk to workers would be due primarily to the proximity of the site to the steep edge of a boulder-covered mountain, which is the driver for proposing to leave some PCB- and lead-contaminated (above cleanup criteria) soil on site. Risk to workers would also be due to the use of equipment to install signs, which could be reduced through proper site control. The differences between these alternatives are as follows:

- Alternative SS16SS2 (institutional controls, engineering controls, and containment) does not involve treatment; therefore, the risk remains. Risk to the environment would be low due the non-invasive aspect of this alternative.
- Alternative SS16SS3 (PCB soil hot spots ≥10 mg/kg: excavation, ex-situ treatment, and on-site disposal and PCB soil ≥1 and <10 mg/kg: institutional controls and engineering controls) would pose risk to workers due to the creation of airborne dust during remedial action and the use of chemicals to treat the contaminated soil (where PCBs ≥10 mg/kg). This risk could be reduced through dust mitigation, proper use of PPE, and proper handling of chemicals. Risk to the environment would exist due to airborne dust and chemical spills during soil washing of the contaminated soil. These risks could be reduced through dust mitigation and proper chemical handling techniques. Due to the short duration of the remedial action under this alternative, the period of risk would be limited. In leaving all soil ≥1 and <10 mg/kg PCBs in place, there would be little risk to workers except during use of equipment to install signs. This is not an effective strategy to reach remedial objectives, but limiting work on a steep cliff is in the best interest of the safety of the workers.
- Alternative SS16SS4 (PCB soil ≥1 mg/kg: excavation, to the extent feasible, and off-site disposal) would also pose the risk to workers due to and the creation of airborne dust during remedial action (where PCBs ≥1 mg/kg and lead ≥400 mg/kg). This risk could be reduced through dust mitigation and proper use of PPE. Risk to the environment would exist due to airborne dust and the chance of spilling the soil during transportation off-site. These risks could be reduced through dust mitigation and proper transportation techniques. Due to the short duration of the remedial action under this alternative, the period of risk would be limited. This is not an effective strategy to reach remedial objectives, but limiting work on a steep cliff is in the best interest of the safety of the workers.

2.11.5.6 Implementability

Alternative SS16SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS16SS2 fully meets this criterion, in that it is highly effective. Site conditions (including the remote location) increase construction and operation difficulties. The alternative is readily implementable. Although it does require the construction of a cap and installation of signs near the steep, boulder-covered slope, both are simple construction tasks. The construction services required to install the cap and signs may be procured locally or from Anchorage.

Alternatives SS16SS3 and SS16SS4 both partially meet this criterion in that they are moderately effective. Site conditions (a steep, boulder-covered slope at a remote location) increase construction and operation difficulties. The differences between these alternatives are as follows:

- Alternative SS16SS3 would require large amounts of equipment and fuel to be mobilized to the site and the construction of additional structures to support this technology. In addition, construction of impoundment structures and the storage and handling of process chemicals and residual waste products pose additional risk to workers and the environment. All of these factors reduce technical feasibility and may decrease state and community acceptance of this alternative. The services required to implement the excavation and treatment of the contaminated soil may be procured locally or from Anchorage. Confirmation sampling following the treatment of soils with PCBs ≥10 mg/kg would document the effectiveness of the remedy.
- Alternative SS16SS4 is readily implementable and, unlike Alternative SS16SS3, requires no construction of additional facilities. The services required to implement the excavation and transportation of the contaminated soil may be procured locally or from Anchorage. Confirmation sampling following the excavation and disposal of soils with PCBs ≥1 mg/kg and lead ≥400 mg/kg would document the effectiveness of the remedy. If successful, additional remedial actions would not be required with this alternative. If contaminated soil must be left in-place due to safety concerns, construction of a cap and installation of signs near the steep, boulder-covered slope would be required; however, these are simple construction tasks.

2.11.5.7 Costs

Table 2-44 presents the cost comparison for all SS016 surface soil action alternatives. No costs are associated with the no-action alternative (SS16SS1).

No costs are associated with the no-action alternative (SS16SS1).

The least costly alternative is SS16SS4 if all contaminated soil is successfully removed. This alternative involves excavating and disposing of soil contaminated with ≥1 mg/kg PCBs (approximately 339 cy) off-site. If contaminated soil must be left in-place, costs will increase to make this the second least costly alternative (after SS16SS2).

The next least costly alternative is SS16SS2, which involves construction of a cap (over approximately 4,500 square ft of soil ≥1 mg/kg PCB) and land use controls, each of which requires minimal equipment rental and mobilization to Cape Romanzof. While the cap and land use controls would require maintenance for up to 30 years, the method of cap installation is highly cost-effective.

Alternative SS16SS3 is significantly more costly than the other alternatives primarily due to the expense of the soil washing treatment proposed for all soil ≥10 mg/kg PCBs (approximately 188 cy). This alternative would require the rental and mobilization of soil washing equipment to Cape Romanzof, in addition to operation and maintenance of the equipment and follow-on analysis of the treated soil. Soil with PCBs ≥1 and <10 mg/kg (approximately 151 cy or 2,000 square ft) would be left in place at this remote area and would be identified with land use controls, which would require maintenance over the years. While these costs may be reduced

significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs for Alternative SS16SS3 will still remain significantly higher than all other alternatives.

Table 2-44 Cost Comparison of SS016 Surface Soil Alternatives

Alternative	Total Present Value
SS16SS2 – Institutional Controls, Engineering Controls, and Containment	$1,028,175
SS16SS3 – PCB Soil Hot Spots (≥10 mg/kg): Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil (≥1 and <10 mg/kg): Institutional Controls and Engineering Controls	$4,857,366
SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the extent feasible, and Off-Site Disposal	$795,743/ $1,205,386 [1]

Notes:

[1] If all contaminated soil can be removed, cost is estimated at $795,743; if site conditions (safety and logistics) result in PCBs ≥1 mg/kg left on-site and capped, the cost increase for cap and IC installation and maintenance for 30 years would be $409,643, for a total estimated cost of $1,205,386.

mg/kg milligram per kilogram
PCB polychlorinated biphenyl

2.11.6 SS017 Surface Soil Alternatives (SS17SS)

The following subsections compare the four selected remedial alternatives for lead- and PCB-contaminated surface soil at Lower Tram Terminal Area (SS017) to each other, based on their ratings against the evaluation criteria. Table 2-45 summarizes the ratings for each alternative.

Table 2-45 SS017 Surface Soil Alternatives Individual Analysis Ratings

Alternative	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 (Estimated TPV)
SS17SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS17SS2 – Institutional Controls, Engineering Controls and Containment	PASS	PASS	M	I	H	H	$899,910
SS17SS3 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	M	$4,251,234
SS17SS4 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	$699,868

Notes:

ARAR applicable or relevant and appropriate requirement
H Highly effective alternative / fully meets criterion
I Ineffective alternative / does not meet criterion
M Moderately effective alternative / partially meets criterion
NA not applicable
TPV total present value

2.11.6.1 Overall Protection of Human Health and the Environment

The no action alternative (SS17SS1) would not provide protection of human health and the environment and therefore fails to meet the criterion. Soil contaminated with PCBs above cleanup levels protective of human health and the environment (at concentrations above ≥1 mg/kg) would remain on-site and would likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

Alternatives SS17SS2 (institutional controls, engineering controls and containment), SS17SS3 (excavation, ex-situ treatment and on-site disposal), and SS17SS4 (excavation and off-site disposal) all meet this criterion, thereby passing this analysis. The differences between these alternatives are as follows:

- Alternative SS17SS2 protects human health by denying access to the site via property use restrictions and signs. A soil cap over contaminated soil would protect human health and the environment by preventing physical contact with contaminated soil, preventing dust contaminated with lead and PCBs from blowing from the site, and preventing additional contamination from migrating away from the site. The toxicity and volume of contamination in shallow soil would not be reduced through natural degradation; however, capping would reduce the mobility of contaminants. Normal safety precautions would mitigate risk to workers. Environmental impacts caused by capping could be mitigated by revegetating the area.

- Alternatives SS17SS3 and SS17SS4 would meet ARARs and provide adequate protection of human health and the environment. Risk to workers would be due to the use of heavy equipment and the creation of airborne contaminated dust. However, these risks could be reduced through proper site control, proper use of PPE, and dust mitigation. Normal safety precautions would mitigate risk to workers. Both alternatives would permanently remove all unacceptable levels of soil contamination from the site.

- Alternative SS17SS3 would excavate and actively treat the contamination to reduce toxicity, mobility, and volume. Handling chemicals (for soil washing) would pose a risk to workers, but could be mitigated with the use of proper PPE and proper chemical handling techniques. Normal safety precautions would mitigate risk to workers. Environmental impacts caused by erosion and dust from excavation could be mitigated by revegetating the area.

- Alternative SS17SS4 would provide adequate protection for human health and the environment, as it would permanently remove PCB- and lead-contaminated soil from the site. This alternative reduces mobility of contaminated soil by removing it from the site, but because this alternative involves no treatment, the toxicity and volume of the contamination is not affected.

2.11.6.2 Compliance with ARARs

The no action alternative (SS17SS1) fails to meet this criterion. The site risks would remain at the current level. PCBs are not expected to degrade in a reasonable timeframe.

The three action alternatives pass this analysis and meet this criterion. The differences between these alternatives are as follows:

- Alternative SS17SS2 (institutional controls, engineering controls and containment) would cap the surface soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment. Although this involves no treatment of contamination on-site the alternative would prevent contact with the contaminated soil.

- Alternative SS17SS3 (excavation, ex-situ treatment and on-site disposal) would treat soil contaminated with PCBs and lead above ADEC Method Two cleanup levels (1 mg/kg and 400 mg/kg respectfully) on-site to below cleanup levels. Analytical confirmation samples would document that chemical-specific ARARs have been met. Appendix B lists potential action-specific ARARs which may be applicable should this alternative be implemented.

- Alternative SS17SS4 (excavation and off-site disposal) would excavate and remove from the site soil contaminated with PCBs and lead above ADEC Method Two cleanup levels. The soil would not be treated. Analytical confirmation samples would document that chemical-specific ARARs have been met with the excavation of the contaminated soil. Appendix B lists potential action-specific ARARs which may be applicable should this alternative be implemented.

2.11.6.3 Long-Term Effectiveness and Performance

Alternative SS17SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS17SS2 (institutional controls, engineering controls and containment) partially meets this criterion. Because this alternative does not include actual reduction of the contaminant mass in surface soil at site SS017, residual risk would remain at levels calculated in the 2009 RI. Although institutional and engineering controls and capping would be implemented to mitigate residual risk (by preventing contact with contaminated soil), constant monitoring and maintenance of the signs and cap would be required indefinitely. Five-year reviews would also be necessary.

Both Alternatives SS17SS3 (excavation, ex-situ treatment and on-site disposal) and SS17SS4 (excavation and off-site disposal) fully meet this criterion and are highly effective, as they would permanently remove contamination exceeding cleanup levels from the site. The difference between these alternatives is that one treats the contamination on-site and the other removes it from the site. Following treatment (SS17SS3) or permanent removal from the site (SS17SS4), analytical confirmation samples would document that chemical-specific ARARs have been met. Therefore, it is likely there would be no residual contamination exceeding ADEC Method Two cleanup levels and no remaining source of risk.

2.11.6.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SS17SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS17SS2 and SS17SS4 each reduce some but not all of the three aspects of this criterion, resulting in a partial rating. The differences between these alternatives are as follows:

- Alternative SS17SS2 proposes institutional controls and capping, neither of which are considered a "treatment"; therefore, this criterion is partially met. Capping partially contains contaminants, thereby decreasing their mobility rather than treating them. The lead and PCBs toxicity and volume will not degrade through natural processes. No LTM would be conducted.
- Alternative SS17SS4 will decrease the volume, toxicity, and mobility of contaminants at the site through excavation and off-site disposal. However, the soil will not be treated prior to disposal so the volume and toxicity will not change.

Alternative SS17SS3 fully meets this criterion. The excavation and chemical treatment of the lead- and PCB-contaminated soil would effectively reduce the toxicity, mobility, and volume of PCB and lead contamination at the site that posed a threat to the threshold criteria of "overall protection of human health and the environment."

2.11.6.5 Short-Term Effectiveness

Alternative SS17SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS17SS3 (excavation, ex-situ treatment and on-site disposal) partially meets this criterion. Risk to workers would be due primarily to the use of heavy equipment and the creation of airborne dust during remedial action. These risks could be reduced through proper site control, dust mitigation, and proper use of PPE. Risk to the environment would exist due to airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques. Additionally, the chemicals required for the soil washing process would create additional risk to workers and the environment. Due to the short duration of the remedial action under this alternative, the period of risk would be limited.

Alternatives SS17SS2 (institutional controls, engineering controls and containment) and SS17SS4 (excavation and off-site disposal) fully meets this criterion. Risk to workers would be due primarily to the use of heavy equipment and the creation of airborne dust during remedial action. These risks could be reduced through proper site control, dust mitigation, and proper use of PPE. Risk to the environment would exist due to airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques. Due to the short duration of the remedial action under these alternatives, the period of risk would be limited.

2.11.6.6 Implementability

Alternative SS17SS1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS17SS3 (excavation, ex-situ treatment and on-site disposal) partially meets this criterion. Site conditions (including the remote location) increase construction and operation difficulties. In addition, construction of impoundment structures and the storage and handling of

process chemicals and residual waste products pose additional risk to workers and the environment. This alternative would require large amounts of equipment and fuel to be mobilized to the site and the construction of additional structures to support this technology. The services required to implement the excavation and treatment of the contaminated soil may be procured locally or from Anchorage. Confirmation sampling following treatment would document the effectiveness of the remedy. Additional remedial actions would not be required with this alternative.

Both Alternatives SS17SS2 (institutional controls, engineering controls and containment) and SS17SS4 (excavation and off-site disposal) fully meet this criterion in that they are highly effective. Site conditions (including the remote location) increase construction and operation difficulties. However, these alternatives are readily implementable and require no construction of additional facilities. The services required for implementing the construction of the cap and installation of signs (SS17SS2) or excavation and subsequent transportation of the contaminated soil to a disposal facility (SS17SS4) may be procured locally or from Anchorage. The difference between these alternatives is as follows:

- Alternative SS17SS2 is readily implementable. Although it does require the construction of a soil cap and installation of signs, both are simple construction tasks. The signs and capping would require constant monitoring and maintenance; indefinitely.
- Alternative SS17SS4 is readily implementable. In contrast to Alternative SS17SS2, no monitoring or maintenance would be required. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Additional remedial actions would not be required with this alternative.

2.11.6.7 Costs

Table 2-46 presents the cost comparison for all SS017 surface soil action alternatives.

No costs are associated with the no-action alternative (SS17SS1).

The least costly alternative is SS17SS4, which excavates approximately 180 cy of PCB-contaminated soil and disposed of off-site. This alternative requires no land use controls, treatment, or monitoring.

The second least costly alternative is SS17SS2, which involves land use controls and installation of a soil cap. The cap and land use controls would both require monitoring and maintenance, which could be performed by workers on-site to reduce transportation expenses.

Alternative SS17SS3 is significantly more costly than the other alternatives primarily due to the expense of the soil washing treatment proposed for all PCB-contaminated soil ≥1 mg/kg (approximately 180 cy). This alternative would require the rental and mobilization of soil washing equipment to Cape Romanzof, in addition to operation and maintenance of the equipment and follow-on analysis of the treated soil. The soil would be disposed of on-site, thereby reducing transportation costs of shipping it to a landfill in Arlington, Oregon. While these costs may be reduced significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs for Alternative SS17SS3 will still remain significantly higher than all other alternatives.

Table 2-46 Cost Comparison of SS017 Surface Soil Action Alternatives

Alternative	Total Present Value
SS17SS2 – Institutional Controls, Engineering Controls and Containment	$899,910
SS17SS3 – Excavation, Ex-Situ Treatment and On-Site Disposal	$4,251,234
SS17SS4 – Excavation and Off-Site Disposal	$699,868

2.11.7 SS017 Subsurface Soil Alternative (SS17SB)

The following subsections compare the four selected remedial alternatives for subsurface soil at Lower Tram Terminal Area (SS017) to each other, based on their ratings against the evaluation criteria. Table 2-47 summarizes the ratings for each alternative.

Table 2-47 SS017 Subsurface Soil Alternatives Individual Analysis Ratings

Alternative	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 (Estimated TPV)
SS17SB1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS17SB2 – Institutional Controls and Engineering Controls	PASS	PASS	M	I	M	H	$589,452
SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	M	$4,245,013
SS17SB4 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	$239,127

Notes:

ARAR applicable or relevant and appropriate requirement
H Highly effective alternative / fully meets criterion
I Ineffective alternative / does not meet criterion
M Moderately effective alternative / partially meets criterion
NA not applicable
TPV total present value

2.11.7.1 Overall Protection of Human Health and the Environment

The no action alternative (SS17SB1) would not provide protection of human health and the environment and therefore fails to meet the criterion. Soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment (at concentrations above 1 mg/kg and 400 mg/kg respectfully) would remain on-site and be a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

Alternatives SS17SB2 (institutional controls and engineering controls), SS17SB3 (excavation, ex-situ treatment and on-site disposal), and SS17SB4 (excavation and off-site disposal) meet this criterion, thereby passing this analysis. The differences between these alternatives are as follows:

- Alternative SS17SB2 protects human health by denying access to the site via property use restrictions and signs. The contamination is located at least 2 ft bgs so a person or animal would have to dig into the soil to be exposed to the contamination. The toxicity and volume of the PCB contamination in subsurface soil would not likely be reduced through natural degradation. Normal safety precautions would mitigate risk to workers.

- Alternatives SS17SB3 (excavation, ex-situ treatment and on-site disposal) and SS17SB4 (excavation and off-site disposal) both fully meet this criterion in that they are highly effective. The remedial action proposed under each alternative would result in meeting ARARs and providing adequate protection of human health and the environment by permanently removing all unacceptable levels of soil contamination from the site. Following treatment (SS17SB3) or permanent removal from the site (SS17SB4), analytical confirmation samples would document that chemical-specific ARARs have been met. Risk to workers would be due to the use of heavy equipment and the creation of airborne contaminated dust. However, these risks could be reduced through proper site control, proper use of PPE, and dust mitigation. Environmental impacts caused by erosion and dust from excavation could be mitigated by revegetating the area. The difference between these alternatives is as follows:

- Alternative SS17SB3 would actively treat the contamination to reduce toxicity, mobility, and volume and return the clean soil to the site.

- Alternative SS17SB4 would reduce the mobility and volume of PCB- and lead-contaminated soil by removing it from the site, but because it involves no treatment, the toxicity and volume of the contamination is not affected.

2.11.7.2 Compliance with ARARs

Alternative SS17SB1 (no action) fails to meet this criterion.

Alternatives SS17SB2 (institutional controls and engineering controls), SS17SB3 (excavation, ex-situ treatment and on-site disposal), and SS17SB4 (excavation and off-site disposal) all meet this criterion, thereby passing this analysis. The differences between these alternatives are as follows:

- Alternative SS17SB2 does not involve treatment of contamination on site; therefore, soil contaminated with PCBs and lead above ADEC Method Two cleanup levels protective of human health and the environment (≥1 mg/kg and ≥400 mg/kg, respectively) would remain on-site and be a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time. The site risks would remain at the current level.

- Alternatives SS17SB3 and SS17SB4 would result in protection of human health and the environment by permanently removing all unacceptable levels of soil contamination from the site. Following treatment (SS17SB3) or permanent removal from the site (SS17SB4), analytical confirmation samples would document that chemical-specific ARARs have been met. Appendix B lists potential action-specific ARARs which may be applicable should this alternative be implemented.

2.11.7.3 Long-Term Effectiveness and Performance

Alternative SS17SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS17SB2 would partially meet this criterion in that it is moderately effective. This alternative does not include treatment to reduce the contaminant mass in subsurface soil at SS017; therefore, residual risk could remain at levels calculated in the 2009 RI. Although engineering and institutional controls would be implemented to mitigate residual risk, constant monitoring and maintenance of the signs would be required indefinitely. Five-year reviews would also be necessary.

Alternatives SS17SB3 and SS17SB4 both fully meet this criterion in that they are highly effective by permanently removing contamination from the site. It is likely, under both alternatives, that there will be no residual contamination exceeding cleanup levels and no remaining source of risk. The differences between these alternatives are as follows:

- Alternative SS17SB3 would remove and treat all soil above cleanup levels.
- Alternative SS17SB4 would permanently remove all contaminated soil from the site, without treatment, and dispose of it off-site.

2.11.7.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative SS17SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternative SS17SB2 (institutional controls and engineering controls) does not meet this criterion; therefore, it is ineffective. The alternative does not involve treatment of contamination on site; therefore, it would not reduce toxicity, mobility, or volume of the contamination in the soil. Soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment (at concentrations above cleanup levels ≥1 mg/kg and ≥400 mg/kg, respectively) would remain on site and be a risk for the foreseeable future. No monitoring would be performed at the site to assess site conditions over time. Table 1-1 lists potential action-specific ARARs which may be applicable should this alternative be implemented.

Alternative SS17SB4 (excavation and off-site disposal) does not meet this criterion in that it is ineffective. Although this alternative will decrease the volume, toxicity, and mobility of contaminants at the site, the soil will not be treated prior to disposal so the volume and toxicity will not change prior to disposal.

Alternative SS17SB3 (excavation, ex-situ treatment and on-site disposal) fully meets this criterion. The excavation and chemical treatment of the PCB and lead contaminated soil would

effectively reduce the toxicity, mobility, and volume of PCB contamination at the site that posed a threat to the threshold criteria of "overall protection of human health and the environment." by permanently removing contamination from the site. It is likely that there will be no residual contamination exceeding cleanup levels and no remaining source of risk.

2.11.7.5 Short-Term Effectiveness

Alternative SS17SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS17SB2 (institutional controls and engineering controls) and SS17SB3 (excavation, ex-situ treatment, and on-site disposal) both partially meet this criterion in that they are moderately effective. Risk to workers would be due primarily to the use of heavy equipment and the creation of PCB and lead contaminated airborne dust during digging to install controls or excavate soil. These risks could be reduced through proper site control and dust mitigation, in addition to the proper use of PPE. The difference between these alternatives is as follows:

- Alternative SS17SB2 would subject workers and the environment to a lower risk than Alternative SS17SB3 because of the non-invasive nature of installing engineering controls.
- Alternative SS17SB3 would subject workers and the environment to higher risk than Alternative SS17SB2 due to the invasive nature of this alternative as well as the use of chemicals for treatment. Risk to the environment would exist due to airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques. Additionally, the chemicals required for the soil washing process would create another risk to workers and the environment. Due to the short duration of the remedial action under this alternative, the period of risk would be limited.

Alternative SS17SB4 (excavation and off-site disposal) fully meets this criterion. Workers would be more at risk from airborne dust during the remedial action. This risk could also be reduced through dust mitigation and by proper use of PPE. Risk to the environment would exist due to airborne dust and spills during transportation of contaminated soil. These risks could be reduced through dust mitigation and proper transportation techniques. Due to the short duration of the remedial action under this alternative, the period of risk would be limited.

2.11.7.6 Implementability

Alternative SS17SB1 (no action) did not meet the two threshold criteria; therefore, it is not a viable alternative and further evaluation under this criterion is not applicable.

Alternatives SS17SB2 and SS17SB4 fully meet this criterion in that they are highly effective. Site conditions (including the remote location) increase construction and operation difficulties. The services required to implement the alternatives may be procured locally or from Anchorage. The differences between these alternatives are as follows:

- Alternative SS17SB2 is readily implementable as it only requires sign installation, a simple construction task.

- Alternative SS17SB4 is readily implementable requires no construction of additional facilities. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy. Additional remedial actions would not be required with this alternative.

Alternative SS17SB3 partially meets this criterion. Site conditions (including the remote location) increase construction and operation difficulties. In addition, construction of impoundment structures and the storage and handling of process chemicals and residual waste products pose additional risk to workers and the environment. This alternative would require large amounts of equipment and fuel to be mobilized to the site and the construction of additional structures to support this technology. The services required to implement the excavation and treatment of the contaminated soil may be procured locally or from Anchorage. Confirmation sampling following treatment would document the effectiveness of the remedy. Additional remedial actions would not be required with this alternative.

2.11.7.7 Costs

Table 2-48 presents the cost comparison for all SS017 subsurface soil action alternatives.

No costs are associated with the no-action alternative (SS17SB1).

The least costly alternative is SS17SB4, which excavates and disposes of off-site approximately 12 cy of soil contaminated with PCBs or PCBs and lead and requires no land use controls, treatment, or monitoring. The second least costly alternative is SS17SB2, which involves only land use controls and follow-on monitoring of these controls.

Alternative SS17SB3 is significantly more costly than the other alternatives primarily due to the expense of the soil washing treatment proposed for all soil ≥1 mg/kg PCBs and lead ≥400 mg/kg (approximately 12 cy). This alternative would require the rental and mobilization of soil washing equipment to Cape Romanzof, in addition to operation and maintenance of the equipment and follow-on analysis of the treated soil. The soil would be disposed of on-site, thereby reducing transportation costs of shipping it to a landfill in Oregon. While these costs may be reduced significantly through economy of scale by combining costs with alternatives from other sites that also require equipment mobilization, the costs for Alternative SS17SS3 will still remain significantly higher than all other alternatives.

Table 2-48 Cost Comparison of SS017 Subsurface Soil Action Alternatives

Alternative	Total Present Value
SS17SB2 – Institutional Controls and Engineering Controls	$589,452
SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	$4,245,013
SS17SB4 – Excavation and Off-Site Disposal	$239,127

2.11.8 State/Support Agency Acceptance

The State of Alaska agrees that, if implemented properly, the selected remedies presented in this ROD will comply with state environmental laws.

