PROPOSED PLAN

FINAL REMEDIAL ACTIONS FOR ERP SITES LF003, SS010, SS016, AND SS017

CAPE ROMANZOF LRRS

COMMENT PERIOD: July 18-August 17, 2012

611 CES/CEAR Environmental Restoration Program, 10471 20th Street, Suite 302, JBER, Alaska 99506-2201

INTRODUCTION

This ***Proposed Plan***[1] presents the Preferred Remedial Alternatives for the following *United States Air Force* (***USAF***) *Environmental Restoration Program (**ERP**[2])* sites within the Cape Romanzof *Long-Range Radar Site* (***LRRS***):

- 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)

Results from the most recent Remedial Investigation (RI) at Cape Romanzof LRRS show that chemical substances are present at each of these four sites above levels that allow for unrestricted land use. Therefore, the USAF is proposing remedial action at these sites, according to federal and state law.

The USAF has prepared this Proposed Plan according to the *Comprehensive Environmental Restoration, Compensation, and Liability Act* (***CERCLA)*** "Superfund" Program, Section 117(a), the ***National Contingency Plan (NCP)***, Section 300.430(f)(2) and integrates Alaska state law into the CERCLA process to simultaneously satisfy Alaska regulatory requirements and CERCLA. The Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program has regulatory authority under Title 18 Alaska Administrative Code (AAC) 18 AAC 75, Article 3, 'Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances.' Alaska regulations exclusively apply to site SS010, due to the CERCLA petroleum exclusion.

The federal laws regulate the cleanup of hazardous waste sites that contain ***hazardous substances*** regulated under CERCLA. The term "hazardous substance," as defined in CERCLA, excludes "petroleum, including crude oil or any fraction thereof," unless specifically listed or designated under CERCLA (Sections 101(14) and 102(a)).

HOW YOU CAN PARTICIPATE

You are encouraged to comment on this Proposed Plan. The public comment period begins on 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.

A pre-addressed comment form is included at the end of the plan. You can mail or email your comments to the Community Involvement Coordinator at the following address:

Mr. Tommie Baker
Air Force Community Involvement Coordinator
611 CES/CEAR
10471 20th Street, Suite 340
Joint Base Elmendorf-Richardson, Alaska 99506-2201
907-552-4506 or 1-800-222-4137
Tommie.Baker@us.af.mil

[1] For convenience to the reader, the terms in ***bold italic*** are defined in the Glossary at the end of this publication.

[2] The Air Force Environmental Restoration Program (AFI 32-7020) focuses on identifying and cleaning up hazardous waste sites that were contaminated prior to 1984.

REGULATORY BASIS

THIS PLAN IS ISSUED IN ACCORDANCE WITH AND SATISFIES THE REQUIREMENTS OF THE COMPREHENSIVE ENVIRONMENTAL RESTORATION, COMPENSATION AND LIABILITY ACT (CERCLA, AT 42 USC §§ 9601 *ET SEQ.*), AS FURTHER IMPLEMENTED BY THE NATIONAL CONTINGENCY PLAN (NCP, AT 40 CFR PART 300). THE IRP IS AUTHORIZED IN THE DEFENSE ENVIRONMENTAL RESTORATION PROGRAM (10 USC §§ 2701 *ET SEQ.)* AS THE ENVIRONMENTAL RESTORATION PROGRAM THE AIR FORCE USES TO TAKE CERCLA RESPONSE ACTIONS AND SATISFY ITS CERCLA LEAD AGENCY FUNCTIONS AS DELEGATED BY EXECUTIVE ORDER 12580.

PETROLEUM, INCLUDING CRUDE OIL OR ANY FRACTION THEREOF, IS SPECIFICALLY EXCLUDED FROM CERCLA. CONTAMINATION FROM PETROLEUM IS REGULATED UNDER ALASKA STATE LAW AND REGULATIONS.

THE PLAN ALSO MEETS ALL REQUIREMENTS OF ALASKA STATE LAW AND REGULATIONS, INCLUDING BUT NOT LIMITED TO TITLE 46 OF THE ALASKA STATUTES AND REGULATIONS PROMULGATED THEREUNDER.

Petroleum is excluded from CERCLA (as discussed in the Regulatory Basis box on page 2) but is regulated under Alaska state law. The petroleum detected at SS010 was above ADEC Method Two cleanup levels established in 18AAC 75.341 allowing for unrestricted land use.

The State of Alaska has participated in the development of this Plan. The State of Alaska's final decision on the preferred alternative for each contaminated site addressed here will not be made until all comments submitted during the current public comment period have been reviewed and considered.

PURPOSE OF PROPOSED PLAN

The USAF, in coordination with the ADEC, has issued this Proposed Plan in accordance with CERCLA and NCP requirements. The Proposed Plan has the following purposes:

- to provide basic background information related to the subject sites;
- to identify the preferred alternatives for remedial action at the subject sites and explain the reasons for the preference; and
- to provide information on how the public can be involved in the remedy selection process.

The preferred alternatives for Sites LF003, SS010, SS016, and SS017 are listed below.