2.11.9 Community Acceptance

During the public comment period, the community did not object to the selected remedies presented in this ROD.

2.12 PRINCIPAL THREAT WASTES

The NCP expects that treatment that reduces the toxicity, mobility, or volume of the principal threat wastes will be used to the extent practicable. 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 or present a significant risk to human health or the environment should exposure occur. A source material is material that contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or that acts as a source for direct exposure. In A Guide to Principal Threat and Low Level Threat Wastes (USEPA, 1991), principal threat wastes typically have a potential cancer risk of 10^{-3} or greater, while low toxicity source material presents an excess cancer risk near the acceptable risk range. There are no principal threat wastes present at the Cape Romanzof LRRS addressed in this ROD.

2.13 SELECTED REMEDY

The primary indicator of remedial action performance will be satisfying the RAOs for Cape Romanzof LRRS and protecting human health and the environment. Performance measures are defined herein as the RAOs (see Section 2.9 Remedial Action Objectives) plus the required actions to achieve the objectives, as defined in this section. It is anticipated that successful implementation, operations, maintenance, and completion of the performance measures will achieve a protective and legally compliant remedy for Cape Romanzof LRRS.

The selected remedy for each of the four contaminated source areas at the Cape Romanzof LRRS is as follows:

- LF003 – Landfill No. 2 (Surface Soil downgradient of the landfill) – Alternative (LF03SS5) – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal;
- LF003 – Landfill No. 2 (Sediment downgradient of the landfill) – Alternative (LF03SD3) – Excavation, Off-Site Disposal, and LTM;
- LF003 – Landfill No. 2 (landfill itself) – although not addressed in the FS or evaluation of remedial alternatives above, the remedy for the landfill is ICs and LTM;
- SS010 – Spill/Leak No. 4 at the Weather Station Building (Subsurface Soil) – Alternative (SS10SB2) – Institutional Controls and Engineering Controls;
- SS010 – Spill/Leak No. 4 at the Weather Station Building (Groundwater) – Alternative (SS10GW2) – Institutional Controls, Natural Attenuation, and LTM;
- SS016 – Upper Tram Terminal Area (Surface Soil) – Alternative (SS16SS4) – PCB and Lead Soil (≥1 mg/kg and ≥400 mg/kg respectively): Excavation, to the Extent Feasible, and Off-Site Disposal;
- SS017 – Lower Tram Terminal Area (Surface Soil) – Alternative (SS17SS4) – Excavation and Off-Site Disposal; and
- SS017 – Lower Tram Terminal Area (Subsurface Soil) – Alternative (SS17SB4) – Excavation and Off-Site Disposal.

These remedies were selected based upon their ability to comply with the nine criteria. This section describes the selected remedies and also provides specific performance measures for the selected remedies.

Remedy selections are based on the detailed evaluation of remedial alternatives presented in the *Cape Romanzof LRRS Feasibility Study*, Cape Romanzof LRRS, September 2011 (USAF, 2011). It is expected that these remedies will remain in effect and be protective of human health and the environment until such time as the concentrations of PCBs, lead and fuels contamination decrease to, or below applicable cleanup levels. Land use controls will remain in effect for as long as site conditions pose an unacceptable risk to the population at Cape Romanzof LRRS.

The USAF is responsible for implementing, maintaining, and monitoring the remedial actions identified herein for the duration of the remedies selected in this ROD. The USAF will exercise this responsibility in accordance with CERCLA and the NCP. Approval by ADEC is required for any modification of the remedy.

2.13.1 Summary of the Rationale for the Selected Remedy

The USAF believes that the selected remedies meet the threshold criteria and provide the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The remedies are expected to satisfy the following selection criteria as defined by CERCLA § 121(b):

- Threshold criteria
  - Protection of human health and the environment
  - Compliance with ARARs
- Balancing criteria
  - Long-term effectiveness and permanence
  - Toxicity, mobility or volume reduction through treatment
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying criteria
  - State agency acceptance
  - Community acceptance

A comparative analysis among alternatives for surface soil at LF003 found alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal to be the best remedial action alternative for addressing contaminants present in soil at LF003. Alternative LF03SS5 was selected because it eliminates unacceptable risk at the site without the need for ICs when complete, and it does not require costly and potentially hazardous treatment technologies. LF03SS5 is a readily implementable approach for reducing risks posed by contaminants present at the area and, therefore, provides the best balance of tradeoffs with respect to the threshold,

balancing and modifying criteria. Since LF03SS5 does not treat the contaminated soil, this alternative does not reduce the overall toxicity or volume of contamination. The No Action alternative (Alternative LF03SS1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment and is not in compliance with State of Alaska regulations. Both LF03SS2 (Institutional Controls, Engineering Controls, and Containment) and LF03SS3 (PCB Soil [≥10 mg/kg]: Excavation and Off-Site Disposal; PCB Soil [≥1 and <10 mg/kg]: Institutional Controls, Engineering Controls and Containment) would reduce mobility of PCBs, the former by capping the area and the latter by removing hot spots (PCBs ≥10 mg/kg) and capping the remaining PCBs, but neither alternative decreases the toxicity or volume of on-site contaminants and they would require monitoring and maintenance of the cap and ICs for an indefinite period of time. LF03SS4 (PCB Soil [≥1 mg/kg]: Excavation, Ex-Situ Treatment and On-Site Disposal) and LF03SS6 (Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal) are both the most difficult alternatives to implement. LF03SS4 is the only alternative that would permanently reduce toxicity, mobility, and volume of PCB-contaminated soil, but requires costly and potentially hazardous treatment. Alternative LF03SS6 was rejected primarily due to the high cost associated with removing the landfill and off-site disposal of untreated waste would not reduce contaminant toxicity or volume, though this alternative does remove the source of contamination.

A comparative analysis among alternatives for sediment at LF003 found Alternative LF03SD3 – Excavation, Off-Site Disposal, and LTM to be the best remedial action alternative for addressing contaminants present in sediment at LF003. Alternative LF03SD3 was selected because it eliminates unacceptable risk at the site and it does not require costly and potentially hazardous treatment technologies. Since LF03SD3 does not treat the contaminated soil, this alternative does not reduce the overall toxicity or volume of contamination. Alternative LF03SD3 is not the least costly although it is a readily implementable approach for reducing the risk posed by the contaminants present at the area and, therefore, provides the balance of tradeoffs with respect to the balancing and modifying criteria. The No Action alternative (Alternative LF03SD1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment. Alternative LF03SD2 (Institutional Controls and Engineering Controls) has the lowest costs, but toxicity, mobility, and volume of PCB contamination in sediment would not be reduced, no LTM is proposed, and monitoring and maintenance of ICs would be required for an indefinite period of time. Alternative LF03SD4 (Excavation, Ex-Situ Treatment, and On-Site Disposal) would permanently reduce toxicity, mobility, and volume of PCB-contaminated soil, but requires costly and potentially hazardous treatment.

LF003 also includes Landfill No. 2, which was addressed in an Interim ROD (USAF, 2002). The remedy for the landfill is capping (which has been done), IC/LUCs preventing excavation or disturbance of the cap/cover material, maintenance of the cap/cover, placing and maintaining barriers and signs documenting that buried solid waste and potentially hazardous materials are present, and long term monitoring of surface water and sediment to ensure the applicable cleanup levels are achieved.

A comparative analysis among alternatives for subsurface soil at SS010 found Alternative SS10SB2 – Institutional Controls and Engineering Controls to be the best remedial action alternative for addressing the contaminants present in subsurface soil at SS010. The alternative

was selected because exposure risk to subsurface soil is low and contaminant concentrations are close to meeting cleanup levels. Alternative SS10SB2 is the least costly alternative and is a readily implementable approach for reducing the risk posed by the contamination present in subsurface soil at SS010. Therefore, SS10SB2 provides the best balance of tradeoffs with respect to threshold and balancing criteria. The No Action alternative (Alternative SS10SB1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment. The remaining alternatives, SS10SB3 (Institutional Controls, In-Situ Treatment and LTM), SS10SB4 (Excavation, Ex-Situ Treatment, and On-Site Disposal), and SS10SB5 (Excavation and Off-Site Disposal), are disproportionately costly relative to the low level of risk present at the site.

A comparative analysis among alternatives for groundwater at SS010 found Alternative SS10GW2 – Institutional Controls, Natural Attenuation, and LTM to be the best remedial action alternative for addressing the contaminants present in groundwater at SS010. This alternative is the most cost-effective. While contaminant toxicity would not be reduced immediately, toxicity will dissipate over time through natural attenuation, which will be monitored via LTM. The No Action alternative (Alternative SS10GW1) was rejected because it fails to meet the threshold criteria for protection to human health and the environment. Alternative SS10GW3 (Institutional Controls, In-Situ Treatment and LTM) and SS10GW4 (Ex-Situ Treatment and On-Site Disposal) require treatment options that may be extremely difficult to implement at the site. In addition, the precise location of the source of contamination is unknown, creating the potential that the source material may not be fully attenuated and leading to the potential for contamination rebound after treatment.

A comparative analysis among alternatives for surface soil at SS016 found Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-Site Disposal to be the best remedial action alternative for addressing the contaminants present in surface soil at SS016. Alternative SS16SS4 was selected because it reduces, and potentially eliminates, unacceptable risk at the site without using costly and potentially hazardous treatment technologies. Because the site is located on a steep slope within an area comprised of large boulders, it may not be possible to remove all contaminated soil. Areas with PCB contamination ≥1 mg/kg would be capped and ICs implemented. The alternative is a readily implementable approach for reducing the risk posed by contamination present in surface soil and, therefore, provides the balance of tradeoffs with respect to the balancing and modifying criteria. Since SS16SS4 does not treat the contaminated soil, this alternative does not reduce the overall toxicity or volume of contamination. The No Action alternative (Alternative SS16SS1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment. Alternative SS16SS2 (Institutional Controls, Engineering Controls, and Containment) would cap the contaminated area but would not reduce the toxicity, mobility, or volume. Alternative SS16SS3 (PCB Soil Hot Spots [≥10 mg/kg]: Excavation, Ex-Situ Treatment, and On-Site Disposal; PCB Soil [≥1 mg/kg and >10 mg/kg]: Institutional Controls and Engineering Controls) would partially reduce toxicity, mobility, and volume of PCB-contaminated soil by treating hot spots, but the treatment is costly and potentially hazardous. This alternative does not provide the same cost benefit as the selected remedy.

A comparative analysis among alternatives for surface soil at SS017 found Alternative SS17SS4 – Excavation and Off-Site Disposal to be the best remedial action alternative for addressing the contaminants present in surface soil at SS017. Alternative SS17SS4 was selected because it eliminates risk at the site without using costly and potentially hazardous treatment technologies. This alternative is the most cost-effective and readily implementable to remove contamination at SS017. Since SS17SS4 does not treat the contaminated soil, this alternative does not reduce the overall toxicity or volume of contamination. The No Action alternative (Alternative SS17SS1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment. Alternative SS17SS2 (Institutional Controls, Engineering Controls, and Containment) would cap the contaminated area but would not reduce the toxicity, mobility, or volume. Alternative SS17SS3 (Excavation, Ex-Situ Treatment and On-Site Disposal) would eliminate toxicity, mobility, and volume of PCB-contaminated soil through treatment, but the treatment is costly and potentially hazardous. This alternative does not provide the same cost benefit as the selected remedy.

A comparative analysis among alternatives for subsurface soil at SS017 found Alternative SS17SB4 – Excavation and Off-Site Disposal to be the best remedial action alternative for addressing the contaminants present in the subsurface soil at SS017. Alternative SS17SB4 was selected because it eliminates risk at the site without the need for ICs and without using costly and potentially hazardous treatment technologies. This alternative is the most cost-effective and readily implementable to remove contamination at SS017. Since SS17SB4 does not treat the contaminated soil, this alternative does not reduce the overall toxicity or volume of contamination. The No Action alternative (Alternative SS17SB1) was rejected because it fails to meet the threshold criteria for protection of human health and the environment. Alternative SS17SB2 (Institutional Controls and Engineering Controls) does not reduce toxicity, mobility, and volume of PCB/lead contamination in sediment, does not include LTM, and requires monitoring and maintenance of ICs for an indefinite period of time. Alternative SS17SB3 (Excavation, Ex-Situ Treatment and On-Site Disposal) would eliminate toxicity, mobility, and volume of PCB-contaminated soil through treatment, but the treatment is costly and potentially hazardous. This alternative does not provide the same cost benefit as the selected remedy.

2.13.2 Description of the Selected Remedies

This section describes in detail the selected remedy for each of the four contaminated areas at the Cape Romanzof LRRS. The remedial alternatives were developed and evaluated through the 2011 FS (USAF, 2011).

2.13.2.1 LF003

The selected remedies for LF003 for PCB-contaminated surface soil and PCB-contaminated sediment are described as follows:

- Surface Soil – Alternative LF03SS5: PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal:
    - Surface soil with PCB concentrations ≥1 mg/kg will be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soil that contains PCBs in excess of 50 mg/kg will be considered a RCRA Subtitle C

hazardous waste. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 227 cy with a maximum PCB concentration of 110 mg/kg.

- Confirmation sampling following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavation.
- The excavated area will be revegetated to help reduce the chance of erosion.

- Sediment – Alternative LF03SD3: Excavation, Off-Site Disposal, and LTM:
  - Sediment with PCB concentrations above ≥1 mg/kg will be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All sediment that contains PCBs in excess of 50 mg/kg will be considered a RCRA Subtitle C hazardous waste. Contaminated sediment with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of sediment requiring excavation at the site is estimated to be approximately 20 cy with a maximum PCB concentration of 230 mg/kg.
  - Confirmation sampling of sediment and surface water following the excavation will document the effectiveness of the remedy.
  - Soil from a local borrow source will be used to backfill the excavation.
  - The excavated area will be revegetated to help reduce the chance of erosion.
  - While the excavation would remove the sediment currently present, it may not remove the source of the PCBs, which is thought to be the landfill itself. Therefore, contaminated sediment may continue to migrate from the landfill via the seep and into the sediment near the toe of the landfill. Eroded soil control barriers will be constructed on-site to prevent the off-site migration of runoff water that may contain PCB contaminated sediment in order to protect the surface water that flows around the landfill and further away (Fowler Creek).
  - ICs that prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and maintain the landfill cap at LF003 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the LUC Plan for LF003
  - Signs warning that PCB buried solid waste and potentially hazardous materials are present and site access is restricted will be constructed and maintained at the site to alert personnel that PCB-contaminated sediments may be present within the drainage channel and sediment control barriers.
  - Eroded soil barriers, collected sediment, and signs will be managed and maintained by the USAF until it is determined that sediments no longer pose an

unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure.

- Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

- Landfill – buried solid waste remaining at the site will be addressed by institutional controls and long term monitoring.
  - ICs that prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses, site dig permits will be required in the event of excavation, implement soils management plan, and maintain the landfill cap at LF003 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the LUC Plan for LF003
  - Signs warning that PCB contaminated sediment may be present and site access is restricted will be constructed and maintained at the site to alert personnel that PCB-contaminated sediments may be present within the drainage channel and sediment control barriers.
  - Annually, inspections, maintenance, and performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

2.13.2.2 SS016

The selected remedy for PCB- and lead-contaminated surface soil at Site SS016 is described as follows:

- Surface Soil – Alternative SS16SS4: PCB Soil (≥1 mg/kg) and Lead (≥400 mg/kg), Excavation, to the Extent Feasible, and Off-Site Disposal:
  - Surface soil with PCB concentrations above ≥1 mg/kg and Lead (≥400 mg/kg) will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA PCB remediation waste and will be sent to a TSCA or RCRA Subtitle C hazardous waste and if lead soils fail the TCLP will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 339 cy with a maximum PCB concentration of 6,600 mg/kg.
  - Confirmation sampling following the excavation will document the effectiveness of the remedy.
  - Soil from a local borrow source will be used to backfill the excavation.
  - The excavated area will be revegetated to help reduce the chance of erosion.
  - Because the site is located on a steep slope in an area covered with large boulders, it may not be possible to remove all PCB soil ≥1 mg/kg for safety and logistical

reasons. If areas of PCB soil ≥1 mg/kg are left in-place at the site, the following actions will be implemented:

- A cap will be placed over remaining surface soil contaminated with PCBs and lead above cleanup levels (≥1 mg/kg and ≥400 mg/kg respectively) protective of human health and the environment to prevent access and exposure to contaminated soil. Given the steep, boulder-covered, and exposed slope at this site, the most feasible type of cap to install is gravel; asphalt would be too labor-and equipment-intensive for such a remote area and soil would be blown away by the wind. Gravel will not be as subject to erosion as soil; therefore, the cap would not be revegetated.
- ECs such as signs warning of contamination will be erected at the location where surface soil is located at concentrations above cleanup levels protective of human health and the environment.
- ICs that prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted use, dig permits will be required in the event of excavation, implement soils management plan and maintain cap (if necessary) at SS016 in order to prevent direct exposure and water infiltration. The cap and signs will be maintained by the USAF until it is determined that PCB contaminated soil no longer poses an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure at the site.
- Locations of the cap and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

  - In the case that all PCB contaminated surface soil ≥1 mg/kg and lead ≥400 mg/kg are not able to be removed due to safety or logistical issues, then ICs and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

2.13.2.3 SS017

The selected remedies for PCB- and lead-contaminated surface soil and subsurface soil at Site SS017 are described as follows:

- Surface soil – Alternative SS17SS4: Excavation and Off-Site Disposal includes the following remedial actions;
  - Surface soil with PCB and lead concentrations above ≥1 mg/kg and ≥400 mg/kg respectfully will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA Subtitle C hazardous waste and if lead soils fail the TCLP will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or

comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 179 cy with a maximum PCB concentration of 68 mg/kg. All lead-contaminated soil areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil.

- Confirmation sampling for both PCBs and lead following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavation.
- The excavated area will be revegetated to help reduce the chance of erosion.

- Subsurface soil – Alternative SS17SB4 – Excavation and Off-Site Disposal includes the following remedial actions;
  - Surface soil with PCB and lead concentrations above ≥1 mg/kg and ≥400 mg/kg respectfully will both be excavated and containerized for transport via barge to the Port of Seattle in Washington, and then via railcar to the Waste Management facility in Arlington, Oregon. All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA Subtitle C hazardous waste and if lead soils fail the TCLP will be considered RCRA hazardous. Contaminated soil with PCBs at concentrations from 1 to 50 mg/kg will be containerized in Super Sacks® or comparable containers for transportation. The quantity of surface soil requiring excavation at the site is estimated to be approximately 11.7 cy with a maximum PCB concentration of 13.6 mg/kg. All lead-contaminated soil areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil.
  - Confirmation sampling for both PCBs and lead following the excavation will document the effectiveness of the remedy.
  - Soil from a local borrow source will be used to backfill the excavation.
  - The excavated area will be revegetated to help reduce the chance of erosion.

2.13.2.4 SS010

Due to the petroleum exclusion, Site SS010 is regulated under Alaska state laws and regulations rather than CERCLA. The selected remedies under Alaska state laws and regulations for fuel-contaminated subsurface soil and groundwater at Site SS010 are described as follows:

- Subsurface soil – Alternative SS10SB2 – Institutional Controls and Engineering Controls:
  - Contaminated subsurface soil will remain in place to naturally attenuate.
  - ICs that prevent access to groundwater until groundwater cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system, prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and conduct LTM at SS010. ICs will be incorporated into the LUC Plan for SS010.

- Annual inspections (with photos and field observations) of the signs, control barriers and submit the performance reports to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of inspections and reports may be reduced.
- Land Use Controls will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as land use control boundaries will encompass all areas where subsurface soil contaminant levels pose an unacceptable risk to human health and the environment and will be surveyed and a map designating their locations will accompany notations placed on land records.
- These controls are in place to ensure that invasive activities are not taking place within the boundary of the sites where land use has been restricted, or that ADEC and USAF approvals are obtained prior to conducting such work.
- Because contaminated subsurface soil will remain onsite, ICs annual inspections and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.

- Groundwater – Alternative SS10GW2 – Institutional Controls, Engineering Controls, Natural Attenuation, and Long-Term Monitoring includes the following actions:
  - Potentially contaminated groundwater will remain in place. Over time, natural attenuation of the contaminants is expected to occur and LTM will provide the data necessary to determine whether the plume is stable or shrinking or when contaminant levels allow for unlimited use and unrestricted exposure.
  - Three monitoring wells will be installed and sampled at the source area (one well) and downgradient of the source area upgradient of Fowler Creek (two wells) in order to determine groundwater flow direction and if groundwater is contaminated and if so, if contamination poses an unacceptable risk to surface water quality at Fowler Creek.
    - If groundwater is determined to be contaminated and poses no unacceptable risk to surface water quality at Fowler Creek, the USAF will perform periodic monitoring of groundwater contaminant levels and risk to surface water quality at Fowler Creek.
    - If groundwater is determined to be contaminated and poses an unacceptable risk to surface water quality at Fowler Creek, the USAF will identify and conduct appropriate remedial action to protect surface water quality.
  - ICs that prevent access to groundwater until groundwater cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system (such as monitoring wells) by implementing a well permitting system. Prohibit the development and use of property for residential housing and prevent the use of contaminated groundwater for restricted uses, in the event of

excavation a site dig permit will be required, and conduct LTM and ICs will be incorporated into the LUC Plan for SS010.

- Periodic sampling and analysis of contaminated groundwater in the monitoring wells (LTM) will be performed at the site to assess changes in groundwater contaminant concentrations over time. Additionally, if groundwater is determined to be contaminated, the seeps and sediments adjacent to Fowler Creek (downgradient of the site) will be monitored to ensure that contamination does not reach the creek. When groundwater contaminant concentrations are below groundwater cleanup levels for two consecutive sampling events and risk to surface water quality at Fowler Creek is determined to be acceptable, LTM will be discontinued.
- Land Use Controls will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as land use control boundaries will encompass all areas where groundwater contaminant levels pose an unacceptable risk to human health and the environment and be surveyed and a map designating their locations will accompany notations placed on land records.
- Annual inspections will be conducted and performance reports will be submitted every year to ADEC for the first five years and then followed by a five-year review. At that time, the frequency of inspections and reports may be reduced.

2.13.3 Applicable Land Use Controls for All Areas

Land use restrictions are, or may be, required as part of the selected remedies presented in this ROD and will be achieved through implementation of land use controls (i.e., ICs and/or ECs) that limit the use and/or exposure to those areas of the property, including water resources, that are contaminated. The resource use assumptions for surface and groundwater are described in Section 2.7. Groundwater from confined water-bearing zones is used as the drinking water source for Cape Romanzof LRRS. However, a groundwater use determination was developed for Site SS010 under 18 AAC 75.350 illustrating that groundwater at this site is not a reasonable current or future drinking water source. The SS010 groundwater use determination is attached in Appendix E of this ROD.

Although few workers reside at the Cape Romanzof LRRS and the site is infrequently used for subsistence purposes, land use controls are necessary to reduce the risk at areas where the selected remedy does not involve reducing the level of contamination to below cleanup levels allowing for unlimited use and unrestricted exposure. Land use controls will serve to dissuade people from entering a contaminated area and will only be removed when that area is confirmed to no longer pose unacceptable risk to human health and the environment. The objective of the land use controls is to reduce the risk to humans and the environment by preventing certain activities that could lead to exposure to contaminants (i.e., digging in PCB-contaminated soil).

The USAF is responsible for implementing, maintaining, monitoring, enforcing, and reporting on land use controls. Although the USAF may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the USAF shall

retain ultimate responsibility for remedy integrity. The specific land use controls for the selected remedies are described in detail in Section 2.13.2, Description of the Selected Remedies. The type, location, and duration of land use controls, as well as the monitoring period, is specific to each remedy.

The USAF will notify the ADEC as soon as practicable, but no longer than ten days after discovery of any activity that violates or is inconsistent with the Land Use Control objectives or use restrictions, or any other action that may interfere with the effectiveness of the Land Use Controls. The USAF will, as necessary, take prompt measures to correct the violation or deficiency and/or prevent its recurrence. In this notification, the USAF will identify any corrective measures it has taken or any corrective measures it plans to take and the estimated timeframe for completing them. For corrective measures taken after the notification, the USAF shall notify the relevant regulators when the measures are complete.

The USAF shall not modify or terminate Land Use Controls or modify land uses which may impact the effectiveness of Land Use Controls or take any anticipated action that may alter or negate the need for Land Use Controls without prior approval from ADEC.

The USAF is committed to notify as appropriate, any tenant, contractor, or other lawful occupants of land use controls and the requirement to comply with them, and monitor, maintain and enforce as necessary the land use controls associated with the selected remedies. Land use controls will include:

- Placing signs at the site to notify people of the location of landfills and where contamination is at concentrations above cleanup levels protective of human health.
- Placing a notice on property records to inform current and future property owners of the presence of contamination.
- Restricting the use of the contaminated matrix (unless concurrence granted from ADEC) by:
    - Prohibiting the installation of groundwater wells in vicinity of contaminated groundwater.
    - Dissuading people from digging in contaminated soil,
    - Dissuading people from digging in sediment or from drinking the surface water that is collected with the sediment.
    - Restricting excavation or subsurface soil disturbance unless approved by ADEC for any off-site movement of soil with the requirement of a digging permit and approved plan for soil characterization and management.
- If any contaminated media is moved from the site, characterization is required by following all applicable regulations.

The USAF will conduct annual monitoring of the land use restrictions and controls and submit a performance report to ADEC every year, for the first five years followed by a Five-Year Review. At that time the monitoring frequency and reports may be reduced as mutually agreed upon by the USAF and ADEC. The USAF will provide reports to ADEC following each monitoring event, with copies filed in the administrative record and information repository. Monitoring reports will include the frequency, scope, and nature of Land Use Control monitoring activities,

the results or findings of such monitoring, any changes to the Land Use Controls, and any corrective measures resulting from monitoring during the time period.

2.13.4 Property Transfer

The USAF will provide notice to ADEC, consistent with CERCLA Section 120(h), at least six (6) months prior to any transfer or sale of USAF property associated with Cape Romanzof LRRS, including transfers to private, state or local entities, so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer items or conveyance documents to maintain effective land use controls. If it is not possible for the USAF to notify ADEC at least six (6) months prior to any transfer or sale, then the USAF will notify ADEC as soon as possible but no later than sixty (60) days prior to the transfer or sale of any property subject to land use controls.

In addition to the land transfer notice and discussion provisions above, the USAF further agrees to provide ADEC with similar notice, within the same time frames, for federal-to-federal transfer of property accountability and administrative control. Review and comment opportunities afforded to ADEC as to federal-to-federal transfers shall be in accordance with all applicable federal laws. All notice and comment provisions above shall also apply to leases, in addition to land transfers or sales.

2.13.5 Summary of Estimated Remedy Costs

Tables 2-49 through 2-56 give a detailed cost summary of each selected remedy. The information in these cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during implementation of the remedy. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Table 2-49 Cost Estimate Summary – Capital Costs for Remedy Component for Surface Soil at LF003

Description:
The LF03SS5 Alternative includes excavation of PCB-contaminated soil ≥1 mg/kg and off-site disposal in Arlington, Oregon. The reclamation of the removal site will occur through placement of local borrow source topsoil and revegetation. The maximum detected PCB concentration in soil is 110 mg/kg. There is no landfill in Alaska that will accept soil with PCB contamination greater than 10 mg/kg. The remedy does not include segregating soil above 10 mg/kg PCBs; therefore, all excavated soil with PCBs ≥1 mg/kg will be transported off-site and barged from Cape Romanzof LRRS to Port of Seattle, Washington a distance of 2,400 miles. Contaminated soil will be transported from the Port of Seattle to the Waste Management landfill in Arlington, Oregon for disposal. The distance from the Port of Seattle to the landfill is approximately 310 miles.

Excavation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	5	HR	$199.88	$999.39
Project Scientist	5	HR	$202.48	$1,012.42
QA/QC Officer	1	HR	$200.56	$200.56
Field Technician	1	HR	$119.91	$119.91
Word Processing/Clerical	1	HR	$103.09	$103.09
Draftsman/computer-aided design and drafting (CADD)	1	HR	$113.15	$113.15
953, 2.0 cy, Track Loader	40	HR	$384.37	$15,374.91
Excavate and Load, Bank Measure, Medium Material, ¾-cy bucket, Hydraulic Excavator	226	BANK CY	$11.77	$2,660.77
35-Ton, 796, Off-Highway Truck	40	HR	$507.07	$20,282.77
Onsite Backfill for Large Excavation, Includes Compaction	260	ECY	$4.77	$1,241.17
Seeding, Vegetative Cover	0.17	ACR	$10,959.38	$1,863.09
Sample Collection, Vehicles, Van or Pickup Rental	14	DAY	$212.76	$2,978.63
Disposal Material Per Sample	11	EA	$27.00	$296.97
PCBs in Soil (Method SW8082)	5	EA	$343.79	$1,718.94
Airfare	2	LS	$7,600.00	$15,200.00
Barge Transport of Containerized Waste	1060	CWT	$49.36	$52,321.60
			Subtotal	$116,487.38
Residual Waste Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Waste Packaging, Handling & Disposal, Cart Bags From Worksite to Haul Truck	272	EA	$2.83	$770.00
Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	6	EA	$362.09	$2,172.51
Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	272	BCY	$7.44	$2,023.49
Transfer Cargo from Transport 1 to Transport 2	6	EA	$751.04	$4,506.24
Disposal of Radioactive Waste, Rail Car Transportation, Rail Flatbed Car	6582	CWT	$1.11	$7,209. 22

Table 2-49 Cost Estimate Summary – Capital Costs for Remedy Component for Surface Soil at LF003 (Continued)

Residual Waste Management (Continued)	Quantity	Unit	Unit Cost (USD)	Cost
Barge Transport of Containerized Waste	6582	CWT	$65.82	$433,227.25
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$1,508.37	$1,508.37
Landfill Nonhazardous Solid Bulk Waste by cy	272	CY	$33.82	$9,199.04
Commercial RCRA landfills, Jumbo Bags	272	EA	$14.00	$3,808.00
			Subtotal	$464,505.13
Professional Labor Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Lump Sum Percentage Labor Cost	1	LS	$71,785.00	$71,785.00
			Subtotal	$71,785.00
Site Close-Out Documentation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$264.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01

Subtotals	
Excavation	$116,487.38
Residual Waste Management	$464,505.13
Professional Labor Management	$71,785.00
Site Closeout	$9,578.01
Subtotal	$662,355.52

Cost Summary	
Cost	$662,355.52
Markup	$153,913.48
Total	$816,269.00

Notes:

ACR	acre
CADD	computer-aided design and drafting
CWT	hundredweight
CY (cy)	cubic yard
EA	each
ECY	excavated cubic yards
HR	hour
LS	lump sum
mg/kg	milligrams per kilogram
QA	quality assurance
QC	quality control
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
USD	U.S. dollars

Table 2-50 Cost Estimate Summary – Capital Costs for Remedy Component for Sediment at LF003

Description:
The LF03SD3 Alternative includes excavation of PCB-contaminated soil ≥1 mg/kg and off-site disposal in Arlington, Oregon. The reclamation of the removal site will occur through placement of local borrow source topsoil. The maximum detected PCB concentration in soil is 230 mg/kg. There is no landfill in Alaska that will accept soil with PCB contamination greater than 10 mg/kg. The remedy does not include segregating soil above 10 mg/kg PCBs; therefore, all excavated soil with PCBs ≥1 mg/kg will be transported off-site and barged from Cape Romanzof LRRS to Port of Seattle, Washington a distance of 2,400 miles. Contaminated soil will be transported from the Port of Seattle to a non-hazardous waste landfill in Arlington, Oregon for disposal. The distance from the Port of Seattle to the landfill is approximately 310 miles. Institutional controls and engineering controls will be established since the source of contamination will not be removed.

Excavation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	5	HR	$199.88	$999.39
Project Scientist	5	HR	$202.48	$1,012.42
QA/QC Officer	1	HR	$200.56	$200.56
Field Technician	1	HR	$119.91	$119.91
Word Processing/Clerical	1	HR	$103.09	$103.09
Draftsman/computer-aided design and drafting (CADD)	1	HR	$113.15	$113.15
Excavation (Continued)	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
953, 2.0 cy, Track Loader	48	HR	$384.37	$18,449.90
Excavate and Load, Bank Measure, Medium Material, ¾-cy bucket, Hydraulic Excavator	20	BANK CY	$11.77	$235.47
35-Ton, 796, Off-Highway Truck	48	HR	$507.07	$24,339.33
On-site Backfill for Large Excavation, Includes Compaction	23	ECY	$35.58	$818.39
Seeding, Vegetative Cover, Per Square Yard (SY)	180	SY	$4.53	$814.80
Sample Collection, Vehicles, Van or Pickup Rental	14	DAY	$212.76	$2,978.63
Disposal Material Per Sample	5	EA	$27.00	$134.99
PCBs in Soil (Method SW8082)	5	EA	$343.79	$1,718.94
Airfare	2	LS	$7,600.00	$15,200.00
16 oz./sy Geotextile/Drainage Fabric (170 Mil)	100	SY	$9.24	$924.66
Barge Transport of Containerized Waste	1060	CWT	$49.36	$52,321.60
			Subtotal	$120,485.23
Residual Waste Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Waste Packaging, Handling & Disposal, Cart Bags From Worksite to Haul Truck	272	EA	$2.83	$770.00
Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	6	EA	$362.09	$2,172.51
Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	272	BANK CY	$7.44	$2,023.49

Table 2-50 Cost Estimate Summary – Capital Costs for Remedy Component for Sediment at LF003 (Continued)

Residual Waste Management (Continued)	Quantity	Unit	Unit Cost (USD)	Cost
Transfer Cargo from Transport 1 to Transport 2	6	EA	$751.04	$4,506.24
Disposal of Radioactive Waste, Rail Car Transportation, Rail Flatbed Car	6582	CWT	$1.11	$7,290.22
Barge Transport of Containerized Waste	6582	CWT	$65.82	$433,227.25
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$1,508.37	$1,508.37
Landfill Nonhazardous Solid Bulk Waste by cy	272	CY	$33.82	$9,199.04
Commercial RCRA landfills, Jumbo Bags	272	EA	$14.00	$3,808.00
			Subtotal	$464,505.12
Professional Labor Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Lump Sum Percentage Labor Cost	1	LS	$72,427.00	$72,427.00
			Subtotal	$72,427.00
Administrative Land Use Controls	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Erosion Control, Silt Fence, Polypropylene, 3" high, Includes 7.5' posts	300	LF	$7.96	$3,783.39
Sedan, Automobile, Rental	2	DAY	$152.75	$305.51
Per Diem (per Person)	2	DAY	$171.00	$342.00
Overnight Delivery, 8 oz. Letter	6	EA	$36.92	$221.53
Overnight Delivery Service, 1 lb. Package	2	LB	$117.87	$235.75
Portable GPS Set with Mapping, 5 cm Accuracy	0.5	MO	$2,197.10	$1,098.55
Airfare	1	LS	$7,600.00	$15,200.00
Barge Transport of Containerized Waste	255	CWT	$49.36	$12,586.80
Project Manager	97	HR	$163.90	$16,390.07
Project Engineer	120	HR	$145.91	$17,509.72
Staff Engineer	40	HR	$193.35	$7,734.13
QA/QC Officer	24	HR	$164.46	$4,276.03
Word Processing/Clerical	36	HR	$84.54	$3,127.83
Draftsman/CADD	28	HR	$92.78	$2,597.83
Attorney, Partner, Real Estate	22	HR	$560.72	$12,335. 94
Attorney, Associates, Teal Estates	5	HR	$387.42	$1,937. 09
Paralegal, Real Estate	6	HR	$116.16	$697.02
Other Direct Costs	1	LS	$5346.85	$5,147.12
Local Fees	1	LS	$200.00	$200.00
			Subtotal	$105,726.31

Table 2-50 Cost Estimate Summary – Capital Costs for Remedy Component for Sediment at LF003 (Continued)

Five-Year Review	Quantity	Unit	Unit Cost (USD)	Cost
Per Diem (Per Person)	6	DAY	$171.00	$684.00
Surface Soil Sampling Equipment	0.5	EA	$1,455.16	$727.58
PCBs in Soil (Method SW8082)	4	EA	$208.36	$833.42
Polypropylene Shovel	2	EA	$138.29	$276.57
Airfare	3	LS	$4,200.00	$7,600.00
Project Manager	23	HR	$199.88	$1,199.27
Project Engineer	65	HR	$177.94	$4,270.66
Project Scientist	60	HR	$202.48	$4,859.61
Staff Scientist	37	HR	$115.70	$694.23
			Subtotal	$21,145.34
Site Close-Out Documentation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	52	HR	$199.88	$5,196.85
Senior Staff Engineer	4	HR	$264.54	$529.08
Staff Engineer	19	HR	$235.80	$2,122.17
Word Processing/Clerical	16	HR	$103.09	$824.74
Draftsman/CADD	16	HR	$113.15	$905.17
			Subtotal	$9,578.01

Subtotals	
Excavation	$120,485.23
Residual Waste Management	$464,505.12
Professional Labor Management	$72,427.00
Administrative Land Use Controls	$105,726.31
Five-Year Review	$21,145.34
Site Closeout	$9,578.01
Subtotal	$793,867.01

Cost Summary	
Cost	$793,867.01
Markup	$278,149.00
Total	$1,072,016.00

Notes:

CADD	computer-aided design and drafting	HR	hour	QA	quality assurance
cm	centimeter	LS	lump sum	QC	quality control
CWT	hundredweight	mg/kg	milligrams per kilogram	RCRA	Resource Conservation and Recovery Act
cy	cubic yard	MO	month		
EA	each	oz.	ounce	USD	U.S. dollars
ECY	excavated cubic yards	PCB	polychlorinated biphenyl		
LF	linear foot (feet)				
GPS	global positioning system				

Table 2-51 Cost Estimate Summary – Capital Cost for Remedy Component for Subsurface Soil at SS010

Description:
The SS10SB2 Alternative includes institutional controls and engineering controls. Subsurface soil contaminated above cleanup levels protective of human health and the environment would remain on-site. However, over time natural attenuation of contaminants will likely occur.

Administrative Land Use Controls	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Sedan, Automobile, Rental	2	DAY	$152.75	$305.51
Per Diem (per Person)	2	DAY	$171.00	$342.00
Overnight Delivery, 8 oz. Letter	6	EA	$36.92	$221.53
Overnight Delivery Service 1 lb. Package	2	LB	$117.87	$235.75
Portable GPS Set with Mapping, 5 cm Accuracy	0.5	MO	$2,197.10	$1,098.55
Airfare	1	LS	$7,600.00	$7,600.00
Barge Transport of Containerized Waste	255	CWT	$49.36	$12,586.31
Project Manager	97	HR	$163.90	$15,898.30
Project Engineer	120	HR	$145.91	$17,509.20
Staff Engineer	40	HR	$193.35	$7,734.13
QA/QC Officer	24	HR	$164.46	$3,947.04
Word Processing/Clerical	36	HR	$84.54	$3,043.44
Draftsman/CADD	28	HR	$92.78	$2,597.84
Attorney, Partner, Real Estate	22	HR	$560.72	$12,335.94
Attorney, Associate, Real Estate	5	HR	$387.42	$1,937.09
Paralegal, Real Estate	6	HR	$116.16	$696.97
Other Direct Costs	1	LS	$4,847.31	$4,847.31
Local Fees	1	LS	$200.00	$200.00
			Subtotal	$93,137.90
Five-Year Review	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Per Diem (per Person)	2	DAY	$171.00	$342.00
Airfare	1	LS	$5,000.00	$5,000.00
Project Manager	17	HR	$199.88	$3,397.93
Project Engineer	41	HR	$177.94	$7,295.72
Project Scientist	36	HR	$202.48	$7,289.41
Staff Scientist	31	HR	$115.70	$3,586.70
			Subtotal	$26,911.92
Fencing	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Boundary Fence, 5-foot Galvanized	610	LF	$63.10	$38,493.92
Hazardous Waste Signing	4	EA	$195.79	$783.15
			Subtotal	$39,277.08

Table 2-51 Cost Estimate Summary – Capital Cost for Remedy Component for Subsurface Soil at SS010 (Continued)

Site Closeout	Quantity	Unit	Unit Cost (USD)	Cost
Project Management	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$256.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01

Subtotal	$168,904.91
Contingency Allowances (0%)	
Project Management and Support	$505,266.09
Total Capital Costs	$674,171.00

Subtotals	
Administrative Land Use Controls	$93,137.90
Fencing	$39,277.08
Five-Year Review	$26,911.92
Site Closeout	$9,578.01
Project Management and Support	$124,981.09
Subtotal	$303,464

Cost Summary	
Cost	$303,464
Markup	$370,707
Total	$674,171

Notes:

CADD	computer-aided design and drafting
cm	centimeter
EA	each
GPS	global positioning system
HR	hour
lb. (LB)	pound
LF	linear foot (feet)
LS	lump sum
MO	month
oz.	ounce
QA	quality assurance
QC	quality control
USD	U.S. Dollar

Table 2-52 Cost Estimate Summary – Capital Cost for Remedy Component for Groundwater at SS010

Description:
The SS10GW2 Alternative includes installation of monitoring wells and groundwater monitoring sampling occurring every five years. Monitoring will be performed until groundwater sample results show that contaminants are below ADEC Groundwater Cleanup Criteria. The maximum detected fuel (DRO, GRO, and RRO) concentrations in groundwater are not yet determined.

Site Close-Out Documentation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$264.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01
Administrative Land Use Controls	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Sedan, Automobile, Rental	2	DAY	$152.75	$305.51
Per Diem (per Person)	2	DAY	$171.00	$342.00
Overnight Delivery, 8 oz. Letter	6	EA	$36.92	$221.53
Overnight Delivery Service, 1 lb. Package	2	LB	$117.87	$235.75
Portable GPS Set with Mapping, 5 cm Accuracy	0.5	MO	$2,197.10	$1,098.55
Project Manager	40	HR	$163.90	$6,556.03
Project Manager	17	HR	$163.90	$2,786.31
Project Manager	40	HR	$163.90	$6,556.03
Project Engineer	40	HR	$145.91	$5,836.57
Project Engineer	80	HR	$145.91	$11,637.14
Staff Engineer	40	HR	$193.35	$7,734.13
QA/QC Officer	16	HR	$164.46	$2,631.40
QA/QC Officer	8	HR	$164.46	$1,315.70
Word Processing/Clerical	20	HR	$84.54	$1,690.72
Word Processing/Clerical	8	HR	$84.54	$676.29
Word Processing/Clerical	8	HR	$84.54	$676.29
Draftsman/CADD	8	HR	$92.78	$742.24
Draftsman/CADD	20	HR	$92.78	$1,855.59
Attorney, Partner, Real Estate	22	HR	$560.72	$12,335.94
Attorney, Associate, Real Estate	5	HR	$387.42	$1,937.09
Paralegal, Real Estate	6	HR	$116.16	$696.97
Other Direct Costs	1	LS	$2,098.29	$2,098.29
Other Direct Costs	1	LS	$2,349.26	$2,349.26
Other Direct Costs	1	LS	$399.73	$399.73
Local Fees	1	LS	$200.00	$200.00
			Subtotal	$72,951.10

Table 2-52 Cost Estimate Summary – Capital Cost for Remedy Component for Groundwater at SS010 (Continued)

Groundwater Monitoring Well	Quantity	Unit	Unit Cost (USD)	Cost
Mobilize/Demobilize Drilling Rig & Crew	1	LS	$6,063.36	$6,063.36
Sample Collection, Vehicles, Van, or Pickup Rental	14	DAY	$212.76	$2,978.63
Organic Vapor Analyzer Rental, per Day	14	DAY	$108.58	$1,520.08
Total Petroleum Hydrocarbons (SW8015B), Water Analysis	7	DAY	$278.49	$1,949.43
Testing , Soil & Sediment Analysis, Total Petroleum Hydrocarbons (TPH)	8	EA	$209.02	$1,672.13
BTEX/MTBE/TVPH (EPA 8021B/8015B), Soil Analysis	8	EA	$277.42	$2,219.36
BTEX/MTBE/TVPH (EPA 8021B/8015B), Water Analysis	7	EA	$277.42	$1,941.94
Airfare	2	LS	$7,600	$15,200.00
Decontaminate Rig, Augers, Screen (Rental Equipment)	2	DAY	$1,594.96	$6,379.82
Barge Transport of Containerized Waste	2500	CWT	$49.36	$123,400.00
Field Technician	64	HR	$119.91	$7,674.18
2” PVC, Schedule 40, Well Casing	200	LF	$29.61	$5,921.04
2” PVC, Schedule 40, Well Screen	50	LF	$37.13	$1,856.09
2” PVC, Well Plug	5	EA	$114.01	$570.03
Air Rotary, 6” Die Borehole (Unconsolidated), Depth ≤100 ft.	255	LF	$135.10	$34,449.05
Split Spoon Sampling	55	LF	$50.75	$2,790.78
Move rig/Equipment Around Site	4	EA	$1,110.31	$4,441.26
DOT Steel Drums, 55 gal, Open, 17C	13	EA	$299.38	$3,891.95
2” Screen, Filter Pack	60	LF	$44.14	$2,648.89
Surface Pad, Concrete, 2’ x 2’ x 4”	5	EA	$191.86	$959.31
2” Well, Portland Cement Grout	185	LF	$3.11	$574.67
2” Well, Bentonite Seal	5	EA	$909.61	$4,548.01
			Subtotal	$233,650.03
Long-Term Monitoring	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Disposable Material per Sample	3	EA	$27.00	$80.99
Disposable Material per Sample	5	EA	$27.00	$134.99
Disposable Material per Sample	2	EA	$27.00	$53.99
Decontamination Material per Sample	5	EA	$35.23	$176.17
Decontamination Material per Sample	3	EA	$35.23	$105.70
Decontamination Material per Sample	2	EA	$35.23	$70.47
Lysimeter accessories, nylon t7ubing, ¼” OD	175	LF	$0.41	$71.55
Sludge Sampler, Stainless Steel, Thread on, 3.25” x 12”	1	EA	$1,759.10	$1,759.10
Monitor Well Sampling Equipment, Rental, Water Quality Testing Parameter Device Rental	1	WK	$943.50	$943.50

Table 2-52 Cost Estimate Summary – Capital Cost for Remedy Component for Groundwater at SS010 (Continued)

Long-Term Monitoring (Continued)	Quantity	Unit	Unit Cost (USD)	Cost
Monitor Well Sampling Equipment, Rental, Water Quality Testing Parameter Device Rental	1	WK	$943.50	$943.50
Total Petroleum Hydrocarbons (SW8015B), Water Analysis	2	EA	$306.34	$612.68
Total Petroleum Hydrocarbons (SW8015B), Water Analysis	5	EA	$306.34	$1,531.69
Testing, Soil & Sediment Analysis, Total Petroleum Hydrocarbons (TPH)	3	EA	$229.92	$689.76
BTEX/MTBE/TVPH (EPA 8021B/8015), Soil Analysis	3	EA	$305.16	$915.49
BTEX/MTBE/TVPH (EPA 8021B/8015), Water Analysis	5	EA	$305.16	$1,525.81
BTEX/MTBE/TVPH (EPA 8021B/8015), Water Analysis	2	EA	$305.16	$610.33
Airfare	1	LS	$7,600.00	$7,600.00
DOT Steel Drums, 55 gal, Closed Only, 17H	4	EA	$178.48	$713.91
Project Manager	2	HR	$199.88	$399.76
Project Manager	2	HR	$199.88	$399.76
Project Manager	2	HR	$199.88	$399.76
Project Manager	11	HR	$199.88	$2,198.67
Project Engineer	10	HR	$177.94	$1,779.44
Project Scientist	20	HR	$202.48	$4,049.67
Staff Scientist	20	HR	$115.70	$2,314.10
QA/QC Officer	8	HR	$200.56	$1,604.51
Field Technician	44	HR	$119.91	$5,276.00
Field Technician	8	HR	$119.91	$959.27
Field Technician	8	HR	$119.91	$959.27
Field Technician	8	HR	$119.91	$959.27
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
Peristaltic Pump, Weekly Rental	1	WK	$225.40	$225.40
Other Direct Costs	1	LS	$855.70	$855.70
			Subtotal	$42,650.13
			Subtotal	$358,829.27
			Contingency Allowances (0%)	
			Project Management and Support	
			Total Capital Costs	

Table 2-52 Cost Estimate Summary – Capital Cost for Remedy Component for Groundwater at SS010 (Continued)

Subtotals				
Site Closeout	$9,578.01		**Cost Summary**	
Land Use Controls	$72,951.10		Cost	$358,829.27
Groundwater Monitoring Wells	$233,650.03		Markup	$682,910.73
Long-Term Monitoring	$42,650.13			
Subtotal	$358,829.27			
			Total	$1,041,740.00

Notes:

ADEC	Alaska Department of Environmental Conservation
BTEX	benzene, toluene, ethylbenzene, and xylene
CADD	computer-aided design and drafting
CM (cm)	centimeter
CWT	hundredweight
DOT	Department of Transportation
DRO	diesel-range organics
EA	each
GPS	global positioning system
GRO	gasoline-range organics
HR	hour
LB (lb.)	pound
LF	linear foot
LS	lump sum
MO	month
OD	outer diameter
OZ (oz.)	ounce
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RRO	residual-range organics
TPH	total petroleum hydrocarbons
USD	U.S. dollars
WK	week

Table 2-53 Cost Estimate Summary – Capital Cost for Remedy Component for Surface Soil at SS016

Description:
The SS16SS4 Alternative includes excavation of PCB- and lead-contaminated soil (≥1 mg/kg and ≥400 mg/kg respectively) and off-site disposal in Arlington, Oregon. The reclamation of the removal site will occur through placement of local borrow source topsoil and revegetation. The maximum detected concentrations in soil are 6,600 mg/kg PCBs and 617 mg/kg lead. There is no landfill in Alaska that will accept soil with PCB contamination greater than 10 mg/kg. The remedy does not include segregating soil above 10 mg/kg PCBs; therefore, all excavated soil with PCBs ≥1 mg/kg will be transported off-site and barged from Cape Romanzof LRRS to Port of Seattle, Washington a distance of 2,400 miles. Contaminated soil will be transported from the Port of Seattle to a non-hazardous waste landfill in Arlington, Oregon for disposal. The distance from the Port of Seattle to the landfill is approximately 310 miles. If, due to logistical and safety concerns, areas of soil with PCBs ≥1 mg/kg and lead ≥400 mg/kg are left on-site, these areas will be capped and Institutional/Engineering Controls will be implemented.