LF003 PCB contaminated soil and sediment:

- **LF03SS5: PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal.**
- **LF03SD3: Excavation, Off-Site Disposal and Long-Term Monitoring.**

SS010 petroleum contaminated subsurface soil and groundwater potentially contaminated with petroleum:

- **SS10SB2: Institutional Controls and Engineering Controls.**
- **SS10GW2 – Institutional Controls, Engineering Controls, Natural Attenuation and LTM.**

SS016 PCB contaminated soil:

- **SS16SS4: PCB Soil ≥1 mg/kg Excavation, to the extent feasible, and Off-Site Disposal.**

SS017 PCB contaminated surface and subsurface soil:

- **SS17SS4: Excavation and Off-Site Disposal.**
- **SS17SB4: Excavation and Off-Site Disposal.**

Detailed descriptions of each alternative are presented in the **ERP SITE alternatives - description and analysis** section beginning on page 23.

The preferred alternatives may be modified if public comments or additional data indicate that such a change would result in a more appropriate solution. Therefore, the public is encouraged to review and comment on this Proposed Plan.

Following consideration of public comments, the USAF will prepare a *Record of Decision* (***ROD)*** to document the final remedies selected for Sites LF003, SS010, SS016, and SS017. The ROD will contain a summary of responses to public comments received (***Responsiveness Summary).***

ORGANIZATION OF PROPOSED PLAN

The remainder of this Proposed Plan presents general information about Cape Romanzof LRRS; individual information summaries for ERP Sites LF003, SS010, SS016, and SS017; a discussion about how the USAF identified and developed the final actions/alternatives proposed for these sites (i.e., no action under CERCLA; ***monitored natural attenuation*** [***MNA***]***/institutional controls*** [***ICs***] under ADEC's contaminated site regulations); a description of the alternatives for each site; and the results of the analysis/ evaluation that led to the selection of the preferred alternatives per site.

CAPE ROMANZOF BACKGROUND

LOCATION

The Cape Romanzof LRRS is located approximately 540 air miles west of Anchorage, AK off the coast of the Bering Sea on a small peninsula between Scammon and Kokechik bays. The installation consists of approximately 4,900 acres held by the USAF within the Yukon-Kuskokwim Delta National Wildlife Refuge. The LRRS consists of two main camp areas referred to as the Upper Camp and the Lower Camp. Most of the facilities at the Lower Camp and the ***White Alice Communications System*** (***WACS***) at the Upper Camp have been demolished; a new composite facility was installed at the Lower Camp in 1984 and a radome facility is currently in operation at the Upper Camp. The current Lower Camp facilities include a dormitory, maintenance building, bulk fuel storage, and a power plant. A tramway and a gravel road connect the two camps for mountain top access year round. The gravel road continues from the Lower Camp to a one-mile-long runway and weather station building, approximately four miles southwest of the Lower Camp, with beach facilities approximately one mile further south along Kokechik Bay. The location of Cape Romanzof LRRS is shown on **Figure 1**. The locations of ERP Sites LF003, SS010, SS016 and SS017 are shown on **Figure 2**.

ENVIRONMENTAL SETTING

The Cape Romanzof LRRS is located in the Yukon-Kuskokwim Coastal Lowland region at the western end of the Askinuk Mountains. Cape Romanzof lies within the Alaskan Transitional Climatic Zone, with an approximate average annual precipitation of 27 inches, average wind speed of 12 miles per hour, summer average high temperatures of approximately 45 degrees Fahrenheit, and winter average high temperatures in the teens (Fahrenheit). Permafrost is not known to exist at Cape Romanzof.

The Upper Camp geology is characterized by a thin layer of soil overlying bedrock. The Lower Camp is underlain by moderately thick deposits of talus and other alluvial materials that form an apron at the base of the steep slope. Further down the valley, alluvial/glacial deposits make up the surface geology. Surface water runoff at the LRRS generally follows the surface topography. The Fowler (Nilamut) Creek watershed collects the majority of surface water runoff in the area and drains a distance of approximately four miles through a constructed reservoir (behind Husan Dam) and runoff through numerous seasonal tributaries, until it reaches Kokechik Bay (**Figure 2**). Fowler Creek supports several species of fish, including Dolly Varden and pink salmon.

Groundwater at the LRRS was not encountered during a subsurface investigation conducted as part of the 2008 RI, but has historically been reported at depths ranging from 5 to 70 feet below ground surface (***bgs***) (USAF, 2002). Groundwater flow directions follow many slopes and generally trend to the west toward Kokechik Bay. The unconfined aquifer occurs both in the glacial till and fractured bedrock. The LRRS utilizes a deep well (Well No. 1) at the Lower Camp to obtain drinking water. Recharge of the

groundwater is from infiltration of precipitation within the drainage basin.

HISTORICAL USE

The Cape Romanzof LRRS was one of 10 original *Aircraft Control and Warning Systems* (***ACWS***) sites in the Alaska air defense system. Installation construction was completed in 1952, and operations began in 1953. In 1958, Cape Romanzof was established as a WACS, replacing the ACWS. In 1979, a commercially owned and operated communications system (American Telephone and Telegraph [AT&T] Alascom) used a satellite earth terminal to replace the WACS operations.