Excavation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	6	HR	$199.88	$1,199.27
Project Scientist	10	HR	$202.48	2,024.84
QA/QC Officer	2	HR	$200.56	$401.13
Field Technician	2	HR	$119.91	$239.82
Word Processing/Clerical	2	HR	$103.09	$206.19
Draftsman/CADD	2	HR	$113.15	$226.29
953, 2.0 cy, Track Loader	40	HR	$384.37	$15,374.91
Excavate and Load, Bank Measure, Medium Material, ¾-cy bucket, Hydraulic Excavator	140	BCY	$11.77	$1,648.27
35-Ton, 796, Off-Highway Truck	40	HR	$507.07	20,282.77
On-site Backfill for Large Excavation, Includes Compaction	161	ECY	$35.58	$5,728.73
Seeding, Vegetative Cover, per square yard	336	SY	$4.53	$1,520.97
Sample Collection, Vehicles, Van, or Pickup Rental	14	DAY	$212.76	$2,978.63
Disposable Material per Sample	15	EA	$27.00	$404.96
PCBs in Soil (Method SW8082)	15	EA	$343.79	$5,156.82
Airfare	2	LS	$7,600	$15,200.00
Barge Transport of Containerized Waste	1060	CWT	$49.36	$52,321.60
			Subtotal	$124,915.18

Table 2-53 Cost Estimate Summary – Capital Cost for Remedy Component for Surface Soil at SS016 (Continued)

Residual Waste Management	Quantity	Unit	Unit Cost (USD)	Cost
Waste Packaging, Handling & Disposal, Cart Bags From Worksite to Haul Truck	170	EA	$2.83	$481.25
Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	4	EA	$362.09	$1,448.34
Bulk Solid Waste Loading into Disposal Vehicle or Bulk Disposal Container	170	BCY	$7.44	$1,264.68
Transfer Cargo from Transport 1 to Transport 2	4	EA	$751.04	$3,004.16
Disposal of Radioactive Waste, Rail Car Transportation, Rail Flatbed Car	4100	CWT	$1.19	$4,860.14
Barge Transport of Containerized Waste	4100	CWT	$65.62	$269,042.00
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$1,508.37	$1,508.37
Landfill Nonhazardous Solid Bulk Waste by cy	170	CY	$33.82	$5,794.40
Commercial RCRA Landfills, Jumbo Bags	170	EA	$14.00	$2,380.00
			Subtotal	$289,738.35
Professional Labor Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Lump Sum Percentage Labor Cost	1	LS	$52,181.00	$52,181.00
			Subtotal	$52,181.00
Administrative Land Use Controls	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Construction Signs	96	SF	$56.30	$5,404.37
Erosion control, silt fence, polypropylene, 3' high, includes 7.5' posts	1000	LF	$9.17	$9,168.06
Sedan, Automobile, Rental	2	DAY	$152.75	$305.51
Boundary Fence, 5' Galvanized	360	LF	$63.10	$22,717.72
Hazardous Waste Signing	6	EA	$195.79	$1,174.73
Per Diem (per person)	2	DAY	$171.00	$342.00
Overnight Delivery, 8 oz Letter	6	EA	$36.92	$221.53
Overnight delivery service, 1 lb package	2	LB	$117.87	$235.75
Portable GPS Set with Mapping, 5 cm Accuracy	0.5	MO	$2,197.10	$1,098.55
Project Manager	97	HR	$163.90	$15,898.36
Project Engineer	100	HR	$145.91	$14,591.43
Staff Engineer	20	HR	$193.35	$3,867.07
QA/QC Officer	24	HR	$164.46	$3,947.11
Word Processing/Clerical	36	HR	$84.54	$3,043.29
Draftsman/CADD	28	HR	$92.78	$2,597.83
Attorney, Partner, Real Estate	22	HR	$560.72	$12,335.94

Table 2-53 Cost Estimate Summary – Capital Cost for Remedy Component for Surface Soil at SS016 (Continued)

Administrative Land Use Controls (Continued)	Quantity	Unit	Unit Cost (USD)	Cost
Attorney, Associate, Real Estate	5	HR	$387.42	$1,937.09
Paralegal, Real Estate	6	HR	$116.16	$696.97
Other Direct Costs	1	LS	$4,847.32	$4,847.32
Local Fees	1	LS	$200.00	$200.00
			Subtotal	$104,630.63
Five-Year Review	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Per Diem (per Person)	2	DAY	$171.00	$342.00
Airfare	1	LS	$5,000.00	$5,000.00
Project Manager	17	HR	$199.88	$3,397.93
Project Engineer	41	HR	$177.94	$7,295.72
Project Scientist	36	HR	$202.48	$7,289.41
Staff Scientist	31	HR	$115.70	$3,586.70
			Subtotal	$26,911.92
Site Close-Out Documentation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$264.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01

Subtotals	
Excavation	$124,915.18
Residual Waste Management	$289,738.35
Professional Labor Management	$52,181.00
Administrative Land Use Controls	$104630.64
Five Year Review	$161,471.52
Site Closeout	$9,578.01
Subtotal	$742,514.70

Cost Summary	
Cost	$742,515
Markup	$462,871
Total	$1,205,386

Notes:

BCY	bank cubic yard
CADD	computer-aided design and drafting
CWT	hundredweight
cy (CY)	cubic yard
EA	each
ECY	excavated cubic yard
GPS	global positioning system
HR	hour
LS	lump sum
mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SY	square yard
USD	U.S. dollars
SF	slope factor

Table 2-54 Cost Estimate Summary – Capital Cost for Remedy Component for Surface Soil at SS017

Description:
The SS17SS4 Alternative includes excavation of PCB- and lead-contaminated soil (≥1 mg/kg and ≥400 mg/kg respectively) and off-site disposal in Arlington, Oregon. The reclamation of the removal site will occur through placement of local borrow source topsoil and revegetation. The maximum detected contaminant concentrations in soil are 68 mg/kg PCBs and 1,500 mg/kg lead. There is no landfill in Alaska that will accept soil with PCB contamination greater than 10 mg/kg. The remedy does not include segregating soil above 10 mg/kg PCBs; therefore, all excavated soil with PCBs ≥1 mg/kg and lead ≥400 mg/kg will be transported off-site and barged from Cape Romanzof LRRS to Port of Seattle, Washington a distance of 2,400 miles. Contaminated soil will be transported from the Port of Seattle to a non-hazardous waste landfill in Arlington, Oregon for disposal. The distance from the Port of Seattle to the landfill is approximately 310 miles.

Excavation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	6	HR	$199.88	$1,199.27
Project Scientist	10	HR	$202.48	$2,0224.84
QA/QC Officer	2	HR	$200.56	$401.13
Field Technician	2	HR	$119.91	$239.82
Word Processing/Clerical	2	HR	$103.09	$206.19
Draftsman/CADD	2	HR	$113.15	$226.29
953, 2.0 cy, Track Loader	40	HR	$384.37	$15,374.91
Excavate and Load, Bank Measure, Medium Material, ¾-cy bucket, Hydraulic Excavator	180	BANK CY	$11.77	$2,119.20
35-Ton, 796, Off-Highway Truck	40	HR	$507.07	$20,282.77
On-site Backfill for Large Excavation, Includes Compaction	180	ECY	$35.58	$6,404.79
Seeding, Vegetative Cover, Per SY	336	SY	$4.53	$1,520.97
Sample Collection, Vehicles, Van or Pickup Rental	14	DAY	$212.76	$2,978.63
Disposal Material Per Sample	15	EA	$27.00	$404.96
PCBs in Soil (Method SW8082)	15	EA	$343.79	$5,156.82
Airfare	2	LS	$7,600.00	$15,200.00
Barge Transport of Containerized Waste	1060	CWT	$49.36	$52,321.60
			Subtotal	$126,062.18
Residual Waste Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Waste Packaging, Handling & Disposal, Cart Bags From Worksite to Haul Truck	170	EA	$2.83	$481.25
Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	5	EA	$362.09	$1,810.43
Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	170	BANK CY	$7.44	$1,264.68
Transfer Cargo from Transport 1 to Transport 2	5	EA	$751.04	$3,755.20
Disposal of Radioactive Waste, Rail Car Transportation, Rail Flatbed Car	5160	CWT	$1.19	$6,116.66

Table 2-54 Cost Estimate Summary – Capital Cost for Remedy Component for Surface Soil at SS017 (Continued)

Residual Waste Management (Continued)	Quantity	Unit	Unit Cost (USD)	Cost
Barge Transport of Containerized Waste	5160	CWT	$65.62	$338,599.19
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$1,508.37	$1,508.37
Landfill Nonhazardous Solid Bulk Waste by cy	215	CY	$33.82	$7,271.30
Commercial RCRA landfills, Jumbo Bags	170	EA	$14.00	$2,380.00
			Subtotal	$363,187.08
Professional Labor Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Lump Sum Percentage Labor Cost	1	LS	$61,203.00	$61,203.00
			Subtotal	$61,203.00
Site Close-Out Documentation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Manager	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$264.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01

Subtotals				
Excavation	$126,062.18		**Cost Summary**	
Residual Waste Management	$363,187.08		Cost	$560,030.27
Professional Labor Management	$61,203.00		Markup	$139,837.73
Site Closeout	$9,578.01			
Subtotal	$560,030.27		**Total**	$699,868.00

Notes:

CADD	computer-aided design and drafting	HR	hour	QC	quality control
CWT	hundredweight	LS	lump sum	RCRA	Resource Conservation and Recovery Act
cy (CY)	cubic yard	mg/kg	milligrams per kilogram		
EA	each	PCB	polychlorinated biphenyl	SY	square yard
ECY	excavated cubic yard	QA	quality assurance	USD	U.S. dollars

Table 2-55 Cost Estimate Summary – Capital Cost for Remedy Component for Subsurface Soil at SS017

Description:
The SS17SB4 Alternative includes excavation of PCB- and lead-contaminated subsurface soil (≥1 mg/kg and 400 mg/kg, respectively), and off-site disposal in Arlington, Oregon. The reclamation of the removal site will occur through placement of local borrow source topsoil and revegetation. The maximum detected PCB concentration in subsurface soil is 13.6 mg/kg and lead at 1,440 mg/kg. There is no landfill in Alaska that will accept soil with PCB contamination greater than 10 mg/kg. The remedy does not include segregating soil above 10 mg/kg PCBs; therefore, all excavated soil with PCBs ≥1 mg/kg and lead ≥ 400 mg/kg will be transported off-site and barged from Cape Romanzof LRRS to Port of Seattle, Washington a distance of 2,400 miles. Contaminated soil will be transported from the Port of Seattle to a non-hazardous waste landfill in Arlington, Oregon for disposal. The distance from the Port of Seattle to the landfill is approximately 310 miles.

Excavation	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
935, 2.0 cy, Track Loader	40	HR	$384.37	$15,374.91
Excavate and Load, Bank Measure, Medium Material, ¾ cy Bucket, Hydraulic Excavator	12	BCY	$11.77	$141.28
35 Ton, 769, Off-Highway Truck	40	HR	$507.07	$20,282.77
On-Site Backfill for Small Excavations and Trenches, Includes Compaction	12	ECY	$35.58	$426.99
Seeding, Vegetative Cover, per SY	336	SY	$4.53	$1,520.97
Sample Collection, Vehicles, Van, or Pickup Rental	14	DAY	$212.76	$2,978.63
Disposal Material per Sample	15	EA	$27.00	$404.96
PCBs in Soil (Method SW8082)	15	EA	$343.79	$5,156.82
Airfare	2	EA	$7,600.00	$15,200.00
Barge Transport of Containerized Waste	1060	CWT	$49.36	$52,321.60
Project Manager	6	HR	$199.88	$1,199.27
Project Scientist	10	HR	$202.48	$2,024.84
QA/QC Officer	2	HR	$200.56	$401.13
Field Technician	2	HR	$119.91	$239.82
Word Processing/Clerical	2	HR	$103.09	$206.19
Draftsman/CADD	2	HR	$113.15	$226.29
			Subtotal	$118,106.46
Residual Waste Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Waste Packaging, Handling & Disposal, Cart Bags From Work Site to Haul Truck	14	EA	$2.83	$39.63
Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	1	EA	$362.09	$362.09
Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	14	BCY	$7.44	$104.15
Transfer Cargo from Transport 1 to Transport 2	1	EA	$751.04	$751.04
Disposal of Radioactive Waste, Rail Car Transportation, Rail Flatbed Car	336	CWT	$1.19	$398.29
Barge Transport of Containerized Waste	336	CWT	$65.62	$22,048.32
Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	$1,508.37	$1,508.37
Landfill Nonhazardous Solid Bulk Waste by cy	14	CY	$33.82	$473.48
Commercial RCRA Landfills, Jumbo Bags	14	EA	$14.00	$196.00
			Subtotal	$25,881.38

Table 2-55 Cost Estimate Summary – Capital Cost for Remedy Component for Subsurface Soil at SS017 (Continued)

Professional Labor Management	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Lump Sum Percentage Labor Cost	1	LS	$19,317.00	$19,317.00
			Subtotal	$19,317.00
Site Closeout	**Quantity**	**Unit**	**Unit Cost (USD)**	**Cost**
Project Management	26	HR	$199.88	$5,196.85
Senior Staff Engineer	2	HR	$256.54	$529.08
Staff Engineer	9	HR	$235.80	$2,122.17
Word Processing/Clerical	8	HR	$103.09	$824.74
Draftsman/CADD	8	HR	$113.15	$905.17
			Subtotal	$9,578.01
			Subtotal	$172,882.85
			Contingency Allowances (0%)	
			Project Management and Support	$66,244.15
			Total Capital Costs	$239,127.00

Notes:

BCY	bank cubic yard
CADD	computer-aided design and drafting
CWT	hundredweight
cy (CY)	cubic yard
EA	each
ECY	excavated cubic yard
HR	hour
LS	lump sum
mg/kg	milligrams per kilogram
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SY	square yard
USD	U.S. dollars

2.13.6 Expected Outcomes of Selected Remedy

Following completion of the selected remedies for each site at Cape Romanzof LRRS, sites LF003, SS010, and potentially SS016 (if contaminated soil is left in place and capped) will be restricted to commercial/industrial land use, and site SS017 will have unrestricted land use. Expected outcomes for the selected remedies are described in the tables in Section 2.10.3. Cleanup will be considered complete under CERCLA and 18 AAC 75 when COCs are deemed protective of human health and the environment. In accordance with 18 AAC 75.325(i), the landowner or its operators shall obtain approval from ADEC prior to disposing or transporting soil from the site.

2.14 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, is cost-effective, and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, periodic five-year reviews

are required if, after the remedy, hazardous substances will remain in place above levels allowing for unlimited use and unrestricted exposure. CERCLA also includes 1) a preference for remedies that employ treatment which 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.

Petroleum hydrocarbons (DRO, GRO, and RRO at Site SS010), which are exempt from CERCLA but considered hazardous substances under State of Alaska laws and regulations, are present at concentrations above levels protective of unlimited use allowed by Alaska regulations. The selected remedy complies with state requirements under 18 AAC 75.325-390. The following sections discuss how the selected remedy meets these statutory requirements.

2.14.1 Protection of Human Health and the Environment

The selected remedies for surface soil at LF003, SS016, and SS017 (Alternatives LF03SS5, SS16SS4, and SS17SS4), subsurface soil at SS017 (Alternative SS17SB4), and sediment at LF003 (Alternative LF03SD3), along with IC/LUCs and LTM at the landfill, will protect human health and the environment by excavating and disposing of PCB-contaminated soil ≥1 mg/kg (and lead-contaminated soil from sites SS016 and SS017) at an approved off-site disposal facility. These alternatives will provide protection for human health and the environment by permanently removing contaminated soil from the site. These alternatives do not, however, include treatment and therefore they do not reduce the volume and mobility of contaminants at the site. Overall, these alternatives meet the criterion of Protection of Human Health and the Environment.

The selected remedies for subsurface soil and groundwater at SS010 (Alternatives SS10SB2 and SS10GW2) will protect human health by placing notations regarding residual contamination and land use restrictions on appropriate land records and the Base Master Plan. These notations will alert personnel and the public to the existence and locations of contamination and restrictions on invasive activities at the site, preventing inadvertent exposure to contaminated media. Though groundwater at this site has been determined not to be a potential drinking water source, property use restrictions will prohibit installation of water wells, with the exception of groundwater monitoring wells, in areas with contaminated groundwater.

The toxicity and volume of contamination in both groundwater and subsurface soil are expected to be reduced, through natural processes, to levels below the prescribed cleanup levels for each medium; however, no active treatment is proposed that would reduce contamination. Groundwater monitoring is included as part of the selected remedy to ensure that groundwater contamination is not migrating off-site at levels exceeding water quality criteria and to track the progress of natural attenuation toward achieving remedial goals. Overall, these alternatives meet the criterion of Protection of Human Health and the Environment.

2.14.2 Compliance with ARARs

Remedial actions must comply with both federal and state ARARs. ARARs are legally applicable or relevant and appropriate requirements, standards, criteria, or limitations of federal and state environmental laws and regulations.

ARARs fall into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are health-based or risk-management-based numbers that provide concentrations limits for the occurrence of a chemical in the environment at agreed-upon points of compliance. Location-specific ARARs restrict activities in certain sensitive environments. Action-specific ARARs are activity-based or technology-based, typically controlled remedial activities that generate PCB-contaminated wastes (such as with those covered under the RCRA). Off-site shipment, treatment and disposal of excavated contaminated soil invoke action-specific ARARs. Criteria to be considered, or TBCs, are non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. However, in many circumstances, TBCs are considered along with ARARs.

ARARs are briefly listed for each alternative in the tables in Section 2.10.2, and Appendix B contains a list of the primary chemical- and potentially applicable action-specific ARARs determined for each contaminated media at Cape Romanzof LRRS.

Alternatives LF03SS5, LF03SD3, SS16SS4, SS17SS4 and SS17SB4 comply with ARARs. These alternatives will remove contaminated soil, sediment, and subsurface soil with contaminants above chemical-specific ARARs from the site. Analytical confirmation samples will document that chemical-specific ARARs are met at the site. Due to the physical location of Site SS016, some contaminated soil may be left in-place. If this is necessary, these areas will be capped and institutional and engineering controls will be implemented at the site in order that ARARs are met. These alternatives involve the off-site disposal of untreated wastes and therefore do not reduce the overall toxicity and volume of contaminants.

Alternatives SS10SB2 and SS10GW2 comply with applicable regulations. These alternatives rely on natural attenuation of fuel contaminants in subsurface soil and groundwater to meet cleanup levels. A notice on the property records and signage at the site will reduce the potential for incidental exposure to subsurface soil and groundwater by providing notification of potential hazards present and warning against intrusive activities and groundwater use. LTM of groundwater will document when the natural attenuation processes at the site has decreased contaminant levels below cleanup levels. LTM does not satisfy ADEC preference for using active remediation processes whenever possible.

The selected remedies comply with the chemical-specific, location-specific, and action-specific ARARs. The implementation of the remedies is required to meet the substantive portions of these requirements at agreed-upon points of compliance and is exempt from administrative requirements such as permitting and notification.

2.14.3 Cost Effectiveness

In the USAF's judgment, the selected remedies are cost-effective and represent a reasonable value for the money to be spent. In making this determination, the following definition was used. "A remedy shall be cost-effective if its cost are proportional to its overall effectiveness" (40 CFR 300.430[f][1][ii][D]). This determination was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfy the threshold criteria (that is, is protective of human health and the environment and ARAR-compliant).

Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination: long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness. Overall effectiveness was then compared to costs to determine cost-effectiveness. The overall effectiveness of the selected remedies for Cape Romanzof LRRS was demonstrated in the comparative analysis of alternatives (Section 2.11 – Summary of Comparative Analysis of Alternatives) and is summarized in Table 2-56 below. The estimated present worth cost of the selected remedies (in 2012 dollars) are as follows:

- Landfill No. 2:
  - Surface Soil Alternative #5 (LF03SS5) – $816,269
  - Sediment Alternative #3 (LF03SD3) – $1,072,016
- Spill/Leak No. 4 at the Weather Station Building:
  - Subsurface Soil Alternative #2 (SS10SB2) – $674,171
  - Groundwater Alternative #2 (SS10GW2) – $1,041,740
- Upper Tram Terminal Area:
  - Surface Soil Alternative #4 (SS16SS4) – $1,205,386
- Lower Tram Terminal Area:
  - Surface Soil Alternative #4 (SS17SS4) – $699,868
  - Subsurface Soil Alternative #4 (SS17SB4) – $239,127

It is important to note that more than one cleanup alternative can be cost-effective, and the Superfund program does not mandate the selection of the most cost-effective cleanup alternative. In addition, the most cost-effective remedy is not necessarily the remedy that provides the best balance of tradeoffs with respect to the remedy selection criteria nor is it necessarily the least-costly alternative that is both protective of human health and the environment and ARAR-compliant. Rather, cost-effectiveness is concerned with the reasonableness of the relationship between the effectiveness afforded by each alternative and its cost compared to other available options.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
LANDFILL No. 2 SURFACE SOIL (LF03SS)				
Alternative LF03SS1 – No Action	None	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist. Risk to community and environment.
Alternative LF03SS2 – Institutional Controls, Engineering Controls, and Containment	$1,191,785	Provides limited long-term effectiveness because alternative doesn't include reduction of contamination mass in soil. ICs will mitigate residual risks, although constant monitoring and maintenance and five-year reviews will be required indefinitely.	Capping partially contains contaminants, thereby decreasing their mobility. No reduction in toxicity or volume because PCBs will not degrade through natural processes. ICs and capping are not considered "treatment."	Effective in the short term; dust mitigation would be necessary to minimize risk to human health of site workers. Risk to the environment would be low due to non-invasive aspects of this alternative.
Alternative LF03SS3 – PCB Soil (≥10 mg/kg): Excavation and Offsite Disposal; PCB Soil (≥1 mg/kg and <10 mg/kg): Institutional Controls, Engineering Controls, and Containment	$1,328,809	Provides limited long-term effectiveness and permanence by removing the highest of the contaminated soil from the site.	Excavation is not considered "treatment." Capping soil left on-site partially contains contaminants, thereby decreasing their mobility. No reduction in overall volume and toxicity.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative LF03SS4 – PCB (Soil ≥1 mg/kg): Excavation, Ex-Situ Treatment and On-Site Disposal	$1,894,240	Provides long-term effectiveness and permanence by treating and removing contaminants from soil.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
LANDFILL No. 2 SURFACE SOIL (LF03SS)				
Alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal ***(selected remedy)***	$816,269	Provides long-term effectiveness and permanence by removing contaminated soil from the site.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal	$40,577,885	Provides long-term effectiveness and permanence by removing contaminated soil from the site.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
LANDFILL No. 2 SEDIMENT (LF03SD)				
Alternative LF03SD1– No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.
Alternative LF03SD2 – Institutional Controls and Engineering Controls	$655,146	Provides limited long-term effectiveness because alternative doesn't include reduction of contamination mass in sediment. ICs and eroded soil control barriers would mitigate residual risks, but constant monitoring and maintenance and five-year reviews would be required indefinitely.	No reduction in volume, toxicity and mobility through treatment.	Partially effective in the short-term. This alternative would not entirely prevent potential human contact with contaminated sediment or dust, even after installation of signs. Risk to workers could be mitigated by dust control measures. Risk to environment would be low due to the non-invasive aspect of this alternative.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
LANDFILL No. 2 SEDIMENT (LF03SD)				
Alternative LF03SD3 – Excavation and Off-Site Disposal ***(selected remedy)***	$1,072,016	Provides limited long-term effectiveness. Although contaminated sediment would be removed, the PCB source would still be present. ICs and eroded soil control barriers would mitigate residual risks, but constant monitoring and maintenance and five-year reviews would be required indefinitely.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative LF03SD4 – Excavation, Ex-Situ Treatment and On-Site Disposal	$2,128,580	Provides long-term effectiveness and permanence by treating and removing contaminants from sediment.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
SPILL/LEAK No. 4 AT THE WEATHER STATION BUILDING SUBSURFACE SOIL (SS10SB)				
Alternative SS10SB1 – No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
SPILL/LEAK No. 4 AT THE WEATHER STATION BUILDING SUBSURFACE SOIL (SS10SB)				
Alternative SS10SB2 – Institutional Controls and Engineering Controls ***(selected remedy)***	$674,171	Provides limited long-term effectiveness because alternative doesn't include reduction of contamination mass in subsurface soil. Although natural attenuation would occur, no LTM is planned to document contaminant concentrations. ICs would mitigate residual risks, but constant monitoring and maintenance and five-year reviews would be required indefinitely.	No reduction in volume, toxicity and mobility through treatment would occur. ICs, ECs and natural attenuation are not considered "treatment" and there is no proposed monitoring to determine if natural attenuation achieves cleanup levels over time.	Short-term risk to the workers during installation of signs, but risk can be reduced through proper site control. Risk to environment would be low due to the non-invasive aspect of this alternative.
Alternative SS10SB3 – Institutional Controls, In-Situ Treatment, and LTM	$1,733,456	Provides long-term effectiveness and permanence by treating and removing contaminants from subsurface soil. Long-term monitoring would document contaminant concentrations over time and ICs and ECs would mitigate residual risks until cleanup levels are achieved.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Short-term risk to the workers and the environment during treatment activities. Handling chemicals for treatment would pose risk to workers, but can be mitigated through proper use of personal protective equipment and chemical handling.
Alternative SS10SB4 – Excavation, Ex-Situ Treatment, and On-Site Disposal	$916,465	Provides long-term effectiveness and permanence by treating and removing contaminants from subsurface soil.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
SPILL/LEAK No. 4 AT THE WEATHER STATION BUILDING SUBSURFACE SOIL (SS10SB)				
Alternative SS10SB5 – Excavation and Off-Site Disposal	$13,061,623	Provides long-term effectiveness and permanence by removing contaminated subsurface soil from the site.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
SPILL/LEAK No. 4 AT THE WEATHER STATION BUILDING GROUNDWATER (SS10GW)				
Alternative SS10GW1 – No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.
Alternative SS10GW2 – Institutional Controls, Natural Attenuation, and LTM *(selected remedy)*	$1,041,740	Provides long-term effectiveness and permanence by removing contaminants over time from groundwater. Long-term monitoring would document contaminant concentrations over time and ICs and ECs would mitigate residual risks until cleanup levels are achieved. However, if subsurface soil (contamination source) is not treated or removed, groundwater could be re-contaminated, which limits the effectiveness of this remedy.	No reduction in volume, toxicity and mobility through treatment would occur. ICs, ECs and natural attenuation are not considered "treatment." In addition, if the source of contamination is not treated or removed, groundwater could be re-contaminated.	Short-term risk to the workers during installation of signs, but risk can be reduced through proper site control. The natural attenuation process would take many years and is therefore not effective over the short-term.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
SPILL/LEAK No. 4 AT THE WEATHER STATION BUILDING GROUNDWATER (SS10GW)				
Alternative SS10GW3 – Institutional Controls, In-Situ Treatment, and LTM	$1,584,224	Provides long-term effectiveness and permanence by treating and removing contaminants from groundwater. Long-term monitoring would document contaminant concentrations over time and ICs and ECs would mitigate residual risks until cleanup levels are achieved. However, if subsurface soil (contamination source) is not treated or removed, groundwater could be re-contaminated, which limits the effectiveness of this remedy.	Toxicity, mobility, and volume will be decreased through treatment of contaminants. If the source of contamination is not treated or removed, groundwater could be re-contaminated, which limits the effectiveness of this remedy.	Short-term risk to the workers and the environment during treatment activities. Handling chemicals for treatment would pose risk to workers, but can be mitigated through proper use of personal protective equipment and chemical handling. Treatment process may take several months or more, and groundwater could be re-contaminated by untreated sediments, decreasing the short-term effectiveness of the remedy.
Alternative SS10GW4 – Ex-Situ Treatment and On-Site Disposal	$1,376,725	Provides long-term effectiveness and permanence by treating and removing contaminants from groundwater. However, if subsurface soil (contamination source) is not treated or removed, groundwater could be re-contaminated, which limits the effectiveness of this remedy.	Toxicity, mobility, and volume will be decreased through treatment of contaminants. If the source of contamination is not treated or removed, groundwater could be re-contaminated, which limits the effectiveness of this remedy.	Short-term risk to the workers and the environment during treatment activities, but risk could be reduced through proper site control.
UPPER TRAM TERMAINAL AREA SURFACE SOIL (SS16SS)				
Alternative SS16SS1 – No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
UPPER TRAM TERMAINAL AREA SURFACE SOIL (SS16SS)				
Alternative SS16SS2 – Institutional Controls, Engineering Controls, and Containment	$1,028,175	Provides limited long-term effectiveness because alternative doesn't include reduction of contaminant mass in soil. Capping and ICs/ECs will mitigate residual risks, although constant monitoring and maintenance and five-year reviews will be required indefinitely.	Capping partially contains contaminants, thereby decreasing their mobility. No reduction in toxicity or volume because PCBs and lead will not degrade through natural processes. ICs and capping are not considered "treatment."	Effective in the short term; dust mitigation would be necessary to minimize risk to human health of site workers. Risk to the environment would be low due to non-invasive aspects of this alternative.
Alternative SS16SS3 – PCB Soil (≥10 mg/kg): Excavation, Ex-Situ Treatment and On-Site Disposal; PCB Soil (≥1 mg/kg and <10 mg/kg): Institutional Controls and Engineering Controls	$4,857,366	Provides limited long-term effectiveness and permanence by removing and treating the highest of the contaminated soil from the site, but leaving PCB soil <10 mg/kg in-place.	Partially reduces toxicity, mobility and volume of contamination through treatment of a portion of the soil. Remaining untreated soil would be capped in-place.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-Site Disposal *(selected remedy)*	$795,743/ $1,205,386 [1]	Provides long-term effectiveness and permanence by removing contaminated surface soil from the site. Due to the physical location of the site, some contaminated soil may be left in-place. If this is necessary, these areas will be capped and ICs/ECs will be implemented at the site, reducing effectiveness.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
LOWER TRAM TERMINAL AREA SURFACE SOIL (SS17SS)				
Alternative SS17SS – No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.
Alternative SS17SS2 – Institutional Controls, Engineering Controls, and Containment	$899,910	Provides limited long-term effectiveness because alternative doesn't include reduction of contaminant mass in soil. Capping and ICs/ECs will mitigate residual risks, although constant monitoring and maintenance and five-year reviews will be required indefinitely.	Capping partially contains contaminants, thereby decreasing their mobility. No reduction in toxicity or volume because PCBs and lead will not degrade through natural processes. ICs and capping are not considered "treatment."	Effective in the short term; dust mitigation would be necessary to minimize risk to human health of site workers. Risk to the environment would be low due to non-invasive aspects of this alternative.
Alternative SS17SS3 – Excavation, Ex-Situ Treatment and On-Site Disposal	$4,251,234	Provides long-term effectiveness and permanence by treating and removing contaminants from soil.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative SS17SS4 – Excavation and Off-Site Disposal ***(selected remedy)***	$699,868	Provides long-term effectiveness and permanence by removing contaminated surface soil from the site.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
LOWER TRAM TERMINAL AREA SUBSURFACE SOIL (SS17SB)				
Alternative SS17SB1 – No Action	NA	No reduction in risk to human health and the environment.	No reduction in toxicity, mobility or volume.	Current risk due to direct contact would still exist.

Table 2-56 Cost and Effectiveness Summary for Cape Romanzof LRRS Contaminated Areas (Continued)

Alternative	Costs (Estimated TPV)	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness
Alternative SS17SB2 – Institutional Controls and Engineering Controls	$589,452	Provides limited long-term effectiveness because alternative doesn't include reduction of contaminant mass in subsurface soil. ICs/ECs will mitigate residual risks, although constant monitoring and maintenance and five-year reviews will be required indefinitely.	No reduction in toxicity or volume because PCBs and lead will not degrade through natural processes. ICs/ECs are not considered "treatment."	Effective in the short term; dust mitigation would be necessary to minimize risk to human health of site workers. Risk to the environment would be low due to non-invasive aspects of this alternative.
Alternative SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	$4,245,013	Provides long-term effectiveness and permanence by treating and removing contaminants from subsurface soil.	Fully meets this criterion: toxicity, mobility, and volume will be decreased through treatment of contaminants.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.
Alternative SS17SB4 – Excavation and Off-Site Disposal ***(selected remedy)***	$239,127	Provides long-term effectiveness and permanence by removing contaminated subsurface soil from the site.	Excavation and disposal will decrease volume and mobility of contaminants at the site, but without treatment, overall volume and toxicity will not be not reduced.	Effective in the short term if the risk to workers were mitigated by dust control measures and proper transportation techniques. Risk period would be limited due to the short duration of the remedial action.

Notes:

[1] If all contaminated soil can be removed, cost is estimated at $795,743; if site conditions (safety and logistics) result in PCBs ≥1 mg/kg left on-site and capped, the cost increase for cap and IC installation and maintenance for 30 years would be $409,643, for a total estimated cost of $1,205,386.

EC engineering control
IC institutional control
LTM long-term monitoring
mg/kg milligrams per kilogram
PCB polychlorinated biphenyl
NA not applicable

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2.14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The USAF has determined that the selected remedy provides the best balance of trade-offs among the alternatives with respect to the five balancing criteria set out in the NCP 300.430(f)(1)(i)(B). Although no onsite treatment is being utilized, the selected remedy provides the most cost-effective long-term solution given the conditions at the site. ICs and monitored natural attenuation are protective of human health and the environment, are readily implementable, and are cost-effective in comparison to other alternatives.

2.14.5 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 (40 CFR 300.430[a][1][iii][A]). The selected remedy and the remedial process at these contaminated areas were focused on treatment of principal site threats. The selected remedies for Cape Romanzof LRRS do not satisfy the statutory preference for treatment as a principal element of the remedy because on-site treatment options were not all viable given the remote location, limited infrastructure and arctic climate at Cape Romanzof LRRS. The cost would be substantially higher without a significant reduction in risk.

2.14.6 Five-Year Review Requirements

Pursuant to CERCLA §121(c) and NCP §300.430(f)(5)(iii)(C), because the selected remedy, at completion, will result in hazardous substances, pollutants, or contaminants remaining on-site above cleanup levels that allow for unlimited use and unrestricted exposure, a statutory review will be required within five years after initiation of the remedial action to verify that the remedy is, or will be protective of human health and the environment. The date of signature of this ROD will signify the initiation of the remedial action.

Pursuant to USAF policy, because the selected remedies for surface soil at LF003, SS016 (if removal is fully implemented), and SS017, and subsurface soil at SS017, which at completion will attain on-site hazardous substance levels that allow for unlimited use and unrestricted exposure, and are expected to attain this result within five years of the remedy construction complete, a policy review will not be required within five years after initiation of the remedial action to verify that the remedy is, or will be, protective of human health and the environment.

Exceptions to the above include the landfill at LF003, surface soil at SS016, and subsurface soil and groundwater at SS010. The LF003 landfill which will remain in place, the cap will be maintained through ICs and ECs and a Five-Year Review will need to continue as long as the landfill is in place. If PCB-contaminated soils are left in-place at SS016 due to safety and logistical concerns, annual inspections, maintenance to the cap, and signs will be required. Additionally excavation or disturbance of the cap would be prohibited. Performance reports would be required annually for the first five years followed by a Five-Year Review. At which then, the frequency of inspections and reports may be reduced. Though SS010 is subject to the CERCLA petroleum exclusion and therefore, not technically subject to five-year review requirements under CERCLA, the protectiveness of the remedy at this site will be assessed every five years along with the protectiveness of the remedies at LF003 and SS016. Five-year reviews will be conducted at these sites indefinitely, or until concentrations of hazardous substances,

pollutants, or contaminants remaining on-site are reduced to levels that allow for unlimited use and unrestricted exposure.

2.15 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes to the proposed remedies presented in the Proposed Plan, with the exception of clarifying the ICs/LUCs and LTM are included in the remedy for LF003-Landfill No. 2.

3.0 RESPONSIVENESS SUMMARY

This section provides a summary of public comments regarding the Proposed Plan for remedial action at LF003, SS010, SS016, and SS017 at the Cape Romanzof LRRS and the USAF response to comments. At the time of the public review period, the USAF had selected the following alternatives as the remedies for the LRRS:

- LF003 – Landfill No. 2 (Surface Soil) – Alternative LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal;
- LF003 – Landfill No. 2 (Sediment) – Alternative LF03SD3 – Excavation, Off-Site Disposal, and LTM;
- SS010 – Spill/Leak No. 4 at the Weather Station Building (Subsurface Soil) – Alternative SS10SB2 – Institutional Controls and Engineering Controls;
- SS010 – Spill/Leak No. 4 at the Weather Station Building (Groundwater) – Alternative SS10GW2 – Institutional Controls, Natural Attenuation, and LTM;
- SS016 – Upper Tram Terminal Area (Surface Soil) – Alternative SS16SS4 – PCB Soil (≥1 mg/kg): Excavation, to the Extent Feasible, and Off-Site Disposal;
- SS017 – Lower Tram Terminal Area (Surface Soil) – Alternative SS17SS4 – Excavation and Off-Site Disposal; and
- SS017 – Lower Tram Terminal Area (Subsurface Soil) – Alternative SS17SB4 – Excavation and Off-Site Disposal.

3.1 STAKEHOLDER COMMENTS AND LEAD AGENCY RESPONSES

No comments were received on the Proposed Plan during the public comment period.

3.2 TECHNICAL AND LEGAL ISSUES

No technical or legal issues were identified during the public review period of the Proposed Plan.

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Appendix A – Conceptual Site Models

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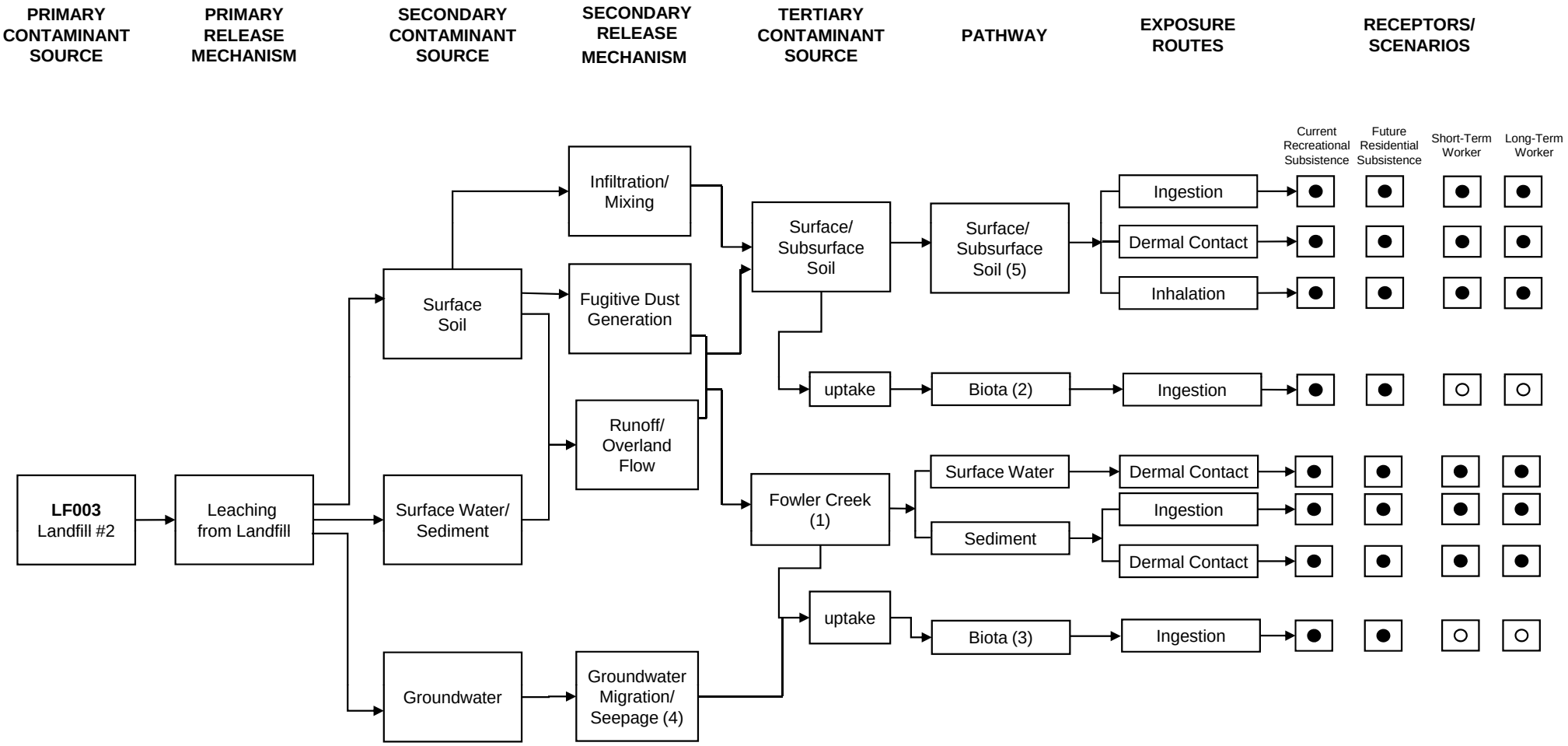


Notes:

● = Medium to High Potential for Exposure. Quantified in BHHRA.

○ = Identified a Incomplete or Low Potential for Exposure. Not quantified in the BHHRA.

(1): Downgradient Creeks/Drainages include Fowler Creek and other drainages that eventually lead to Kokechik Bay.

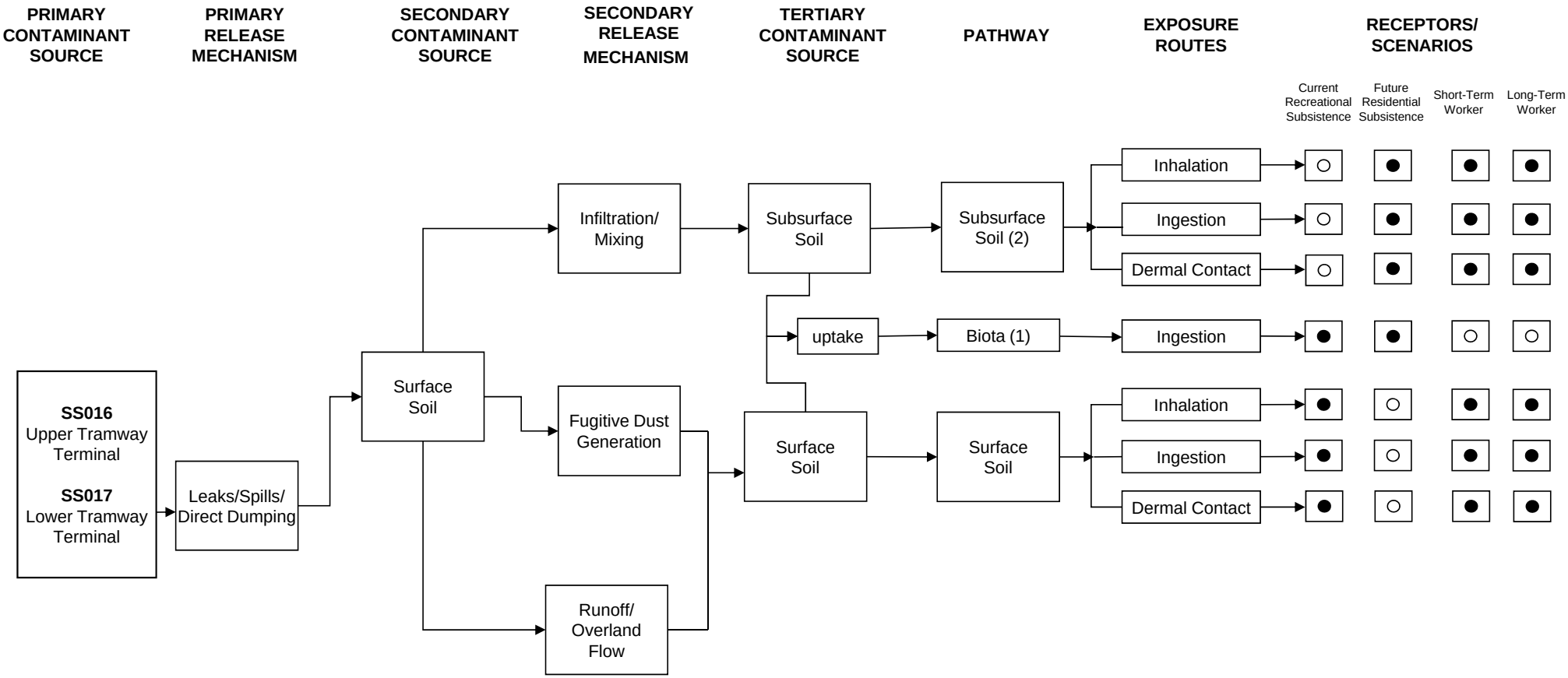
(2): Biota evaluated for soil uptake and human consumption may include terrestrial plants and small mammals.

(3): Biota evaluated for any downgradient creeks may include fish and invertebrates.

(4): Groundwater evaluated based on its day lighting as surface water near the site in addition to transmission as groundwater. Risks evaluated as surface water exposure.

(5) Subsurface soil could be brought to surface by construction activities, resulting in human exposure to to mixed surface and subsurface contamination. A current receptor is assumed to be exposed to surface soil and a future receptor is assumed to be exposed to mixed surface/subsurface soil.

DATE: 10 MAR 2009	United States Air Force
PROJ NO.: 20077.043.159	**SOURCE AREA LF003 – HUMAN HEALTH CSM**
FILE: HH_LF003.pdf	Cape Romanzof LRRS Alaska
DRAWN BY: JG	



Notes:

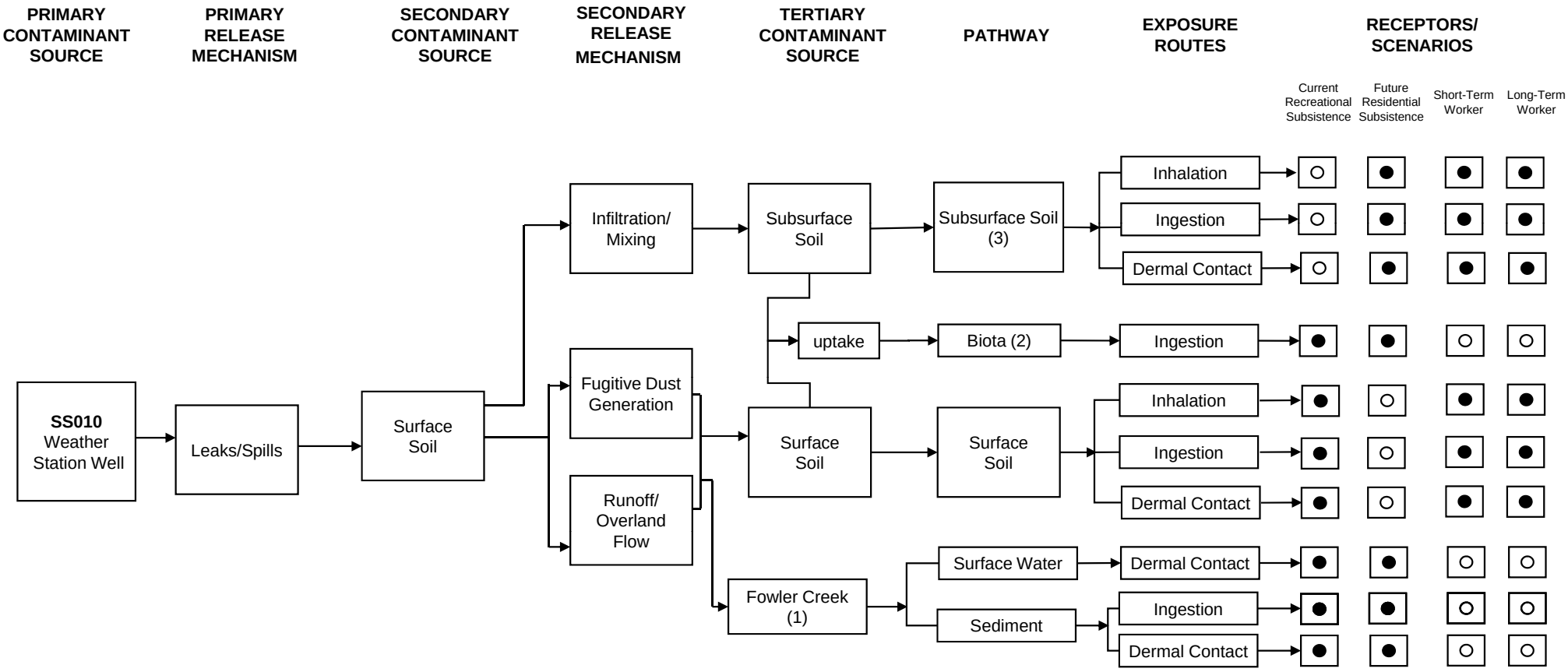
● = Medium to High Potential for Exposure. Quantified in BHHRA.

○ = Identified as Incomplete or low Potential for Exposure. Not quantified in the BHHRA.

(1): Biota evaluated for soil uptake and human consumption may include terrestrial plants and small mammals.

(2): Subsurface soil could be brought to surface by construction activities, resulting in human exposure to to mixed surface and subsurface contamination. A current receptor is assumed to be exposed to surface soil and a future receptor is assumed to be exposed to mixed surface/subsurface soil.

DATE: 10 MAR 2009	United States Air Force
PROJ NO.: 20077.043.159	**SOURCE AREAS SS016/SS017 – HUMAN HEALTH CSM**
FILE: HH_SS016_SS017.pdf	Cape Romanzof LRRS Alaska
DRAWN BY: JG	



Notes:

● = Medium to High Potential for Exposure. Quantified in BHHRA.

○ = Identified as Incomplete or Low Potential for Exposure. Not quantified in the BHHRA.

(1): Surface water drainages include Fowler Creek and other drainages that eventually lead to Kokechik Bay.

(2): Biota evaluated for soil uptake and human consumption may include terrestrial plants and small mammals.

(3): Subsurface soil could be brought to surface by construction activities, resulting in human exposure to mixed surface and subsurface contamination. A current receptor is assumed to be exposed to surface soil and a future receptor is assumed to be exposed to mixed surface/subsurface soil.

DATE: 10 MAR 2009	United States Air Force
PROJ NO.: 20077.043.159	**SOURCE AREA SS010 – HUMAN HEALTH CSM**
FILE: HH_SS010.pdf	Cape Romanzof LRRS Alaska
DRAWN BY: JG	

Appendix B – Applicable or Relevant and Appropriate Requirements

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Appendix B - Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR	Citation or Reference	Requirements	Applicability	Comments and Analysis/Rationale for Decision
Chemical-Specific ARARs				
Toxic Substances Control Act of 1976 (15 U.S.C. 2601-2691)				
Regulation of Hazardous Chemical Substances and Mixtures	15 U.S.C. 2605	Applicable to storage and disposal of PCB-contaminated material.	Applicable	Applicable to actions that involve removal of solid wastes/materials containing PCBs >50 milligrams per liter (mg/L), if present.
PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions	40 CFR 761	Contains parts addressing the storage and disposal of PCB remediation waste (subpart D) and cleanup site verification (subparts N and O).	Applicable	Applicable to PCB and Lead remediation waste/soil storage and disposal.
USEPA PCB Spill Cleanup Policy	40 CFR 761, Subpart G	Cleanup policy applies to intentional and accidental spills of material containing at least 50 mg/L PCBs occurring after May 4. 1987. For spills prior to that date, cleanup levels are established on a case-by-case basis, using the PCB cleanup policy as guidelines.	Applicable	Applicable to cleanup of PCB-and Lead-contaminated soils.
Alaska State Regulations				
Alaska Water Quality Standards (AWQS)	18 AAC 70	Provides water quality criteria and limits to protect fresh and marine water bodies for such uses as drinking water, recreation, and growth and propagation of fish, other aquatic life, and wildlife.	Appropriate and Relevant	Site discharges cannot result in exceedances of AWQS or surface water quality degradation. Applies to protection standards for Fowler Creek. Sites are not known to currently impact water quality at Fowler Creek.
State of Alaska Oil and Hazardous Substances Pollution Control Regulations	18 AAC 75.300 - 18 AAC 75.396	Regulations establishing discharge reporting, cleanup, and disposal requirements for oil and other hazardous substances. Provides cleanup standard for soil and groundwater contaminants.	Applicable	These regulations provide cleanup standards for petroleum (GRO, DRO, and RRO) and other hazardous substances (lead and PCBs) and are directly applicable for comparison of constituent concentrations with cleanup standards.
Action-Specific ARARs				
Resource Conservation and Recovery Act of 1976 (40 U.S.C. 6901)				
Identification and Listing of Hazardous Waste	40 CFR Part 261	Defines those solid wastes that are subject to regulation as hazardous waste under 40 CFR Parts 262-265 and Parts 124, 270, and 271.	Applicable	Applicable to remedial actions involving remote transport and disposal of PCBs and lead wastes classified as hazardous.
Standards for Waste Generators and Transporters	40 CFR Parts 262 and 263	Applicable to generators and transporters of hazardous waste. Requires that transporters must be licensed hazardous waste haulers.	Applicable	Applicable to transport and disposal of PCB- and lead-contaminated soils.