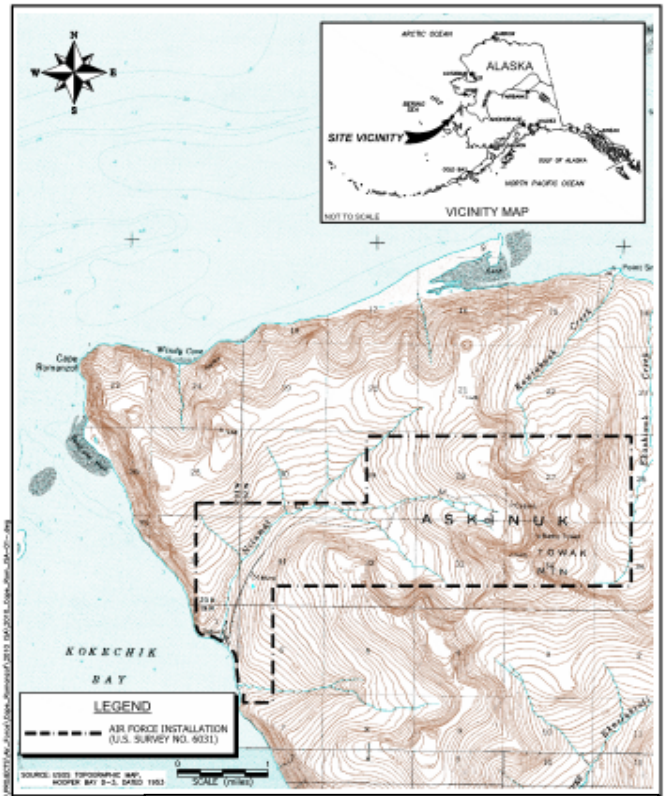


Figure 1: Cape Romanzof Vicinity and Location Map

The 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 decreased to approximately six people (now four), who live at the site year-round. The number of personnel increases significantly in the summer when other contractors and government agencies conduct studies and perform work in and around the LRRS.

All of the structures and equipment associated with the former WACS at the Upper Camp have been demolished and disposed of; only the MARS radar dome and tram station remain. Most of the original buildings at the Lower Camp have been demolished; what now remain are the power plant, bulk fuel storage area, and a dry storage building. A new composite facility, consisting of two dome buildings, was installed in 1984 at the Lower Camp and provides the industrial and living facilities for on-site personnel. There is also a small building at the end of the airstrip that is used as a weather station.

Hazardous and potentially hazardous substances have historically been used or stored at Cape Romanzof LRRS to support base activities.