Appendix B - Applicable or Relevant and Appropriate Requirements (ARARs) *(Continued)*

ARAR	Citation or Reference	Requirements	Applicability	Comments and Analysis/Rationale for Decision
Action-Specific ARARs *(Continued)*				
Resource Conservation and Recovery Act of 1976 (40 U.S.C. 6901) *(Continued)*				
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40CFR 264	Standards for owners and operators of hazardous waste facilities.	Applicable	Off-site waste disposal facilities used for disposal of contaminated soils and other wastes generated from actions must be appropriately licensed and permitted.
RCRA Hazardous Waste Management Regulations, Subtitle C	40 CFR 264	Applicable to the treatment, storage, transportation and disposal of hazardous wastes listed under 40 CFR 261.	Applicable	Pertains to off-site waste disposal facilities where materials contaminated with PCBs at concentrations greater than 50 mg/kg will be disposed.
RCRA Solid Waste Management Regulations, Subtitle D	40 CFR 264	Applicable to the management and disposal of nonhazardous wastes.	Applicable	Pertains to off-site waste disposal facilities where non-hazardous wastes, including PCB-contaminated materials <50 mg/kg, will be disposed.
Standards for Post-Closure for Units with Hazardous waste In Place	40CFR 264.310	Post-closure care consists of cover maintenance and institutional controls.	Applicable	Applicable to actions where hazardous waste is left in place (potentially SS016).
Other Federal Regulations				
CERCLA Waste Off-Site Rule	40 CFR 300.440	Applies to CERCLA remedial or removal actions involving the off-site transfer of any hazardous substance, pollutant, or contaminant.	Applicable	Offsite facilities receiving CERCLA wastes must meet established acceptability criteria.
Hazardous Materials Transportation	40 CFR 107, 171-177	Transportation regulations for shippers and transporters of hazardous materials	Applicable	Off-site transport of hazardous waste must be conducted by licensed transporters.
Location-Specific ARARs				
The Migratory Bird Treaty Act	16 U.S.C. 703	Law makes it unlawful to take, kill, or possess any migratory bird or any part, nest, or eggs of any such bird	Appropriate and Relevant	There are known areas surrounding Cape Romanzof LRRS suitable for visitation by migratory birds, and it is possible that migratory birds may be present at subject sites within Cape Romanzof LRRS.
Solid Waste Management	18 AAC 60	Regulation governs where contaminated stockpiles or store contaminated soils during excavation	Applicable	Applicable to PCB and Lead remediation waste/soil storage and disposal.

Appendix C – Public Notification of Document Availability

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period of physical activity. Maintain a record of attendance and participation in daily activities. Assure the facilities, equipment, and materials are ready for planned activities. Assist Program Coordinator in resolving problems and responding to the suggestions of clients. Protect the confidentiality of clients' case records. Assist clients with feeding, ambulation, and toileting. Help maintain a safe environment for clients and staff. assist ADC Program Coordinator in maintaining case files and required paperwork. Performs other duties as assigned.

Qualifications:

Must have a demonstrated interest in working with elders and by sympathetic to the needs of the elderly. Proven interpersonal skills. Have the ability to develop and lead recreational activities such as field trips and organized games. Have demonstrated ability to relate to the public, staff, community professionals, and program participants and their families in a pleasant and tactful manner. Have knowledge about the community and the resources available within the community. High school diploma or GED required. Prior work experience with elderly persons is highly desirable. Yup'ik speaker preferred. Valid Alaska Drivers License (CDL). Must have CPR and First Aid Certification or participate in training to obtain these certifications soon after date of hire. Mandatory drug testing required for employment. This position subjected to random and post-accident drug testing.

ONC is an equal opportunity employer. Within the concept of Native Preference, all applicants will receive consideration without regard to race, color, sex, religion, national origin or other non-merit factor(s).

Salary: $34,257 Annual DOE

If interested, call Louise Charles at 907-543-3988 or stop by the senior center at 127 Atsaq Street. (342)(7/18-25)

Public Notice

VFW MEMBERSHIP Freedom isn't free, and millions of Americans have paid the price for the freedom we enjoy today. Since 1899, the Veterans of Foreign Wars has served those who served America. From

having claims against the above described estate are required to present same within four (4) months after the date of the first publication of this Notice, or their claims will be forever barred.

Dated this 5th day of July, 2012, at Bethel, Alaska.

ALASKA LEGAL SERVICE CORPORATION
Attorneys for Personal Representative
Signed: E. Carolyn Scott
Rule 43 (133)(7/11-7/25)

PUBLIC NOTICE
NOTICE OF FINDING OF NO SIGNIFICANT IMPACT AND NOTICE OF INTENT TO REQUEST RELEASE OF FUNDS

These notices shall satisfy two separate but related procedural requirements for activities to be undertaken by Kotlik Traditional Council, P.O. Box 20210, Kotlik, AK 99620.

REQUEST FOR RELEASE OF FUNDS

On or about August 3, 2012, the Kotlik Traditional Council will authorize Association of Village Council Presidents Regional Housing Authority (AVCP RHA) to submit a request to the Alaska Office of Native American Programs (AONAP/HUD) for the release of IHBG funds under NAHASDA, as amended, to undertake projects known as 2010 Kotlik New Development. The projects consist of (2) single family units and (2) triplexes in Kotlik located at Lots 1, 2, 3, Block 6 and Lot 4, Block 5 of Kotlik 2010 Subdivision at estimated Cost of $260,000 per single family unit and $1.2 million per triplex.

FINDING OF NO SIGNIFICANT IMPACT

The Kotlik Traditional Council has determined that the projects will have no significant impact on the human environment. Therefore, an Environmental Impact Statement under the National Environmental Protection Act of 1969 (NEPA) is not required. Additional project information is contained in the Environmental Review Record (ERR) on file at AVCP RHA, Development Department, P.O. Box 767, Bethel, AK 99559 and may be examined or copied weekdays 9 A.M. to 4:30 P.M.

PUBLIC COMMENTS

Any individual, group, or agency disagreeing

these responsibilities have been satisfied. AONAP/HUD's approval of the certification satisfies its responsibilities under NEPA and related laws and authorities, and allows the said organizations to use Program funds.

OBJECTIONS TO RELEASE OF FUNDS

AONAP/HUD will accept objections to its release of funds and the Kotlik Traditional Council certification for a period of fifteen days following the anticipated submission date or its actual receipt of the request (whichever is later) only if they are on one of the following bases: (a) the certification was not executed by the Certifying Officer of the said organizations' Council/Tribe; (b) the Kotlik Traditional Council have omitted a step or failed to make a decision or finding required by HUD regulations at 24 CFR Part 58; (c) the grant recipient has committed funds or incurred costs not authorized by 24 CFR Part 58 before approval of a release of funds by AONAP/HUD; or (d) another Federal agency acting pursuant to 40 CFR Part 1504 has submitted a written finding that the project is unsatisfactory from the standpoint of environmental quality. Objections must be prepared and submitted in accordance with the required procedures (24 CFR Part 58) and shall be addressed to AONAP/HUD at 3000 C Street, Suite 401, Anchorage, AK 99503. Potential objectors should contact AONAP/HUD to verify the actual last day of the objection period.

Micheal Hunt, Sr., **Kotlik Traditional Council**
(563)(7/18)

PUBLIC NOTICE
U.S. AIR FORCE ANNOUNCES PROPOSED PLAN
30-DAY PUBLIC COMMENT PERIOD ~ CAPE ROMANZOF LONG RANGE RADAR STATION

The 611th Civil Engineer Squadron (611 CES) at Joint Base Elmendorf-Richardson announces the Proposed Plan and 30-day public comment period regarding proposed environmental cleanup alternatives for four Installation Restoration Program sites (LF003, SS010, SS016, and SS017) at Cape Romanzof Long Range Radar Station (LRRS).

The proposed remedial action for the sites are:

- **LF003 (Landfil No. 2)** - Excavation and off-site disposal of PCB-contaminated soil greater than 1 milligram per kilogram (mg/kg) and Long-term Monitoring (LTM)
- **SS010 (Spill/Leak at the weather station building)** - Institutional Controls (IC), Engineering Controls (EC), Natural Attenuation, and LTM
- **SS016 (Upper Tram Terminal Area)** - Excavation and off-site disposal of PCB-contaminated soil greater than 1 mg/kg, to the extent possible
- **SS017 (Lower Tram Terminal Area)** - Excavation and off-site disposal of PCB-contaminated soil greater than 1 mg/kg, and Lead-contaminated soil greater than 400 mg/kg

The public is encouraged to review and comment on the Proposed Plan. Written public comments will be accepted, and may be mailed in or emailed. The public comment period begins July 18, 2012, and ends on August 17, 2012. If there is sufficient interest for a public meeting on this Proposed Plan, and a meeting is requested before August 17, 2012, an acceptable meeting date will be scheduled before September 17, 2012, and the comment period extended.

For a copy of the Proposed Plan or additional information, or to send comments, please contact:

•Mr. Tommie Baker
Community Involvement Coordinator
611 CES/CEAR
10471 20th Street, Suite 340
JBER, AK 99506-2201
1-800-222-4137
1-907-552-4506
tommie.baker@us.af.mil

•Mr. Keith Barnack
Remedial Project Manager
1-907-552-5160
keith.barnack@us.af.mil
(282)(7/18-8/8)

Classifieds *from page 21*

available at the Nunapitchuk Limited General Store office during normal business hours: Monday-Saturday, 9am to 6pm. (440)(7/11-8/15)

Orutsararmiut Native Council
Senior Services Department
Job Title: Adult Day Care Activities Coordinator
Reports to: Adult Day Care Program Coordinator
Job Responsibilities:
Cooperate with ADC Program Coordinator to plan, schedule, and conduct a minimum of five hours or organized activities each day for clients/participants. Actively participates and interact with clients in the scheduled activities. Encourage volunteers from the community to become involved in activities at the center. Assure the availability of a wide variety of recreational activities each day including a period of physical activity. Maintain a record of attendance and participation in daily activities. Assure the facilities, equipment, and materials are ready for planned activities. Assist Program Coordinator in resolving problems and responding to the suggestions of clients. Protect the confidentiality of clients' case records. Assist clients with feeding, ambulation, and toileting. Help maintain a safe environment for clients and staff. assist ADC Program Coordinator in maintaining case files and required paperwork. Performs other duties as assigned.
Qualifications:
Must have a demonstrated interest in working with elders and by sympathetic to the needs of the elderly. Proven interpersonal skills. Have the ability to develop and lead recreational activities such as field trips and organized games. Have demonstrated ability to relate to the public, staff, community professionals, and program participants and their families in a pleasant and tactful manner. Have knowledge about the community and the resources available within the community. High school diploma or GED required. Prior work experience with elderly persons is highly desirable. Yup'ik speaker preferred. Valid Alaska Drivers License (CDL). Must have CPR and First Aid Certification or participate in training to obtain these certifications soon after date of hire. Mandatory drug testing required for employment. This position subjected to random and post-accident drug testing.
ONC is an equal opportunity employer. Within the concept of Native Preference, all applicants will receive consideration without regard to race, color, sex, religion, national origin or other non-merit factor(s).
Salary: $34,257 Annual DOE
If interested, call Louise Charles at 907-543-3988 or stop by the senior center at 127 Atsaq Street. (342)(7/18-25)

CITY OF BETHEL – JOB OPENINGS
Finance Department
Assistant Finance Director: Full-time FLSA Exempt position with excellent benefit package. Pay Range: Management II, $68,928 - $72,374 DOE and qualifications. Requires Bachelor's degree in accounting, finance, or business or related field and at least three to five years of increasing responsible management-level experience. Will consider additional years of experience as a substitution for educational requirement. For additional information or to apply, please contact Bobby Sutton, Finance Director at 907-543-1376 or at bsutton@cityofbethel.net. (81)(7/25-8/15)

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DEPUTY CLERK II
ALASKA COURT SYSTEM
BETHEL, ALASKA
$4,258.00 Monthly
The Bethel Trial Court is recruiting for a Deputy Clerk to serve as a criminal clerk. Complete recruitment information is available on Workplace Alaska at http://workplace.alaska.gov. Applicants must submit a completed Applicant Profile and Job Qualification Summary Form through Workplace Alaska by 5:00 p.m. on Thursday, July 26, 2012. For further information, please contact the Alaska Court System Human Resources Department at (907) 264-8242.
THE ALASKA COURT SYSTEM IS AN EEO EMPLOYER AND PROUDLY PROMOTES DIVERSITY
(86)(7/25)

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IN THE SUPERIOR COURT FOR THE STATE OF ALASKA AT BETHEL
In RE the estate of CHRISTOPHER ROBERTS, deceased.
Case No. 4BE-12-00005 PR
NOTICE TO CREDITORS
STATE OF ALASKA, FOURTH JUDICIAL DISTRICT, ss:
To the Creditors of the Estate of Christopher Roberts, deceased:
Frank Roberts, c/o Alaska Legal Services Corporation, P.O. Box 248, Bethel, Alaska, 99559, (907) 543-2237, hereby states that he has been appointed Personal Representative of the estate of Christopher Roberts, deceased. ALL CREDITORS having claims against the above described estate are required to present same within four (4) months after the date of the first publication of this Notice, or their claims will be forever barred.
Dated this 5th day of July, 2012, at Bethel, Alaska.
ALASKA LEGAL SERVICE CORPORATION
Attorneys for Personal Representative
Signed: E. Carolyn Scott
Rule 43 (133)(7/11-7/25)

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The proposed remedial action for the sites are:
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(282)(7/18-8/8)

Public Notice

Speak your mind *from page 14*

to come. Many non-renewable resources development projects will also impact our languages, cultures, health impacts, housing, and our ancestral lands, waters, and air. We must be at the table to have meaningful input before development occurs.

In conclusion, I'd like to share my own personal experience with climate change and its impact on one of my great loves. We have used dogs for transportation for thousands of years. Since 1992, I have had the good fortune of participating in the Iditarod, widely referred to as the "Last Great Race on Earth." As a participant, I have seen the race change in number of ways, most notably the lack of snow cover in recent years. On one occasion, the race was moved to Fairbanks. It has been permanently moved to Willow from the more southerly Wasilla. Since the days are now too warm, we have to run mostly at night now to keep dogs cool.

There is much at stake. I implore you to take meaningful action to address climate change and resource development now and to help assure that the traditions of Alaska Indigenous Peoples and American Indian Tribes, which have withstood the test of time, continue for generations into the future.

Quyana.

Classifieds *from page 21*

5450 A Street
Anchorage, AK 99518
Fax 273-5321
Email – hr@uui-alaska.com
Or
Hand deliver to:
United Utilities, Inc.
109 Blackberry Street
Bethel, AK 99559
(154)(5/16-cnx)

Nunapitchuk Limited Job Opening
POSITION: Business Manager
APPLICATION PERIOD: July 1, 2012 to August 15, 2012
POSITION DESCRIPTION:
The Business Manager is responsible for the overall management and administration of Nunapitchuk Limited and its affiliated business activities (e.g. Duplex, 8-plex, Kuicaraq Cable, Nunapitchuk Fuel Services, Nunapitchuk Ltd. General Store, Investments, etc...) Responsible for it's property accountability, payroll authorization, timely filing of all taxes, insurance and business documentation. Preliminary planning, organization, direction and control of all business activities pertaining to Nunapitchuk Limited. Proposes to the Board of Directors policies, goals, budgets and selection of staff. And any other duties assigned by the Board of Directors.
DUTIES & RESPONSIBILITIES:
1. Supervision. Supervises all operations and personnel of the Corporation.
2. Payroll & Payroll Taxes. Approves all payroll time sheets, payroll disbursement and payroll taxes deposits on a semimonthly basis. Assures timely filing of Payroll Tax documentation (i.e. 941, 940, etc..) on a scheduled basis.
3. Payables & Receivables. Review and approve all payables due vendors. Directly supervises and assists the Bookkeeper and Head Cashier on collections of the Accounts Receivables on each of the corporations business activities (Rentals, Kuicaraq Cable, Duplex, 8-plex, *Nunapitchuk Fuel Services, etc.)*
4. Financial & Property Accountability. Responsible for the financial and physical property accountability of the corporation. Supervises the Bookkeeper on the financial operations of the corporation. Supervises each Department on proper operation, maintenance and inventory of all physical assets of the Corporation.
5. Correspondence, Bookkeeping & Record Keeping. Receives and redirects all incoming and outgoing correspondence. Supervises the Bookkeeper in conjunction with the Head Cashier on matters which require detailed financial bookkeeping and records retention. Directly supervises the Bookkeeper on the corporate filing system, correspondence and personnel files.
6. Personnel Office Duties. Insures all employees of the Corporation are briefed on and familiar with the current personnel policies. Interviews all potential employees on receipt of application for position.
7. Reports to the Board. Reports to the Board of Directors on matters which require Board approval, assignments issued by the Board, the current corporate operations and financial status.
8. General Liability & Insurance. Periodic review and correction of all general liability and insurance needs of the Corporation, if any. Verifies that all insurance coverage are current and appropriate.
QUALIFICATIONS & ELIGIBILITY:
1. Nunapitchuk Limited Shareholder preferred, but not mandatory. 2. Business related degree or three (3) years management experience desirable. 3. Minimum qualification of a High School Diploma required.
STARTING SALARY:
1. $17.50 per hour or Depending on Experience (DOE) 2. 8 hrs/day Deadline to apply: Aug. 15, 2012 Applications are available at the Nunapitchuk Limited General Store office during normal business hours: Monday-Saturday, 9am to 6pm. (440)(7/11-8/15)

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Request for Proposals

City of Bethel requests proposals for Project Management Services to assist in construction of Yukon Kuskokwim Regional Aquatic Health and Safety Center. RFP available at cityofbethel.org > public notices or call Lee Foley at 907-543-1373. (35)(8/1)

Invitation to Bid

The Alaska Court System is soliciting bids for courier services for the Bethel Alaska Courthouse, 204 Chief Eddie Hoffman Hwy. Bids will be accepted until 2:00 p.m. Wednesday, August 8, 2012.
The courier will be responsible for the pickup and delivery of mail to and from the courthouse and the Post Office, and pickup and delivery of deposits/deposit slips to and from the bank.
If you are interested in providing this service contact Jesse Head, Procurement Specialist II at (907) 264-8224, email at jhead@courts.state.ak.us. Information packets are also available at the Bethel Courthouse, through Natalie Alexie, 907-543-1105. (98)(8/1)

CITY OF BETHEL
INVITATION FOR BIDS
PORT OF BETHEL HYDROGRAPHIC SURVEY AND MAPPING OF THE KUSKOKWIM RIVER ALONG THE CITY OF BETHEL WATERFRONT
The City of Bethel is soliciting bids from interested persons or companies to survey the Kuskokwim River located along the City of Bethel waterfront. The contractor will provide surveying mapping of all of the areas tied to the mean lower low water datum.
Interested persons may obtain a complete bid packet by contacting the City of Bethel Port Director: Peter Williams, City of Bethel, 300 State Highway, P.O. Box 1388, Bethel, Alaska 99559, ph. 907-543-2310, fax. 907-543-2311, 8 a.m. – 5 p.m. Monday through Friday.
To be considered, the copies of the bids must be received in the office of the Port Director by 2:00 p.m., Monday, August 27, 2012.
No procurement contract may be awarded to a person, group, organization, or other entity that is delinquent in the payment or collection of sales taxes, fees, charges, penalties, interest or other amounts that are due and owing, or otherwise obligated to the City. (Bethel Municipal Code 4.20.290)
No interpretation of the bid documents will be made to any respondent orally. The City of Bethel reserves the right to reject any or all bids or to extent the closing date upon written notice.
Peter Williams, Port Director (220)(8/1-22)

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES (DOT/PF)
CENTRAL REGION
INVITATION FOR BIDS
Project Bid Title: Stony River Airport Maintenance Re-Bid
Project Bid No.: 13-25A-1-019
Estimated Cost: Between $2,000.00 and $25,000.00
Bid Opening: 1:00 PM on August 13, 2012
Telephone: (907) 269-0767
Copies of the Contract bid documents may be obtained at the Stony River Post Office or the M&O Aniak Station Airport Manager's Office.
Additional Information is available on the web at (http://dot.alaska.gov). Under the Section called Quick Links, select the following in order Public Notices, Transportation & Public Facilities and Procurement. (91)(8/1-8/8/12)

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES (DOT/PF)
CENTRAL REGION
INVITATION FOR BIDS
Project Bid Title: Tununak Airport Maintenance Re-Bid
Project Bid No.: 13-25A-1-018
Estimated Cost: Between $2,000.00 and $25,000.00
Bid Opening: 1:00 PM on August 13, 2012
Telephone: (907) 269-0767
Copies of the Contract bid documents may be obtained at the Tununak Post Office or the M&O Bethel Station Airport Manager's Office.
Additional Information is available on the web at (http://dot.alaska.gov). Under the Section called Quick Links, select the following in order Public Notices, Transportation & Public Facilities and Procurement. (93)(8/1-8/8/12)

Public Notice

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(282)(7/18-8/8)

Notice of Petition - Change of Name
A petition has been filed in the Superior Court (Case No. 4BE-12-00315CI) requesting a name change from (current name) Glen Daniel Chingliak to Glen Daniel Schneider. A hearing on this request will be held on September 11, 2012 at 9:30am at Courtroom 6, Bethel Courthouse, 204 Chief Eddie Hoffman Highway, Bethel, AK. (59)(8/1-22)

Notice of Judgment – Change of Name
A judgment has been issued by the Superior Court in Bethel, Alaska, in Case #4BE-11-04 CI ordering that the petitioner's name will be changed from Emmanuel Peter Chunak to Emmanuel Peter Andrews, effective on the effective date stated in the clerk's Certificate of Name Change. (52)(8/1)

PM until 4:00 PM. To bid on the house, bidders must pick up a bidding packet at Yuut Elitnaurviat - The People's Learning Center, which is located at: 610 Akiachak Dr. in Bethel, Alaska. For questions, or if you would like to arrange to have a bidding packet sent to you, please call (907) 543-0999 during normal business hours. (146)(8/8)

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Appendix D – Regulatory Comments and Responses

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Alaska Department of Environmental Conservation
Comments on the Draft Record of Decision LF003, SS010, SS016, and SS017 dated December 2012
Commenter: Louis Howard (ADEC), Comments Developed: February 27, 2013

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-1	1.1	**Site Name and Location** **2nd Paragraph** Cape Romanzof Long Rang Radar Site (LRRS) does have a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) number. See http://cumulis.epa.gov/supercpad/cursites/srchrslt.cfm?start=1&CFID=11228340&CFTOKEN=16854450&jsessionid=e030d693a519447a60bf34537135f46295a6 Searching for archived sites in CERCLIS revealed a CERCLIS ID # of AK9572728633 for USAF CAPE ROMANZOF AFS with a NON-NPL Status Date of 06/30/1992 (NFRAP-Site does not qualify for the NPL based on existing information).	Concur; text will be changed to reflect the CERCLIS ID# and NON-NPL status date.
2.	1-7	1.2	**Statement of Basis and Purpose** **3rd Paragraph** The text states: "As the agency responsible for regulatory oversight of the IRP remedial activities, the ADEC agrees that the remedy selected by the USAF under CERCLA complies with CERCLA and Alaska state law for all non-petroleum contaminated media at the four subject areas. The ADEC also agrees that the remedy selected for petroleum sites complies with Alaska state law." ADEC requests the sentence be changed to the following: "As the agency responsible for regulatory oversight of the IRP remedial activities, the ADEC agrees that the remedy selected, *when properly implemented*, by the USAF under CERCLA complies with CERCLA and state law for all non-petroleum contaminated media at the four subject areas. The ADEC also agrees that the remedy selected, *when properly implemented*, for petroleum sites complies with state law."	Concur; text will be added as requested.
3.	1-10	1.4.1	**Remedies Selected Under CERCLA** **LF003** **2nd Bullet** Strike text: "Over time, PCB concentrations in the sediment will	Text will be deleted and bullets will be added as requested.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			decrease as the source concentrations decrease." ADEC requests the Air Force clarify how or why PCB source concentrations will decrease over time if source area treatment/removal is not planned. If the decrease would be due to PCB transport out of the landfill and downgradient, that is simply erosion/dispersion and if it continues longer term it would likely trigger the need for a revised remedy. **Additional Bullet** ADEC requests the Air Force add text as a bullet which states: "Excavation, disturbance, or relocation of contaminated sediment, and excavation or drilling in the landfill, will be restricted by the ICs." ADEC requests the Air Force ensure other sections of the Record of Decision (ROD) define the restrictions (e.g. prohibit intrusive work). ADEC will also require text stating ADEC and Air Force approval of a work plan on how potentially contaminated material will be managed prior to issuing a dig permit. ADEC requests the Air Force change the text to state it will conduct annual inspections (with photos and field observations) of the signs, control barriers and submit the performance reports to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of inspections and reports may be reduced. **Last Bullet** The text states: "Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and Alaska Department of Natural Resources (ADNR) land records."	