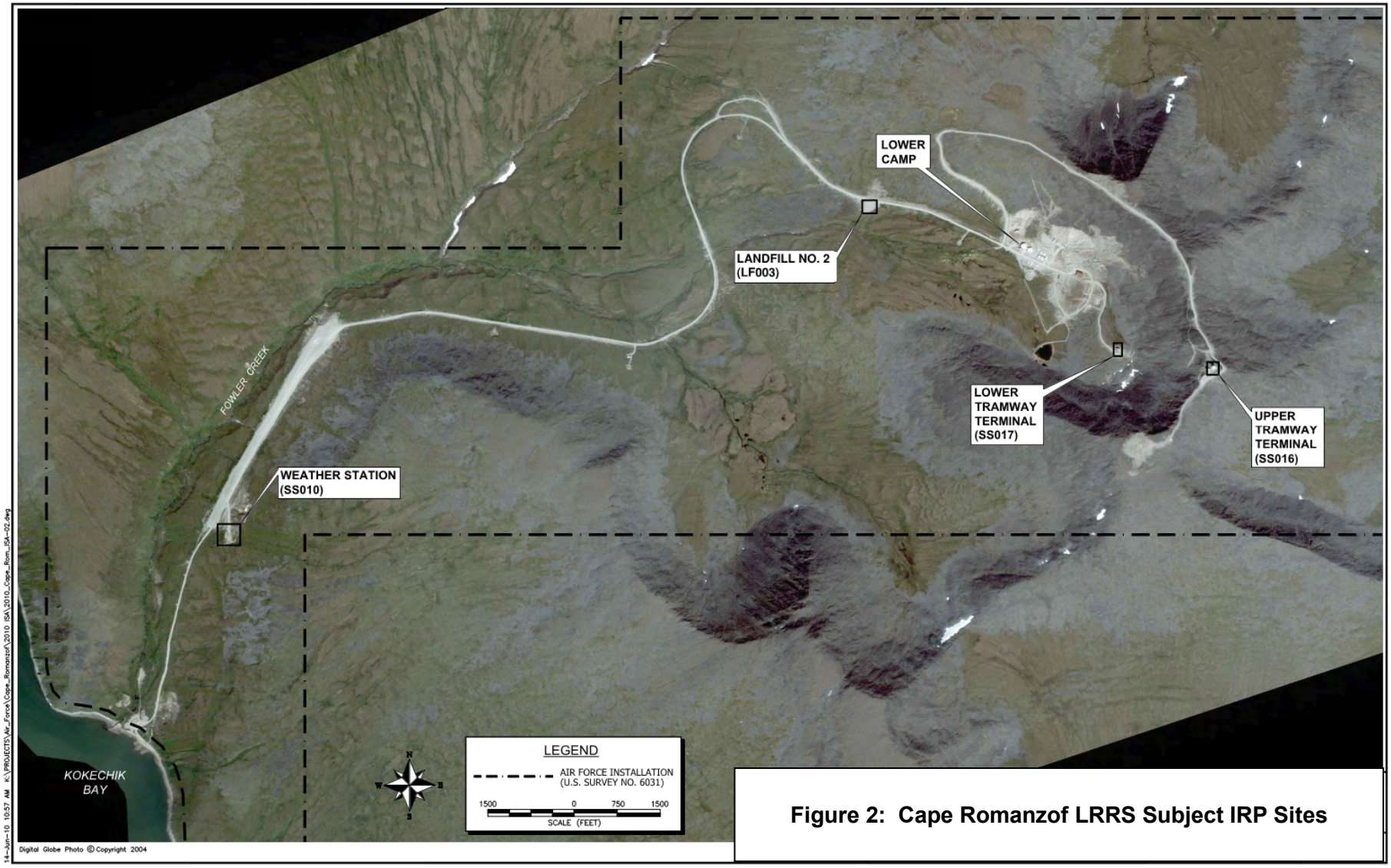


Figure 2: Cape Romanzof LRRS Subject IRP Sites

SITE RESTORATION HISTORY

A Phase I records search conducted in 1985 resulted in identification of 15 potentially contaminated ERP sites at Cape Romanzof LRRS. Four of these sites are the subject of this Proposed Plan. **Table 1** provides an overview of the status of environmental restoration activities at each of these four sites. The restoration of the four subject sites of this Proposed Plan does not affect the other 11 ERP sites, which are being dealt with separately.

Table 1: Cape Romanzof LRRS Proposed Plan ERP Site Status

Site	Name	Status
LF003	Landfill No. 2	2002 Interim ROD; long-term monitoring; RI completed 2009; ***Feasibility Study (FS)*** completed 2011; ROD planned for 2012.
SS010	Spill Site 10 (Weather Station Building)	RI completed 2009; FS completed 2011; Decision Document planned for 2012
SS016	Upper Tram Area	RI completed 2009; FS completed 2011; ROD planned for 2012.
SS017	Lower Tram Area	RI completed 2009; FS completed 2011; ROD planned for 2012

Reports documenting key historical site restoration events at ERP Sites LF003, SS010, SS016 and SS017 are listed below. All of the reports are available in the ***Administrative Record*** (access information is provided on page 39 of this Plan).

- ROD for Interim Remedial Action, Sites: Spill Site SS013, Spill Site SS015, and Landfill Site LF003, Cape Romanzof LRRS, Alaska. USAF, 2002.
- Final First Five-Year Review Cape Romanzof Sites LF003. USAF, 2008.
- Long-Term Monitoring (LTM) Reports for LF003 for 1999, 2000, 2003, 2004, 2006, 2007, and 2008. USAF.
- Final Remedial Investigation Report, Sites: LF003, SS010, SS016, and SS017, Cape Romanzof LRRS, Alaska. USAF, 2009.
- Final Feasibility Study for Sites LF003, SS010, SS016, and SS017, Cape Romanzof LRRS, Alaska. USAF, 2011.

SUMMARY OF SITE RISKS

It is the USAF's current judgment that the Preferred Alternatives identified in this Proposed Plan, or one of the other active measures considered, are necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

The concentration at which a pollutant or contaminant poses an unacceptable risk depends on many factors, including toxicity and the frequency or chance that an individual may become exposed to the chemical. Therefore, the location and size of a contaminated area affects the potential risk. Pollutants or contaminants at sites within the Cape Romanzof LRRS that exist at concentrations that pose an unacceptable risk to human health and/or the environment are referred to as contaminants of concern (COCs) in this proposed plan.

The COCs present at each site addressed in this Proposed Plan are summarized in Table 2 below. Detailed information on the location, volume, and maximum concentrations for each COC at each site are presented in Tables 3, 5, and 7 in the *ERP Site Alternatives – Description and Analysis* section of this Proposed Plan.

Table 2: Cape Romanzof LRRS Proposed Plan ERP Site Contaminants of Concern

ERP Site	Environmental Medium	COC
LF003	Surface Soil	PCBs
LF003	Sediment (eroded soil)	PCBs
SS010	Subsurface Soil	DRO
SS010	Groundwater	Fuel Suspected
SS016	Surface Soil	PCBs, Lead
SS017	Surface Soil	PCBs, Lead
SS017	Subsurface Soil	PCBs, Lead

Notes:
COC Contaminant of Concern
DRO Diesel Range Organics
PCBs Polychlorinated Biphenyls

Though eroded soil within the seasonal drainage channel at LF003 has historically been referred to as sediment, due to the seasonality of the seep and lack of consistent habitat for aquatic organisms, it has been determined by the USAF and ADEC that the Method 2 Soil Cleanup levels presented in 18 AAC 75.341 are most appropriate for remediation of this medium at this site. Because remedial approaches for this material may differ from those for contaminated soil at other locations within this site, it is referred to here as sediment, rather than soil, and separate remedial alternatives have been developed and evaluated for this material and other surface soil.

Based on an historic anecdotal report of a fuel odor in groundwater from a well previously located near SS010, groundwater at this site is suspected to be contaminated with fuel constituents such as gasoline range organics (GRO), diesel range organics (DRO), or residual range organics (RRO). There are currently no groundwater wells at this site and recent attempts to install wells have been unsuccessful due to the rocky surface and subsurface geology of the area. For this reason, no analytical data currently exist to evaluate the potential for fuel contamination within groundwater at this site or any potential risk it may pose to downgradient surface water quality within Fowler Creek. The preferred remedial alternative for ground-water at this site will include the installation of three groundwater monitoring wells to assess contaminant concentrations in groundwater and potential risks to surface water quality within Fowler Creek.

Lead contamination in soil at ERP Sites SS016 and SS017 was found to be localized in "pockets" within areas contaminated with PCBs. PCB contamination in soil at these sites is more widespread than lead and the concentrations of PCBs pose a more significant risk to human health and the environment. It was determined by the stakeholders involved in the RI process that remedial measures for PCBs in soil at these sites would effectively remediate lead contaminated soil, as well, and that remedial alternatives developed for these sites should focus on remediation of PCB contamination in soil.

CURRENT AND FUTURE LAND USE

Cape Romanzof LRRS is currently operating as an active MARS facility and includes one residential structure for approximately four year-round workers and additional seasonal workers. There are no residents or residential structures at ERP Sites LF003, SS010, SS016, or SS017. There is no road access from nearby communities to Cape Romanzof LRRS; therefore, frequent use by community members is not anticipated. However, members of nearby communities use the surrounding lands and oceans for subsistence purposes.

The Yukon Delta National Wildlife Refuge surrounds the Cape Romanzof LRRS and is a federally protected environment.

The reasonably anticipated future land use of Cape Romanzof LRRS is continued industrial use as an active MARS facility. There are no plans for residential use at ERP Sites LF003, SS010, SS016, or SS017.

GROUNDWATER USE

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 feet deep and 146 to 148 feet 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) in September, 2009. This determination illustrated that groundwater at SS010 is not a reasonable current or future drinking water source in accordance with the three criteria laid out in 18 AAC 75.350.

SURFACE WATER USE

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

Fowler Creek is used by Cape Romanzof workers for recreational fishing. Kokechik Bay is used by nearby communities for subsistence purposes.

POTENTIAL EXPOSURE MEDIA, COMPLETE EXPOSURE ROUTES, AND CURRENT AND FUTURE RECEPTORS

Potential exposure media are contaminated environmental materials such as air, water, soil or sediment that a receptor population, such as humans or other organisms, could be exposed to, potentially leading to negative health impacts. In order for a receptor population to become exposed to a potential exposure medium, a complete exposure route for transfer of contaminants must exist. Examples of complete exposure routes include inhalation of contaminants in air, ingestion of contaminated soil or water; direct contact with contaminants in soil, or consuming contaminated plants or animals.

Potential exposure media, complete exposure routes, and current and future receptors at ERP Sites LF003, SS010, SS016, and SS017 were evaluated during the 2008 RI. Potential exposure media at these Sites were determined to be:

- surface and subsurface soil
- sediment
- surface water
- biota

There is not a complete exposure route for groundwater; therefore, it is not presented as a potential exposure medium. Biota include plants and animals that may take up contaminants directly or indirectly and then be consumed by humans.

Potential human receptor populations at these sites were determined to be:

- current and future recreational/subsistence users;
- future residential/subsistence users;
- current and future short-term workers; and
- current and future long-term workers.

Complete exposure routes for each exposure medium identified during the 2008 RI are listed below:

Soil Exposure Routes:

- Incidental soil ingestion
- Dermal absorption of contaminants from soils
- Inhalation of airborne suspended particles from surface soils

Sediment Exposure Routes

- Incidental sediment ingestion
- Dermal absorption of contaminants from sediment

Surface Water Exposure Routes

- Ingestion of surface water containing contaminated sediment/soil

Biota

- Ingestion of Wild Foods (PCBs only)

SUMMARY OF HUMAN HEALTH RISK CHARACTERIZATION

A Baseline Human Health Risk Assessment (BHHRA) was conducted for the four ERP Sites located at Cape Romanzof LRRS during the 2008 RI. The BHHRA included the following components:

- an assessment of screening and analytical data collected at each site to

identify contaminants of potential concern warranting further evaluation for risk to human receptors;
- an exposure assessment to characterize potentially exposed human populations, identify actual or potential exposure pathways, and determine the extent of exposure;
- a toxicity assessment to determine the degree of toxicity and cancer risk posed by each contaminant of potential concern;
- a risk characterization to determine the actual risk each contaminant of potential concern posed to human receptors and identify those that posed an unacceptable risk to human health. Contaminants that posed an unacceptable risk to human health were carried forward as contaminants of concern and recommended for remedial action; and
- an uncertainty analysis of the data and assumptions used to calculate actual risk to human receptors.

The baseline human health risk assessment concluded that that there is unacceptable human health risk from direct contact with PCBs in soil and sediment at LF003 and from direct contact with lead and PCBs in soil at SS016 and SS017. There are potential hotspots of PCBs in soil and sediment at LF003 and in soil at SS016 and SS017. There is little risk from direct contact with soil at SS010. There is also potential risk from subsistence consumption of plants, small mammals and fish within all source areas, though these risks are overestimated since it is extremely conservative to assume that all subsistence activity takes place in these four contaminated source areas within the Cape Romanzof LRRS.