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			Add text at the beginning of the sentence: "The LF003 site boundaries, landfill cap and locations of eroded soil cap …" The Air Force needs to also reiterate institutional controls (maintain cap, prohibit excavation and construction) and LTM for LF003 in the Final ROD. State that ICs will be incorporated into the LUC Plan. This comment applies throughout the ROD. Please add a bullet: Notice of Environmental Contamination will be placed in the Alaska Department of Natural Resources' land records.	
4.	1-10	1.4.1.2	**SS016** **1st Bullet** Surface Soil: ADEC requests the Air Force include discussion on lead as part of the remedy for lead greater than or equal to 400 mg/kg (cleanup level for lead in soil from Table B1 Method Two) as well as the PCB soil greater than or equal to 1 mg/kg. For example: "All lead-contaminated areas *which exceed 400 mg/kg* are located within …" ADEC requests the Air Force include confirmation sampling for both PCBs and lead since the lead may not be collocated with the PCBs (Assessment of the Site: "…volume of lead-contaminated soil is not *determined* at SS016."). Lead is present in the surface soil at 617 mg/kg, 485 mg/kg, 441 mg/kg and 403 mg/kg (2009 RI Report Table 6-13). Also mention that the Upper Tram Area has very shallow soils (about six to eight inches deep) which made collecting subsurface soil samples impractical. **2nd Bullet** The text states: "Periodic site inspections will be performed and maintenance of the cap and signs will be completed as needed" ADEC requests the Air Force change the text to state "Annual site	Text will be added accordingly to reflect changes requested.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			inspections will be performed. The inspections will be documented by photos and field observations. Maintenance of the cap and signs will be completed as needed. *Excavation or disturbance of the cap would be prohibited.* Performance reports will be submitted every year to ADEC for the first five years and then followed by a five-year review. At that time, the frequency of inspections and reports may be reduced." See comment #3 above regarding the need to place a notice of environmental contamination with ADNR.	
5.	1-11	1.4.1.3	**SS017** **Surface Subsurface Soil** The text states: "Surface soil within source area SS017 with PCBs and lead contamination above cleanup levels…" ADEC requests the Air Force list the cleanup levels for PCBs and lead. **Subsurface Soil** The text states: "Sub-surface soil within source area SS017 with PCBs and lead contamination above cleanup levels…" ADEC requests the Air Force list the cleanup levels for PCBs and lead.	Concur; cleanup levels will be added to text.
6.	1-11 & 1-12	1.4.2.1	**SS010** **Page 1-11** **Subsurface Soil – Alternative SS10SB2** The text states: "…Alternative SS10SB2 Institutional Controls, includes the following actions:" However, in the 2nd bullet and elsewhere in the document the Air Force refers to Land Use Controls in the text and tables. Please choose one or the other and be consistent throughout the document. ADEC requests the Air Force add text as follows: "These controls are in place to ensure that invasive activities are not taking place	Text will be incorporated as requested. LUCs will be replaced with ICs throughout the document.

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			within the boundary of the sites where land use has been restricted, *or that ADEC and Air Force approvals are obtained prior to conducting such work.*" Comment applies throughout the document where digging and the base construction review/digging permit systems are discussed (e.g. 2.13.2.4 SS10). **Page 1-12** **1st Bullet** ADEC requests the Air Force add ICs to the 611 LUC Plan. **Groundwater – Alternative SS10GW2** When groundwater contaminant concentrations *are below groundwater cleanup levels for two consecutive sampling events* and risk to surface water quality is determined to be acceptable, LTM will be discontinued. ADEC requests the Air Force add text to state it will conduct annual inspections and submit the performance reports to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of inspections and reports may be reduced.	
7.	1-13	1.5.1	**CERCLA Sites** **Third Paragraph** **1st Sentence** Text needs to discuss lead contaminated soil for SS016 and SS017. Lead is present in the surface soil above 400 mg/kg at SS016. Lead was also detected at SS017 in the surface at 1,500 mg/kg (2009 RI Report Table 6-16) and subsurface at 1,440 mg/kg (2009 RI Report Table 6-17 2-3.5' bgs). **Last sentence** LF003 remedy **will** not address the continuing on-site source of PCBs (within the landfill immediately adjacent to the sediments) which will continue to impact sediments adjacent to the landfill and therefore will not allow for unlimited exposure/unrestricted	Lead contamination was added for SS016 and SS017. The following text was added to the last paragraph in section 1.5.1: In the case that contamination above cleanup levels remains on-site due to safety or logistical issues associated with removal; engineering controls (eroded soil control barriers constructed on-site to prevent the off-site migration of runoff

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			exposure (UU/UE) after the remedy is implemented. "… [PCB] contaminated sediment may continue to migrate from the landfill via the seep and into the sediment near the toe of the landfill." Engineering controls (e.g. eroded soil control barriers constructed on-site to prevent the off-site migration of runoff water [from the landfill] that may contain [PCB] contaminated sediment…) are to be placed at LF003 to protect human health and the environment. As a landfill, the site will always have institutional controls associated with it. EPA states: "In general, if the selected remedy relies on restrictions of land, ground water, or surface water use by humans *or if any physical or engineered barrier is part of the remedy*, then the use has been limited and a Five-Year Review should be conducted." (Five-Year Review Process in the Superfund Program April 2003). Therefore, ICs/LUCs, maintenance of the landfill cap, long-term monitoring and CERCLA five year reviews will be required for this remedial action at LF003. The SS016 selected remedy may not result in a cleanup that results in UU/UE. "This site is located in an area with large boulders and steep slopes, *which could result in areas where PCB soil ≥1 mg/kg is left in place due to safety or logistical issues associated with removal.*" Therefore, SS016 may require CERCLA five year reviews after remedy implementation. Alternatively, the Air Force can change the remedy to a removal action and if the Air Force can't remove	water that may contain contaminated soils) will be put in place to protect human health and the environment. In addition, ICs, LUCs, maintenance of the landfill cap, LTM and a CERCLA Five-Year Review will be required and an Explanation of Significant Differences or ROD Amendment will be completed.

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			all the contamination, then an explanation of significant differences or ROD amendment will be warranted.	
8.	1-13	1.5.2	**Non-CERCLA Sites** SS10 selected remedy for groundwater will require a periodic review and performance reports to be conducted and submitted to ADEC no less than every year for the first five years, followed by a Five-Year Review. At that time, the frequency of reviews and performance reports may be reduced.	Concur; annual reviews for the first five years and five-year review text will be added.
9.	2-1	2.1	**Site Name, Location, and Description** See comment # 1 above regarding a CERCLIS # for Cape Romanzof LRRS.	Text was incorporated as requested.
10	2-2	2.1.1	**LF003: Landfill No. 2** ADEC requests a 3rd bullet be added for ICs, long term monitoring and maintenance for the landfill cap.	Bullet added as requested.
11	2-2	2.1.2	**SS016 and SS017: Upper Tram Terminal Area and Lower Tram Terminal Area** SS016 has lead contaminated soil greater than or equal to 400 mg/kg that needs to be included in the bullet with PCB soil greater than or equal to 1 mg/kg. If excavation to promulgated soil cleanup levels (1 mg/kg PCBs, 400 mg/kg Lead) is infeasible, then capping and ICs with long term monitoring and maintenance on the cap will be required.	Lead soil greater than or equal to 400 mg/kg will be included with SS016. Statement will be added if cleanup levels are not met due to safety or logistical issues associated with remedial action.
12	2-3	2.1.3	**SS010: Spill/Leak No. 4 at the Weather Station Building** The text now refers to the remedy as "ICs and engineering controls" which are not discussed until now in the document. The Air Force needs to have the terminology consistent so the reader is not confused about the new terms part way through.	ICs and ECs will both be included and mentioned for all sections for SS010.
13	2-6 & 2-7	2.3	**Community Participation** **1st Bullet** ADEC requests the Air Force reference the most current version of the Management Action Plan (MAP). ADEC requests clarification from the Air Force on the date of the	1998 MAP reference was added. The 1996 CRP is the latest version. Comment noted with

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			last community relations plan. If it is actually 1996, then perhaps the Air Force should update the document as specified in the September 1996 Update Community Relations Plan: "The CRP should be reviewed regularly and revised at the interim and/or final decision stage for the IRP sites. To avoid the unnecessary interviews, preparation of a new CRP for each new site, and revision to the CRP each time a remedial action is taken at an IRP site, *the EPA has agreed has agreed to all federal facilities to add appendixes to the original CRP reflecting site updates*. Although only one CRP must be written. it must be updated as actions are taken. The CRP will be reviewed and updated by Elmendorf's Environmental Community Relations Office." ADEC requests the Air Force update the CRP with additional appendices to reflect: 1) any new sites included under the IRP program at Cape Romanzof LRRS since 1996 to present (2012); and 2) all remedial actions that have been taken for any IRP site at Cape Romanzof LRRS since 1996 to present (2012). Without these updated appendices, the Air Force would appear to be out of compliance with the guidelines in the Community Relations In Superfund (EPA Manual), and its own 1996 CRP. **Page 2-7** **Public Meetings** The text states that the Air Force hosts open houses and public meetings when Proposed Plans are distributed for comment. There were no public meetings held for the LF003, SS010, SS016,	respect to updating the CRP. Agreed no public meeting was held. Text will be changed to reflect that the PP and accompanying Fact Sheet were distributed to the public with a note in them that a public meeting would be held if requested. No meeting was requested and no comments were received.

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			and SS017 Proposed Plan.	
14	2-14 & 2-15	2.6.2	**Landfill No. 2 (LF003)** The text states: "Long-term monitoring was conducted from 1996 through 2004,…" ADEC requests the Air Force describe in detail the contaminant levels in surface water. The text states: "PCB concentrations exceeded cleanup levels…" ADEC requests the Air Force provide a figure with the locations of the exceedances. The 2002 interim ROD selected remedy included PCB hotspot removals. ADEC requests the Air Force elaborate more in the text why the PCB removal did not occur. The text states that several investigations, focused investigation have occurred since 2002, but it is silent about why (e.g. changes in scope, performance, cost or some other reason) the selected remedy for PCB hotspot removal has not occurred after the 2002 Interim ROD was signed. **Final paragraph** Strike the words: "A dye tracer study was not conducted, however,…" This text seems random – there is no other reference to dye testing and the inclusion of it here is confusing to the reader. New sentence will begin with "A visual and auditory inspection of the seep…" The text states: "Therefore, three sediment samples were collected at LF003, from SD-2, a location approximately 120 ft downstream	Surface water Data will be incorporated into figure 2-1 Additional Figure will be added to incorporate historical sample results for LF003. The following text will be added regarding the 2002 Interim ROD paragraph: an effort to implement the Interim ROD was undertaken in 2004, however it was determined that additional delineation was required. This delineation was completed during efforts in 2005 and ultimately during the 2008 RI. Dye tracer study text will be removed and edited as requested. Surface water results from the RI will be included in figure 2-1. Sentence was added to indicate PCB contamination in surface water: PCB concentration in surface water exceeded ADEC Table C cleanup levels of 0.0005 mg/L (ADEC, 2012; 2008) with

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			from SD-2 where the seep was accessible, and from the upgradient drainage ditch." ADEC requests the Air Force show seep and sampling locations on a figure and discuss how they correlate with prior sampling locations that had elevated PCB levels. ADEC requests the Air Force clarify whether or not surface water was also sampled/analyzed for PCBs. **Page 2-15** The text states: "PCB concentrations ranged from non-detect to 195 mg/kg." ADEC requests the Air Force to clarify whether PCBs were found above regulatory levels in surface water [0.0005 mg/L Table C/Drinking Water or Chronic Water Quality Criteria for Toxics and Other Deleterious Substances (Dec. 2008) of 0.014 ug/L 24-hr. avg[1]. This criterion applies to total PCBs, (e.g., the sum of all congener or all isomer or homolog or Aroclor analyses.)]. ADEC requests the Air Force add a figure showing area sampled and the exceedances. In ADEC's opinion, it is better to have several good figures showing where sampling has been done and hits were found than 900 pages of cost estimate forms.	results ranging from 0.039 mg/L to 0.014 mg/L. Figure 2-1 will include locations were surface water samples exceeded ADEC Table C cleanup levels.
15	2-16	Table 2-3	**LF003 Source Area Chemicals of Concern and Relevant Cleanup Levels** In the 2002 Interim ROD (Page iv), surface water was a media of concern with PCBs above regulatory levels. In this draft ROD, surface water has been dropped as a media of concern for LF003. ADEC requests the Air Force explain how or why has surface water been eliminated as a media of concern.	The following text was added to the end of section 2.2.6: The affected media include surface soil, sediment, and surface water. Surface water is contaminated as a result of the contaminated surface soil and sediment. Once contaminated soils are

[1] The 24-hour average is to be applied as an average concentration and not as a criterion to be met instantaneously at any point in the surface water.

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				removed surface water will no longer present a risk to human health and the environment. Figures 2-2 and 2-3 show the surface water, sediment and soil contaminant concentrations at Site LF003. Excavation at LF003 will follow the outlined areas of sediment and surface soil exceedances in Figure 2-2 until confirmation samples indicate COCs no longer exceed cleanup levels. LTM of surface water and sediments after remediation may be required to ensure the remedy was affective. Surface water is included with sediment and will be monitored with sediment.
16	2-17	Figure 2-1	**Source Area LF003 Sediment Analytical Exceedances 2008 Remedial Investigation** **Map Inset** ADEC requests the Air Force identify and clarify what is between the landfill boundary and the purple shaded area. Is this the area targeted for soil removal? **CR-LK03-SS-024-1-082808** ADEC requests the Air Force clarify whether or not this is the location where surface water daylights from beneath the boulders or some other location. The extent of PCB impacted sediment ends right after samples with 110 mg/kg PCBs on both ends of the highlighted area. ADEC requests the Air Force clarify whether	Figures 2-1 and 2-2 will be combined and text will be added to the last paragraph on page 2-15 to define where excavation will occur along the purple shaded area until confirmation samples indicate soil no longer exceeds cleanup levels. Text will be added to the legend to reflect where surface water daylights.

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			or not the extent of PCBs has been defined.	
17	2-21	2.6.3	**Weather Station Building (SS010)** **4th Paragraph** The text states: "Anecdotal information indicates groundwater from historical water wells at this location may have had a petroleum odor." Prior text states Well No. 2 drilled at the weather station building in 1962 was reported to have been contaminated with fuel in 1964. See Page 2-3 Section 2.1.3 referencing IRP RI/FS Stage 1, June 1990.	First sentence will be removed and replaced with: Groundwater from well No. 2 was reportedly contaminated with fuel oil in 1964 (USAF, 1990); however, the source of contamination was never identified and no quantitative data have ever been successfully collected.
18	2-23	Figure 2-3	**Source Area SS010 Soil Analytical Exceedances 2008 Remedial Investigation** ADEC requests the Air Force add text to the legend for the figure describing the purpose of the yellow lines. Also, ADEC requests the Air Force describe in the text whether or not the tank on the figure is a former tank that has been removed or is still there present at SS010.	Spider boxes will be added to indicate what the outlined areas are and indicate former or existing infrastructure.
19	2-25	2.6.4	**Upper Tram Terminal Area (SS016) & Lower Tram Terminal Area (SS017)** **1st Last Paragraph** ADEC requests the Air Force clarify when PCBs were identified as contaminants of potential concern at SS016 and SS017. **2nd Paragraph** The text states: "DRO and PCB detections still exceeded cleanup levels in the three areas. Excavations at all three locations were not backfilled due to the presence of the potentially contaminated sandblast material." ADEC requests the Air Force provide a figure which shows the locations of the excavations and residual contaminant levels.	Text will be added to indicate that COCs were identified as part of the 2000 PA/SI and the 2008 RI. Excavation boundaries will be added to both Figures 2-4 and 2-5. Lead exceedances are indicated on figure 2-4, lead boundary areas will be added to figure 2-4. Sentence will be added to indicate that the volume of

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			3rd Paragraph The text states: "The following are the areas where PCBs exceeded cleanup levels: 1) 240 square ft along the south of the facility, east of the entrance to the arctic walkway, 2) 1,787 square ft near the tram docking area, 3) 2,540 square ft near the elevated walkway. Lead was detected above cleanup levels at four locations along the northern wall of the facility." ADEC requests the Air Force show the contaminant exceedance areas in a figure and add a reference for the information. **2nd to Last Paragraph** SS017 has lead contamination too (1.3 Assessment of the Site "The volume of lead contaminated subsurface and surface soil is not determined." and see comment #5 above).	lead contamination at SS017 has not been determined.
20	2-26	Table 2-5	**SS016 and SS017 Chemicals of Concern and Relevant Cleanup Levels** ADEC requests the Air Force either specify 400 mg/kg as the cleanup level for lead in soil or 800 mg/kg as the cleanup level for lead in soil. Whichever level is chosen will dictate whether ICs are necessary (i.e. residential land use vs. commercial or industrial land use). Lead at 800 mg/kg will require institutional controls.	Text will be changed globally for the lead cleanup level and will be changed to reflect the more conservative 400 mg/kg cleanup level for residential use.
21	2-31	Figure 2-5	**Source Area SS017 – Lower Tramway Terminal Soil Analytical Exceedances 2008 Remedial Investigation** ADEC requests the Air Force highlight those areas above 50 mg/kg total PCBs.	Areas where PCBs are greater than 50 mg/kg text will be bold and red. Symbol for sample location will also be red and indicated in the legend to reflect PCB locations greater than 50 mg/kg.
22	2-33	2.7.2	**Ground and Surface Water Beneficial Uses** The text states: "A groundwater use determination was developed for site SS010 (in accordance with ADEC requirements set forth in 18 AAC 75.350)."	A GW use determination was completed and appeared to be approved by ADEC via email on 29 September 2009

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			ADEC requests the Air Force provide further details on whether or not the determination was approved.	between Mr. Barnack and Mr. Howard. A copy of the GW Determination will be included within an appendix to this ROD.
23	2-34	2.8.1	**Identification of COCs through Monitoring Events** The text states: "The chemical-specific applicable or relevant and appropriate requirements (ARARs) were the basis for developing chemicals of potential concern (COPCs), evaluating risk, and assessing the need for further action at potentially contaminated sites at the Cape Romanzof LRRS." ADEC believes the Air Force is confusing ARARs and screening criteria. ARARs need to be achieved and screening criteria are for screening. **Last Paragraph** The text states: "As listed in Table 2-4, the primary soil ARARs used in the identification of COCs…" ADEC believes the Air Force meant Table 2-6 and not 2-4.	Paragraph under 2.8.1 will be reworded to reflect the change from ARARs to screening criteria and clarify the difference. Table reference will be changed to 2-6 instead of 2-4.
24	2-37	Table 2-7	**Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations at LF003, SS010, SS016 and SS017** See comment #5 above regarding the need to include lead contaminated soil and the specific cleanup being used by the Air Force (comment #11).	400 mg/kg will be used for the lead cleanup level and text will be added to the notes about the use of the more conservative cleanup level
25	2-44	2.8.4	**Basis for Action** The text mentions PCBs at SS017 exceeding ADEC Method Two cleanup levels, but does not mention lead contamination. Please add text to include lead contaminated soil at SS017.	Lead contamination will be added to SS017 as well as the cleanup level of 400 mg/kg.
26	2-44	2.9	**Remedial Action Objectives** The text states: "The RAOs for human health under both CERCLA and Alaska state law are as follows…"	Text will be added to reflect the prevention of exposure specific to media and COC

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			The RAOs should be specific to media and individual contaminant level, such as "prevent human exposure to soil containing > 1 mg/kg total PCBs" and not the cancer risk as it is presented in the text. "RAOs provide a general description of what the cleanup will accomplish (e.g., restoration of ground water to *drinking water levels*). These goals typically serve as the design basis for many of the remedial alternatives which will be presented in the text section. See EPA's "A Guide to Preparing Superfund Proposed Plans, Records of Decisions, and Other Remedy Selection Decision Documents" OSWER 9200.1-23P, Chapter 6 Writing the Record of Decision 6.3.8 Remedial Action Objectives: "Presenting RAOs prior to the discussion of remedial alternatives provides the reader of the ROD with a basis for evaluating the cleanup options for the site and an understanding of how the risks identified in the previous section will be addressed by the response action. A clear statement of the RAOs also facilitates the five-year review determination of protectiveness of human health and the environment."	with cleanup levels.
27	2-48	2.10.1.1	**Alternative LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal** ADEC wishes to point out that this alternative for LF003 is the only one that addresses the entire LF003 site; the other alternatives only address surface soil.	Comment noted. The 2002 IRA ROD stated that the selected remedy for LF003 was for capping and LTM of groundwater and any effluent generated by the landfill. Text will be added to reflect cap inspections/maintenance will be required and 5-year

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				reviews will be required.
28	2-52	2.10.1.3	**Spill/Leak No. 4 at the Weather Station Building (SS010) – Subsurface Soil Alternatives** **Alternative SS10SB2 – Institutional Controls** The text states: "In this alternative, notations regarding residual contamination and land use restrictions will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records." ADEC requests the Air Force clearly define in the ROD what LUCs would be implemented – they can't just be generic LUCs. For example, restriction on future excavation; establish dig permit requirement and work clearance request/approval forms, requirement for ADEC approval on work plans prior to future excavation or off-site movement of soil. This issue needs to be clarified in the ROD - if not in each section describing alternatives including ICs, at a minimum in the descriptions of the selected remedy.	Text will be changed to reflect the following: In this alternative, notations regarding residual contamination and land use restrictions (such as, restriction on future excavation; dig permit and work clearance request / approval forms will be required, and approval from ADEC on work plans prior to future excavation or off-site movement of soil) will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.
29	2-54	Table 2-18	**SS016 Surface Soil Alternatives Components** The table for General Response Action: Containment lists a Remedial Technology: Surface water controls. ADEC requests clarification on why surface water controls are listed in the table for surface soil alternatives.	Surface water controls will be removed from the SS016 surface soil alternatives table.
30	2-54, 2-55, 2-56	2.10.1.5	**Upper Tram Terminal Area (SS016) – Surface Soil Alternatives** Text for SS016 only discusses PCB soil contamination. It also needs to discuss lead soil contamination. **Alternative SS16SS2 – Institutional Controls, Engineering Controls, and Containment**	Lead will be added to SS016. Text will be added to include large rock and shot-crete as an option for cap cover material. Rather than gravel

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			The text states: "Given the steep, boulder-covered exposed slope at this site, the only feasible type of cap to install is gravel;…" ADEC disagrees, other options (i.e., larger rock, shot-crete) may be feasible and shouldn't be precluded.	being the "only feasible" type of cap, it will be changed to "preferred"
31	2-58, 2-59	2.10.1.7	**Lower Tram Terminal Area (SS017) – Subsurface Soil Alternatives** Text for SS017 only discusses PCB soil contamination. It also needs to discuss lead soil contamination.	Lead will be added to SS017 discussion.
32	2-65	Table 2-23	**Common Elements and Distinguishing Features of Alternatives for Subsurface Soil at SS010** The last two alternatives have nothing listed for location specific ARARs. Put in 18 AAC 60 because that governs where the Air Force can stockpile or store soils during excavation.	Solid Waste Management (18 AAC 60) will be added to the last two alternatives under location specific ARARs
33	2-71	Table 2-26	**Common Elements and Distinguishing Features of Alternatives for Surface Soil at SS017** See Comment #18 above.	Solid Waste Management (18 AAC 60) will be added to the last two alternatives under location specific ARARs
34	2-73	Table 2-27	**Common Elements and Distinguishing Features of Alternatives for Subsurface Soil at SS017** See Comment #18 above.	Solid Waste Management (18 AAC 60) will be added to the last two alternatives under location specific ARARs
35	2-84	2.11.1.1	**LF003 Surface Soil Alternatives** ADEC requests the Air Force address the text associated with the first bullet with clear circle, third line – delete the word "and" between "than" and "LF02SS5"	Concur; "and" will be deleted.
36	2-84	2.11.1.2	**Compliance with Applicable or Relevant and Appropriate Requirements** **2nd Paragraph** The text states: "…the installation of controls and capping helps prevent contact with the *contamination* PCBs are not expected to degrade in a reasonable timeframe." ADEC requests the Air Force place a period after the word	Concur; a period will be added after contamination.

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			"contamination".	
37	2-85	2.11.1.4	**Reduction of Toxicity, Mobility, or Volume Through Treatment** The text states: "Reduction of Toxicity, Mobility, or Volume Through Treatment…" They do not, because they do not involve treatment. Table 2-35 is correct by saying that these are ineffective/do not meet criterion.	Concur; text will be revised to reflect the ineffectiveness of these alternatives based on the lack of "treatment".
38	2-88	Table 2-37	**LF003 Sediment Alternatives Individual Analysis Ratings** Under LF03SD2 – since it fails first two, the rest of the criteria should be not applicable (NA).	Concur; Effectiveness for the remaining four criteria will be changed to NA.
39	2-89	2.11.2.1	**Overall Protection of Human Health and the Environment** ADEC requests the Air Force delete the second paragraph and LF03SD2 should be incorporated into first "no action" paragraph like it is under 2.11.2.3.	Concur; LF03SD2 will be added to the first paragraph and the second paragraph will be deleted.
40	2-89	2.11.2.2	**Compliance with ARARs** See comment #25 above.	Concur; Lead will be added to text.
41	2-90	2.11.2.4	**Reduction of Toxicity, Mobility, or Volume through Treatment** LF03SD3 does not "partially" meet criterion. Table 2-37 is correct by saying that it is ineffective/do not meet criterion.	Concur; "partially" will be replaced with "does not"
42	2-104	2.11.2.4	**Overall Protection of Human Health and the Environment 2nd bullet** ADEC requests the Air Force clarify on whether the treatment of PCB contamination does anything for lead contamination. If not, this involves no treatment of lead and it should be stated as such. **3rd bullet**	Lead will be added to the 2nd bullet with cleanup level as well as added to the 3rd bullet.