SUMMARY OF ECOLOGICAL RISK CHARACTERIZATION

A screening-level environmental risk assessment (ERA) was performed at Cape Romanzof LRRS as part of the 2008 RI to evaluate the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors. Implementation of an ERA is a two-tier process. The first tier of this process is the screening-level ERA; the second tier represents a baseline ERA. The purpose of a screening-level ERA, which was conducted for the Cape Romanzof LRRS RI sites, is to assess the need and, if required, the level of effort necessary, to conduct a detailed or "baseline" ecological risk assessment for a particular site or facility.

The screening-level ERA concluded that there is potential unacceptable ecological risk for select sample locations at the LF003, SS016 and SS017 source areas within the Cape Romanzof LRRS installation, as concentrations of PCBs in soil and sediment at LF003 and lead and PCBs in soil at SS016/SS017 exceed ecotoxicity screening levels based on food chain exposures. However, this potential risk is limited to few sample locations (e.g., hot spots) within each source area, to developed areas within source area SS016/SS017, and to drainage seeps. PCB contamination has not been found in Fowler Creek. Overall, it was determined that the potential risk to ecological receptors from exposure to PCBs and lead is expected to be limited as the forage habitat provided by the source areas is limited and a baseline ecological risk assessment was not recommended.

OVERALL SITE RESTORATION OBJECTIVES

The overall objectives of the Cape Romanzof LRRS environmental site restoration are to ensure that conditions at each site are protective of human health and the environment and to comply with federal and state regulations. Federal and state regulations that are potentially relevant to establishing remediation goals and cleanup levels are summarized below:

FEDERAL REGULATIONS

The NCP states that remediation goals must establish acceptable exposure levels that are protective of human health and the environment.

ALASKA'S CONTAMINATED SITES REGULATIONS

Soil and Groundwater

The state of Alaska has promulgated ***cleanup levels*** in 18 AAC 75 (Oil and Hazardous Substances Pollution Control Regulations, as amended through October 1, 2011). Tabulated soil cleanup levels are provided in 18 AAC 75.341 Method Two Table B1 and B2 (Under 40-inch zone)[3] for three exposure pathways: ingestion, inhalation, and direct contact[4]. The ADEC Method Two Soil Cleanup Levels may be applied at any contaminated site in Alaska and are considered protective of human health.

Tabulated groundwater cleanup levels are provided in 18 AAC 75.345 Table C[5]. The ADEC Table C groundwater 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. The Table C groundwater cleanup levels are considered, by the USAF and ADEC, to be appropriate for use as cleanup levels for SS010 groundwater.

With the exception of bulk hydrocarbons (***diesel range organics* [*DRO*], *gasoline range organics* [*GRO*],** and ***residual range organics* [RRO]**), when multiple chemicals are detected at a site, ADEC's contaminated site regulations require evaluating the cumulative risk posed by all potential contaminants. ADEC's Cumulative Risk Guidance states that, with the exception of bulk hydrocarbons, the potential for cumulative risk must be evaluated for any chemicals detected above 1/10 of the lowest of the Method Two soil cleanup levels or Table C groundwater cleanup level direct contact, ingestion, or inhalation. In accordance with ADEC's Cumulative Risk Guidance, bulk hydrocarbons are not included in cumulative risk calculations. Human health risk for bulk hydrocarbons is evaluated separately from CERCLA contaminants. Screening levels to assess whether bulk hydrocarbons warrant further evaluation under a human health risk assessment are set at the lowest applicable ADEC Method Two soil cleanup level or Table C groundwater cleanup level.

To establish compliance with cleanup levels and cumulative risk requirements during the 2008 RI, screening levels for soil were established as the lower of Method Two migration to groundwater cleanup levels or 1/10 of the lower of the Method Two direct contact, ingestion, or inhalation cleanup levels. Screening levels for groundwater were established as 1/10 of Table C groundwater cleanup levels.

Human health risk screening levels for bulk hydrocarbons were set at the lowest of the Method Two migration-to-groundwater, inhalation, or ingestion cleanup levels and Table C groundwater cleanup levels because, under ADEC guidance, bulk hydrocarbons are not included in cumulative risk calculations.

Surface Water and Sediment

Surface water criteria for the state of Alaska are provided in 18 AAC 70 (Alaska Water Quality Standards, as amended through May 26, 2011).

Tabulated water quality criteria (in 18 AAC 70.020) are appropriate for surface water at LF003. These levels are protective of human health (water supply and water recreation uses) and the environment (aquatic life and wildlife propagation).

Sediment results are compared to screening criteria developed by the National Oceanic and Atmospheric Administration (NOAA) in their Screening Quick Reference Tables (SQuiRTs) because ADEC cleanup levels do not exist for sediment. These screening levels are designed to help determine if contaminants present in environmental media, such as sediment, could pose an ecological risk and warrant further

[3] Throughout this Plan, these cleanup levels are referred to as ADEC Method Two soil cleanup levels.

[4] For bulk hydrocarbons (i.e., GRO, DRO, and RRO), Method Two cleanup levels are provided for the migration to groundwater, inhalation, and ingestion pathways.

[5] Throughout this Plan, these cleanup levels are referred to as Table C groundwater cleanup levels.

investigation. At Cape Romanzof LRRS, seasonal streams and seeps are not likely to provide consistent habitat for aquatic organisms and pose a significant risk to aquatic receptors; therefore it is more appropriate to use soil cleanup levels rather than sediment screening criteria (NOAA SQuiRTs), while also evaluating other potential ecological or contaminant migration issues. For this reason, the collected seep/runoff channel "sediments" are considered as surface soil in terms of cleanup levels rather than sediment.

ERP SITE DESCRIPTIONS AND HISTORY

This section presents the historical background information for each of the four ERP sites.

LANDFILL NO. 2 (LF003)

Site Description

This former landfill is located along the access road from the runway to the Lower Camp (**Figure 2**). The landfill was capped with material from a local borrow source in 1993 and 1994.

The landfill covers approximately 43,800 square feet and contains various wastes including garbage, wood, metal, plastic, construction/ demolition debris, shop waste, and incinerator ash, and was operated until the mid-1970s (USAF, 1995).

Cleanup Actions to Date

During a 1989 to 1991 Remedial Investigation and Feasibility Study (RI/***FS***), soil, sediment surface water and groundwater samples were collected. (USAF, 1991).

The findings indicated a presence of total petroleum hydrocarbons (***TPH***) contamination in soil and sediment, and polychlorinated biphenyls (***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).

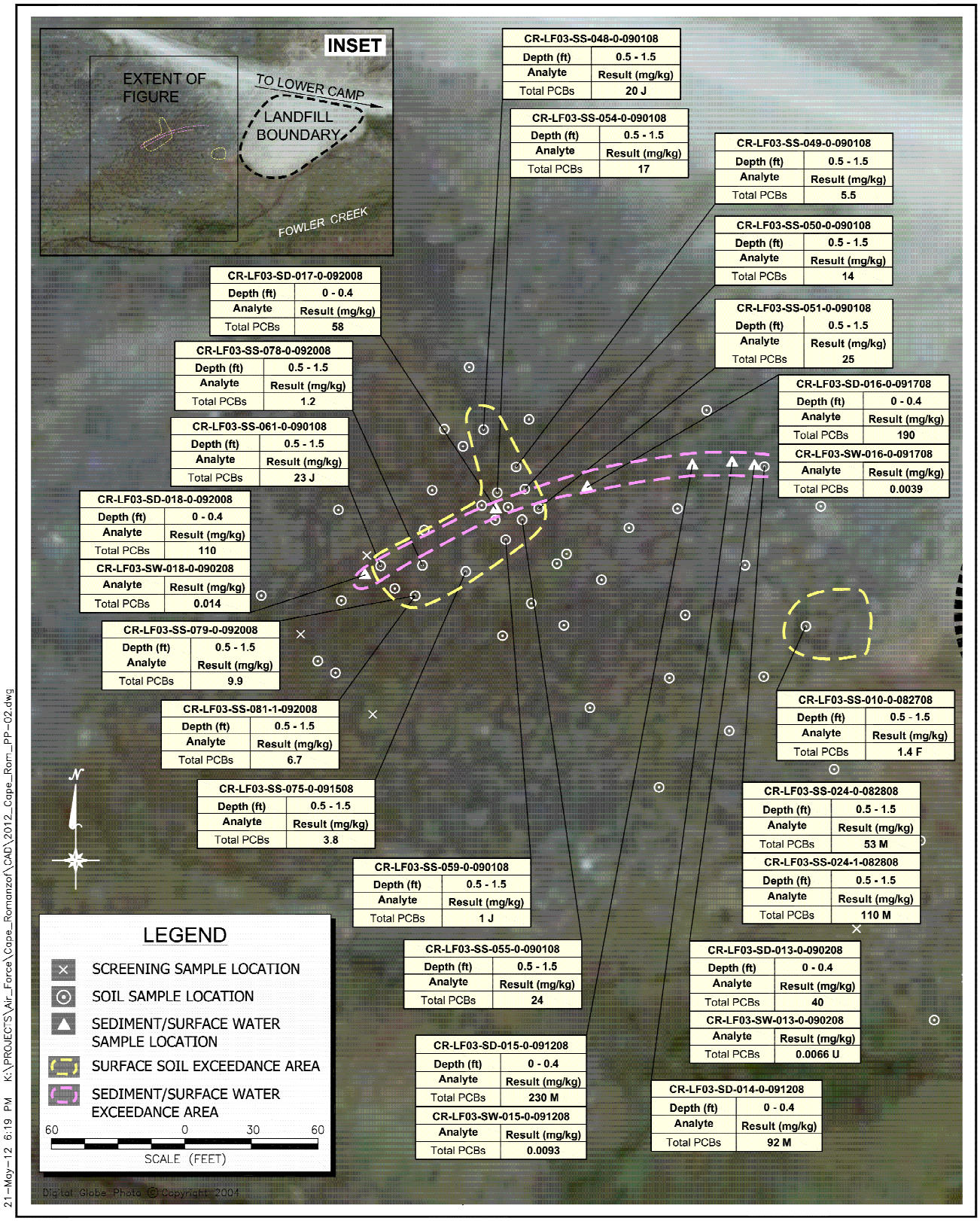
Long-term monitoring was conducted from 1996 through 2004, during which time ground-water, surface water, and sediment samples were analyzed. DRO, RRO, VOCs, semi-volatile organic compounds (***SVOCs***), and metals exceeded cleanup levels in ground- water, surface water, and sediment during several of these monitoring events. PCBs exceeded cleanup levels in surface water and sediment samples during these monitoring events.