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			ADEC requests the Air Force also include text regarding lead contaminated soil greater than or equal to 400 mg/kg.	
43	2-116	2.11.7.4	**Reduction of Toxicity, Mobility, or Volume through Treatment** SS17SB4 does not "partially" meet criterion. Table 2-47 is correct by saying that it is ineffective/do not meet criterion.	Concur; "partially" will be replaced with "does not" and "moderately effective" replaced with "ineffective"
44	2-119	2.13	**Selected Remedy** LF003 ADEC believes the Air Force has left out key components for this source area that need to be included for the main body of the landfill - ICs/LUCs, cap maintenance, monitoring. **5th Bullet** ADEC requests the Air Force also include text regarding lead contaminated soil greater than or equal to 400 mg/kg. If the Air Force is unable to get it all, ICs and Five-Year Reviews will be required.	Comment noted. The 2002 IRA ROD stated that the selected remedy for LF003 was for capping and LTM of groundwater and any effluent generated by the landfill. Text will be added to reflect cap inspections/maintenance will be required and 5-year reviews will be required. Lead soil ≥400 mg/kg will be added to text in 5th bullet.
45	2-120, 2-121 & 2-122	2.13.1	**Summary of the Rationale for the Selected Remedy** The Air Force will need to make sure this analysis is consistent with any other discussion on comparative analysis (e.g. Section 2.11 Summary of Comparative Analysis of Alternatives)	Concur; summary of comparative analysis of alternatives will be reviewed for consistency.
46	2-121	2.13.1	**Summary of the Rationale for the Selected Remedy** The text states: "Alternative LF03SD3 was selected because it eliminates unacceptable risk at the site without the need for ICs when complete, and it does not require costly and potentially hazardous treatment technologies." However, on page 1-10, institutional controls are listed as being needed: engineering controls such as the eroded soil control	Concur; text will be revised to include ICs and ECs for LF003, remedy LF03SD3.

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			barriers constructed on site to prevent off-site migration [of PCB-contaminated sediments] and placement of signs warning that contaminated sediments may be present. Also as a landfill, the site (LF003) will always have institutional control in place preventing excavation, digging into the landfill or disturbance of the cap or cover material associated with the landfill. The timeline for if or when the remedy will be "complete" is unknown. While the excavation would remove the sediment currently present at LF003, it does not remove or address the source of the PCBs, which is the landfill or itself. Also in Table 2-15, LF003 Sediment Alternatives Components shows that Institutional Controls (property law mechanisms-property records) and Engineering Controls (physical access restrictions-signs) are part of the LF03SD3 alternative.	
47	2-123	2.13.2.1	**LF003** ADEC requests the Air Force address the landfill itself and surface water, if it hasn't already been documented as not being a media of concern. However, the remedy described below includes trying to stop PCBs from migrating to surface water and the Interim ROD called out surface water as being impacted by PCBs.	Concur; text was added to section 2.6.2 to address why surface water was no longer considered a COC throughout this CERCLA process. Surface water will also be addressed with sediment in the selected remedy
48	2-124	2.13.2.1	**LF003** ADEC requests the Air Force clarify on whether or not they will place ICs and conduct Five-Year Reviews on the sediments until they know that the unknown source or landfill is no longer leaching PCBs.	Text will be added to reflect annual inspections for the 1st 5 years and a five-year review performance reports provided to ADEC, at which time the frequency of maintenance/ inspections/ LTM/ reporting will be reevaluated by ADEC and USAF.

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49	2-125	2.13.2.2	**SS016** The text states: "All soil that contains PCBs in excess of 50 mg/kg will be considered a RCRA Subtitle C hazardous waste." ADEC wishes to inform the Air Force that lead contaminated soil would also be a RCRA HW if present at levels that fail TCLP criteria. Additionally, PCBs in excess of 50 mg/kg may also be a TSCA PCB remediation waste. The text states: "All lead-contaminated soil areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil." ADEC requests the Air Force also specify the lead cleanup level in soil. If the Air Force is unable to remove all of the PCB contaminated soil greater than 1 mg/kg, then ICs and Five-Year Reviews will be required. The text states: "A gravel cap will be placed over remaining surface soil contaminated with PCBs and lead above cleanup levels protective of human health and the environment to prevent access and exposure to contaminated soil." The Air Force may want more than just gravel if a cap is necessary. The plan should call for an ADEC approved design for any cap. The text states: "Periodic site inspections will be performed to check the condition of the cap and signs; maintenance will be completed as needed." The ROD needs to be specific on IC/LUC inspections, reporting (see EPA OSWER Directive 9355.6-12 Sample Federal Facility Land Use Control ROD Checklist with Suggested Language, dated	Comment noted; the following text will be added: All soils containing PCBs in excess of 50 mg/kg are considered to be TSCA Subtitle C hazardous waste and lead soils that fail the toxicity characteristic leaching procedures (TCLP) will be considered RCRA hazardous waste. Lead with 400mg/kg cleanup level will be added to text. Concur; text will be added to reflect ICs and Five-Year Review in the case that all PCB soil ≥1mg/kg is not able to be removed. Cleanup levels will be added to text. Comment noted; work plans submitted with cap design already require ADEC approval. Gravel will be removed from text and the cap will be designed and approved by ADEC during remediation process. "ICs" and "ECs" will be added to appropriate bullets. Annual inspections and five-year review will be included in text.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			January 4, 2013). ADEC requests the Air Force state it will conduct annual monitoring of the land use restrictions and controls, cap, and signs and submit a performance report to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of monitoring and reports may be reduced as mutually agreed upon by ADEC and the Air Force.	
50	2-126	2.13.2.3	**SS017** **Surface Soil** See comment #49 regarding TSCA remediation waste and the requirement for specifying the lead cleanup level. **Subsurface Soil** See comment #49 regarding TSCA remediation waste. The text needs to mention lead contaminated soil and its cleanup level. Last sentence says it is all co-located but they need to do confirmation sampling of lead to make sure this is true. Same comment applies for both surface soil remedy description and subsurface. **Groundwater** 1st open bullet: Text states: "…LTM will provide the data necessary to determine when contaminant levels allow for unlimited use and unrestricted exposure." After the word "determine" add "whether the plume is stable or shrinking or".	Concur; text will be added to reflect lead TCLP text as included from comment #49 for both surface and subsurface soil. "PCBs and lead" will be added to bullet for confirmation samples in both surface and subsurface. Concur; text will be added as requested under SS010 groundwater.
51	2-127	2.13.2.4	**SS010** **Subsurface soil** The text states that there are engineering controls for subsurface soil. ADEC requests the Air Force elaborate here on what engineering controls will be used for subsurface soil. Only ICs are present in the text (Land Use Controls).	Concur; text will be updated to reflect changes made in section 1.4.1 for both subsurface soil and groundwater based on

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			The text states: "Land Use Controls restricting intrusive soil activities at the site will be implemented and managed, by the USAF…" The Air Force needs to be clear what the restrictions are - for example: restrict excavation or subsurface soil disturbance unless approved through a digging permit; ensure any digging permits that are issued require work be done following an approved plan describing how soil will be characterized and managed; and requiring ADEC approval prior to any off-site movement of soil. **Last Bullet** ADEC requests the Air Force include annual inspections and reporting. **Groundwater** **Last Bullet** The text states: "Periodic sampling and analysis of contaminated groundwater in the monitoring wells (LTM) will be performed…" ADEC requests the Air Force include text which states that the sampling and analysis will be done under a work plan and schedule approved by ADEC.	previous comments. Comment noted; all continued work requires a work plan to be approved by ADEC prior to work and this text would be included when remediation occurs but not necessary for this ROD. IC specific text will be added to remedies where ICs are part of the remedy. Annual inspections/five year review with frequency determination after first five years text will be added as requested.
52	2-128 & 2-129	2.13.3	**Applicable Land Use Controls for All Areas** Text states that a groundwater use determination was developed for Site SS010 under 18 AAC 75.350 illustrating that groundwater at this site is not a reasonable current or future drinking water source. ADEC requests the Air Force elaborate on whether or not the determination was approved. **2-129** **3rd Bullet** See comment #51 above regarding dig permits and restricting	A GW use determination was completed and appeared to be approved by ADEC via email on 29 September 2009 between Mr. Barnack and Mr. Howard. A copy of the GW Determination will be included within an appendix to this ROD.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			excavation. The text states: "The USAF will conduct monitoring of the land use restrictions and controls every five years or at a frequency determined by the USAF and ADEC…" ADEC requests the Air Force state it will conduct annual monitoring of the land use restrictions and controls and submit a performance report to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of monitoring and reports may be reduced as mutually agreed upon by ADEC and the Air Force.	Concur; text will be added to reflect changes on restrictions as requested. Text will be revised as requested for annual monitoring and five-year reviews.
53	2-165	2.14.6	**Five-Year Review Requirements** See comment #5 (CERCLA Sites) above regarding review requirements for LF003 and SS016. The landfill at LF003 will remain in place, the cap needs to be maintained, ICs need to be maintained, and Five-Year Reviews will need to continue as long at the landfill is in place.	Concur; text will be revised to reflect changes made from comment #5 and text as requested for the landfill at LF003.
54	B-1	Appendix B	**Applicable or Relevant and Appropriate Requirements (ARARs)** ADEC requests the Air Force add 18 AAC 60 – for regs governing disposal of polluted soil under Action-specific ARARs (during excavation it will need to be placed somewhere).	Concur; 18 AAC 60 will be added under location specific ARARs within Appendix B
55		Appendix C	This appendix should not list detailed costs regarding the other remedies that were considered, but not selected. Tables 2-21, 2-35, 2-36, 2-37, 2-38 sufficient for comparing common an distinguishing features (such as capital cost, annual O&M cost, total present worth, discount rate and number of years which cost is projected). EPA's "Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents", EPA 540-R-98-031 OSWER 9200.1-23P PB98-963241 July 1999, states at 3.3.7 Summary of Remedial Alternatives:	Concur; the required cost tables are already included within the text of the ROD and therefore no further cost sheets are necessary within an appendix, Appendix C – Detailed Cost Estimates will be removed from the Final version of this ROD.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			"Distinguishing features will vary based on site-specific conditions and remedy specifications. These features may include: *Estimated costs.* Cost must be separated into capital (construction), annual operations and maintenance (O&M), and total present worth. Long-term O&M costs can be a significant factor in determining which cleanup options are more or less expensive than others. A total present worth cost estimate for each alternative allows the public to compare different alternatives that have varying amounts of O&M costs. Use the same discount rate for all alternatives evaluated (current OSWER policy is 7%)." According to EPA's "A Guide to Preparing Superfund Proposed Plans, Records of Decisions, and Other Remedy Selection Decision Document", 540-R-98-031 OSWER 9200.1-23P PB98-963241 July 1999, the selected remedy section "… should provide the appropriate level of detail about the engineering details and estimated costs for the Selected Remedy so that the design engineer has enough information to initiate the design phase of the response action." <u>6.3.12 Selected Remedy</u> 3) Summary of the Estimated Remedy Costs One aspect of the Selected Remedy that should be described in detail is the cost estimate for implementing the Selected Remedy. *This subsection should present a more detailed estimated cost breakdown than that provided in the Description of Alternatives section.* Although this information may also be available in the Feasibility Study,	

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			a much broader public audience is interested in what is being spent on Superfund cleanups. RODS serve as the primary data source for a host of internal and external parties interested in analyzing the costs of Superfund cleanups. Because all RODs are available to the public and are easier to obtain than large documents from the Administrative Record file for a site, it is important to present the estimated costs of the cleanup plan in as much detail as possible in the ROD. This generally can be accomplished by presenting a one to two-page cost estimate summary table (in the same level of detail as provided in the FS). This engineering-oriented "activity-based" estimate should be determined from the major construction and annual O&M activities anticipated to implement each major component of the Selected Remedy. This estimate should include estimated capital, annual O&M, and total present worth costs; discount rate; and the number of years over which the remedy cost estimate is projected. For example, if the Selected Remedy is comprised of a soil and ground-water component, major construction and annual O&M activities and their associated unit and total cost estimates should be clearly presented in a tabular format. If more information is available, this section should NOT merely present lump sum capital, annual O&M, and total present worth cost estimates for the entire remedy. The presentation of the cost estimate should make basic assumptions clear (i.e., discount rate and duration of O&M) and identify sources of uncertainty in capital and annual O&M cost estimates.	

Appendix E – Groundwater Use Determination Source Area SS010

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GROUNDWATER USE DETERMINATION

SOURCE AREA SS010

CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

Prepared for:
611th Air Support Group, Civil Engineering Squadron, Asset Management Flight, Restoration Element
And
The Air Force Center for Engineering and the Environment

Contract: F41624-03-D-8622, Task Order: 0159
Project Numbers: DBWT07-7316 and DBWT2008-7316

September 2009

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1.0 INTRODUCTION

Groundwater at Cape Romanzof Long Range Radar Station (LRRS) Source Area SS010 – The Weather Station Building, meets the criteria stipulated in Title 18 Alaska Administrative Code (AAC) Chapter 75.350 (Alaska Department of Environmental Conservation [ADEC], 2008) to classify groundwater as a non-drinking water source. This groundwater use determination has been completed in accordance with ADEC requirements, in support of the Remedial Investigation (RI) completed in 2008-2009, and in support of any future Feasibility Study (FS). The goal of this determination is to illustrate that groundwater at Source Area SS010 is not a reasonable drinking water source in accordance with ADEC requirements, and that the migration to groundwater pathway-specific cleanup levels may not be required for this Source Area. Details of the RI results can be found in the Final RI Report (United States USAF [USAF], 2009).

Source Area SS010 (previously ROM-2), also known as the Weather Station Building is located approximately 600 feet east of the southwest end of the Cape Romanzof LRRS airstrip. There were two known wells associated with the Weather Station Building; the first well (Well No. 2) was drilled in 1962 and was reportedly located near the southeast corner of the Weather Station Building (USAF, 1990). Groundwater from this well was reported to have been contaminated with fuel oil in 1964 (USAF, 1990); however, the source of contamination was never identified. Well No. 3 was constructed in 1972 to replace Well No. 2 and was located uphill and upgradient, and approximately 200 ft northeast of the Weather Station Building. In 1990, while conducting a RI/FS at Cape Romanzof, one groundwater sample was collected from Well No. 3 and analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) (USAF, 1992a). No BTEX constituents were detected; however, TPH was detected at a concentration of 0.31 mg/L (USAF, 1992a). TPH was also detected in an equipment blank (0.43 mg/L) which was collected after all sampling was complete, therefore it cannot be determined at exactly what sampling point decontamination of the equipment became insufficient. For that reason, TPH data from the 1990 RI/FS has been used for semi-quantitative comparison only. Based on the results of the 1990 RI/FS, SS010 (Well No. 3) was recommended for abandonment to insure that it would not be used in the future (USAF, 1992b). A work plan was prepared in 1993 detailing the proposed abandonment procedure (USAF, 1993a). The ADEC issued a letter to the USAF on December 6, 1993 concurring on no further remedial action planned (NFRAP) for SS010, based on a letter they received stating that the well had been closed in accordance with the approved work plan (ADEC, 1993b).

Groundwater beneath Source Area SS010 is estimated to be approximately 65 feet below ground surface (bgs) based on the well abandonment work plan (USAF, 1993). Monitoring wells could not be installed during the 2008 RI as soil borings met refusal at an average of 19.4 feet bgs across the entire site. A downgradient temporary monitoring well was installed at a significantly lower elevation than the Source Area SS010, in a water bearing sandy layer at approximately 20 feet bgs, however, the well did not produce water. Analytical surface water and sediment samples were collected from downgradient locations along Fowler Creek at points where seeps

were identified. None of these samples contained constituents exceeding regulatory criteria. The baseline human health (BHHRA) and ecological risk assessments (ERA) conducted in conjunction with the RI indicate little risk to humans or the environment exists from contaminants in soil, and surface water and sediments from downgradient locations along Fowler Creek (USAF, 2009).

2.0 GROUNDWATER USE DETERMINATION

The specific criteria spelled out in 18AAC75.350 are discussed below, along with an explanation of why this Source Area meets the criteria.

Criterion 1 – The groundwater is not (A) used for a private or public drinking water system, (B) within the zone of contribution of an active private or public drinking water system, (C) within a recharge area for a public or private drinking water well, wellhead protection area, or a sole source aquifer:

Basis– Groundwater at Source Area SS010 is not currently used for drinking water. The site is remote, and there is only one drinking water well in the vicinity (Well No. 1, the supply well at the composite facility). Due to the relative location and elevation the SS010 groundwater does not contribute to groundwater in Well No. 1, as discussed below.

- **1(A)** Well No. 1 is located approximately two miles upgradient (i.e., up the Fowler Creek drainage) of SS010. All groundwater at the Cape Romanzof LRRS occurs within the Fowler Creek drainage basin, and surface water runoff and groundwater flow directions follow the downward slopes of the valley (i.e., flowing toward SS010 and Kokechik Bay). Groundwater recharges from infiltration of precipitation within the Fowler Creek drainage basin. The lake behind the Huson Dam at the Lower Camp (composite facility) area is intended for recharging the drinking water aquifer that Well No. 1 is completed into.

    - Well No. 1 produces groundwater from confined water-bearing zones at 82 to 102 feet and 146 to 148 feet deep. Given that Well No. 1 is situated at an elevation of approximately 1,500 feet above mean sea level (amsl), and SS010 is at an elevation less 340 feet amsl, the water-bearing zones at the composite facility and Well No. 1 are 1,160 feet higher than the contaminated soil and groundwater zones at Source Area SS010.

    - Two other supply wells were reportedly installed at Cape Romanzof LRRS; however, neither of these wells are currently used for water supply. Well No. 2 was reportedly installed at the Weather Station near the runway and SS010 in 1962. and was contaminated with petroleum, oil, and lubricants

(POLs) in 1964. Field efforts since 1985 have failed to locate Well No. 2. Well No. 3 was constructed in 1972 approximately 210 feet northeast of, and uphill from the Weather Station and SS010. It was completed to a depth of 96.5 feet into a thin water-bearing zone of weathered bedrock directly above granitic bedrock. At one time, Well No. 3 provided non-potable water to the users of the Weather Station Building. Efforts made to locate Well No. 3 during recent Clean Sweep activities and the 2008-2009 RI were unsuccessful, and Well No. 3 is believed to have been abandoned.

- No other wells are present in the vicinity of Cape Romanzof.

- **1(B&C)** The site is very remote, and there are no drinking water wells or public water systems in the vicinity of SS010. Details about the Cape Romanzof LRRS water supply well are provided in the Basis for Criterion 1(A). The nearest towns to Cape Romanzof are Scammon Bay and Hooper Bay, which are about 15 miles east and south, respectively.

Criterion 2 – The groundwater is not a reasonably expected potential future source of drinking water, based on an evaluation of (A) the availability of groundwater, (B) quality of the groundwater, (C) existence and enforceability of institutional controls, (D) land use of the site and neighboring property, (E) need for a drinking water source and availability of an alternative source, and (F) exemption of the groundwater under 40 Code of Federal register (CFR) 146.4:

Basis –

- **2(A & B)** Groundwater occurs in surficial alluvial and colluvial deposits consisting of sandy silt and boulders. Aquifer properties are unknown; however, they are probably irregular due to the highly variable distribution of fine and coarse materials. It was determined at the TRIAD systematic planning meeting that groundwater contamination is a site specific concern due to the reported contamination of groundwater within two former groundwater wells at Source Area SS010, but the current groundwater elevation and continued groundwater impact could not be determined during the 2008 RI.

- **2(C)** The USAF currently owns the property and has no plans to dispose of the property at this time. The USAF can implement an institutional control restricting locating drinking water wells at this Source Area which would remain with the property should the USAF decide to dispose of it and groundwater quality exceeds applicable cleanup levels.

- **2(D)** The groundwater underlies the Cape Romanzof LRRS facility, and the USAF has no plans for residential development in the area. The installation is owned by the USAF and is located within the Yukon-Kuskokwim Delta National Wildlife Refuge administered by the United States Fish and Wildlife Service (USFWS).

- **2(E)** The need for a drinking water source in this area has not been identified.

- **2(F)** The site is not exempt under 40 CFR 146.4.

Criterion 3 – The affected groundwater will not be transported to groundwater that is a source of drinking water, or that is a reasonably expected potential future source of drinking water, in concentrations in the receiving groundwater that exceed the groundwater cleanup levels; in reviewing the demonstration required under this paragraph, the department will consider (A) the aerial extent of the affected groundwater; (B) the distance to any existing or reasonably anticipated future water supply well; (C) the likelihood of an aquifer connection due to well construction practices in the area where the site is located; (D) the physical and chemical characteristics of the hazardous substance; (E) the hydrogeological characteristics of the site; (F) the presence of discontinuities in the affected geologic stratum at the site; (G) the local climate; (H) the degree of confidence in any predictive modeling performed and (I) other relevant information the department determines that the information is necessary to protect human health, safety, or welfare, or the environment. (Eff. 1/22/09, Register 149; am 8/27/2000, Register 155)

Basis –

- **3(A)** Source Area SS010 is a very remote site, and there are no drinking water wells or public water systems currently or planned in the vicinity. While groundwater sampling was proposed at Source Area SS010, groundwater monitoring wells could not be installed, which prevented the collection of analytical groundwater samples. It was determined at the TRIAD meeting that groundwater contamination is a site specific concern due to the reported contamination of groundwater within two former groundwater wells at Source Area SS010, but the current groundwater elevation and continued groundwater impact could not be determined during the 2008 RI. Surface runoff and groundwater flow directions follow the downward slopes of the valley and discharge into Fowler Creek and ultimately into Kokechik Bay to the southwest of the site.

- **3(B & C)** Source Area SS010 is a very remote site,, and there are no drinking water wells or public water systems currently or planned in the vicinity.

- **3(D)** Fuel-related compounds are the contaminants of concern in groundwater at Source Area SS010.

- **3(E & F)** Groundwater occurs in surficial alluvial and colluvial deposits consisting of sandy silt and boulders. Aquifer properties are unknown. However, they are probably irregular due to the highly variable distribution of fine and coarse materials. All geologic soil borings that were collected at SS010 resulted in refusal at an average depth of 19.4 feet bgs. Source Area SS010 subsurface stratigraphy consists of engineered pad/fill material (within the weather station gravel pad) from ground surface to an average depth of approximately 11.6 feet bgs; where buried native surface soil was documented. Buried soils were often organic rich and quickly transition to mineral rich soils, gravel, and sand. Soil borings that were collected off of the gravel pad confirmed similar subsurface stratigraphy without fill material cover. The ground surface in the surrounding area is littered with granitic cobbles and boulders that range in size from several inches to several feet. These larger boulders are likely the cause of the abrupt refusal noted in the geologic boring logs. It was determined at the TRIAD meeting that groundwater contamination is a site specific concern due to the reported contamination of groundwater within two former groundwater wells at Source Area SS010, but the current groundwater elevation and continued groundwater impact could not be determined during the 2008 RI.

- **3(G)** The local climate is characterized by extreme temperature variations and moderate (approximately 27 inches) precipitation.

- **3(H)** No predictive modeling was performed for this site.

- **3(I)** A groundwater use determination was completed for Source Areas ST009 and SS014 located approximately ¾-mile downgradient of Source Area SS010, at the confluence of Fowler Creek and Kokechik Bay (USAF, 2007). Approval of this groundwater use determination could eliminate the ADEC Method Two Screening Criteria for the migration to groundwater pathway of contaminated soils at Source Area SS010. Application of the more stringent of the remaining ADEC Method Two pathway specific screening criteria would be appropriate for future decision making. These screening criteria are generally higher than the migration to groundwater criteria, but would remain protective of human health and the environment. Groundwater is not reasonably a source for drinking water, and downgradient surface water contained few constituents at levels below applicable water quality criteria, indicating that impacts from contaminated soils to surface water are minimal at the Source Area. A BHHRA and ERA were completed for this Source Area, and minimal risk from fuels in soil were identified. The higher

screening criteria would remain protective of human health and the environment based on several factors including; (1) these lands are administered by the USAF for a Minimally Attended Radar (MAR) site, limiting human exposure to contaminants; (2) groundwater at this Source Area is not reasonably a source for drinking water currently nor in the future; (3) contaminated soils have existed at the Source Areas for 20 plus years, yet downgradient surface water and sediments remain relatively un-impacted; and, (4) little to no human health or environmental risk was identified through risk assessments conducted in accordance with applicable ADEC and United States Environmental Protection Agency (USEPA) guidance.

3.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2008. *18 AAC 75 Oil and Other Hazardous Substances Pollution Control*. 9 October 2008.

United States Air Force (USAF). 1990. *Installation Restoration Program, Remedial Investigation/Feasibility Study, Stage 1, Cape Romanzof LRRS, Alaska*. Second Draft Report. June.

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USAF. 1993a. *Natural Resource Plan, South Coastal Long Range Radar Sites*. September.

USAF. 1993b. *Cape Romanzof LRRS Well Closure*. Final Work Plan. July 22.

USAF. 2007. *Proposed Plans for Four ERP Sites, Cape Romanzof LRRS, Alaska*. May.

USAF. 2009. *Final Remedial Investigation Report, Cape Romanzof LRRS, Alaska*. July 2009.

ACRONYM LIST

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
amsl	above mean sea level
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Register
ERA	Ecological Risk Assessment
FS	Feasibility Study
LRRS	Long Range Radar Station
MAR	Minimally Attended Radar
NFRAP	no further remedial action planned
POLs	petroleum, oil, and lubricants
RI	Remedial Investigation
TPH	Total Petroleum Hydrocarbons
USAF	United States USAF
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service