Groundwater is no longer of concern at LF003. DRO has not been detected above cleanup levels since 1999 and no exceedances of any contaminants of concern were detected in groundwater in 2003 and 2004 groundwater monitoring events.

A limited site inspection was conducted in 2000. Two sets of surface water and associated sediment samples were collected along Fowler Creek, both upstream and downstream of the drainages running adjacent to LF003. Surface water samples from Fowler Creek were analyzed for the above-listed constituents, and the results were non-detect for all constituents. Sediment sample results from Fowler Creek detected 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.

FIGURE 3 LF003 SEDIMENT RESULTS



In 2002, the finalized Interim ROD established an interim remedy for LF003, which involved landfill closure including capping, LTM of groundwater, and PCB hotspot (areas of concentrated contamination) removals.

The 2003 Clean Sweep activities at Cape Romanzof LRRS included a general PCB investigation at LF003 (USAF, 2004b). Three sediment samples were collected at a location approximately 120 feet downstream from a seep (SD-2), and from the upgradient drainage ditch. Analytical results indicated PCB concentrations exceeded cleanup levels at both locations.

In 2004, a focused investigation was conducted in the vicinity of this same seep (SD-2). This included sampling on a grid and at intervals to delineate any contamination along the seep to the confluence with Fowler Creek. Results of the analysis of 18 soil samples indicate PCB contamination is present in the vicinity of SD-2, along the seep route down slope towards Fowler Creek, and one of four sediment samples at Fowler Creek contained traces of PCBs (USAF, 2005a).

In 2008 another RI was conducted at LF003 to further investigate PCB contamination present in soils/sediment surrounding the landfill (**Figures 3 and 4**). The results of the RI indicated that PCB contamination at the landfill has been migrating to sediments along the seep emanating from the northwest toe of the landfill. These sediments contain PCBs that exceed cleanup levels. As PCBs were primarily detected in sediment from the northwest seep, the RI concluded that the source of these PCBs may be located within the landfill, along the northwest edge.

SPILL/LEAK NO. 4 AT THE WEATHER STATION BUILDING (SS010)

Site Description

This area is located approximately 600 ft east of the southwest end of the Cape Romanzof LRRS airstrip as detailed in **Figure 5**. The area includes a weather station building, two utility trenches, and a newly installed weather observation tower approximately 200 feet uphill of the weather station building. The old weather observation building has been removed from the gravel pad, as well as a 25,000-gallon and an 1,100-gallon above-ground fuel oil storage tank.

Cleanup Actions to Date

This site was investigated as part of the 1989 Remedial Investigation. 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 feet 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 an additional RI/FS a well (No. 3) was constructed and placed 200 feet northeast of the Weather Station Building, uphill and upgradient from the previously mentioned 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. Subsurface soil contamination was identified at the former location of a 25,000-gallon above-ground storage tank (***AST***). The RI recommended that the area be considered for in-situ soil treatment or removal and treatment to practical extents.

Anecdotal information indicates groundwater from historical water wells at this location may have had a petroleum odor. 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 exists to assess groundwater quality at SS010. This data indicates 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 feet northwest of the fuel contaminated area at SS010 and may be of limited value in assessing current groundwater conditions at this site.

UPPER TRAM TERMINAL AREA (SS016) AND LOWER TRAM TERMINAL AREA (SS017)

Site Descriptions

SS016 - This area is situated on top of a steep slope at the Upper Camp at 2,250 feet above mean sea level. There is an Upper Tram Terminal Building located at the top of the slope (**Figure 6**). Tramway lines connect from the upper terminal building to the Lower Tram Building.

SS017 - This area is located approximately 0.46 miles southeast of the Lower Camp. There is a lower Tram Terminal located at the site which is situated at the toe of a slope (**Figure 7**). There are tram lines that connect from the lower terminal to the upper terminal.

Cleanup Actions to Date

The past investigations and remedial efforts at SS016 and SS017 are summarized jointly (except for the 2008 RI where they are summarized separately) below:

The two sites were investigated under a Preliminary Assessment/Site Inspection (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.

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 material.

In 2008 an RI was 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 feet along the south of the facility, east of the entrance to the arctic walkway
(2) 1,787 square feet near the tram docking area
(3) 2,540 square feet near the elevated walkway

Lead was detected above cleanup levels at four locations along the northern wall of the facility.

In 2008, an RI was also 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 two feet or less bgs and subsurface soil was considered to be between

two feet bgs and the surface of the underlying bedrock. Soil contamination was delineated at these areas both in the surface and subsurface.

At SS017, it was estimated that approximately 179 cubic yards (CY) of surface soil are contaminated with PCBs. All soils with PCBs at concentrations >50 ***parts per million*** (***ppm***) would be handled in accordance with the Toxic Substances Control Act (TSCA) regulations. It was also estimated that an additional 11.7 CY of subsurface soils were contaminated with PCBs.

In all, it was estimated that a total volume of 190.7 CY of soil (surface and subsurface) are contaminated with PCBs at levels greater than one ppm at SS017.

Figure 4: Landfill No. 2 (LF003)
Perimeter Soil Sample Locations and Analytical Exceedances
2008 Remedial Investigation

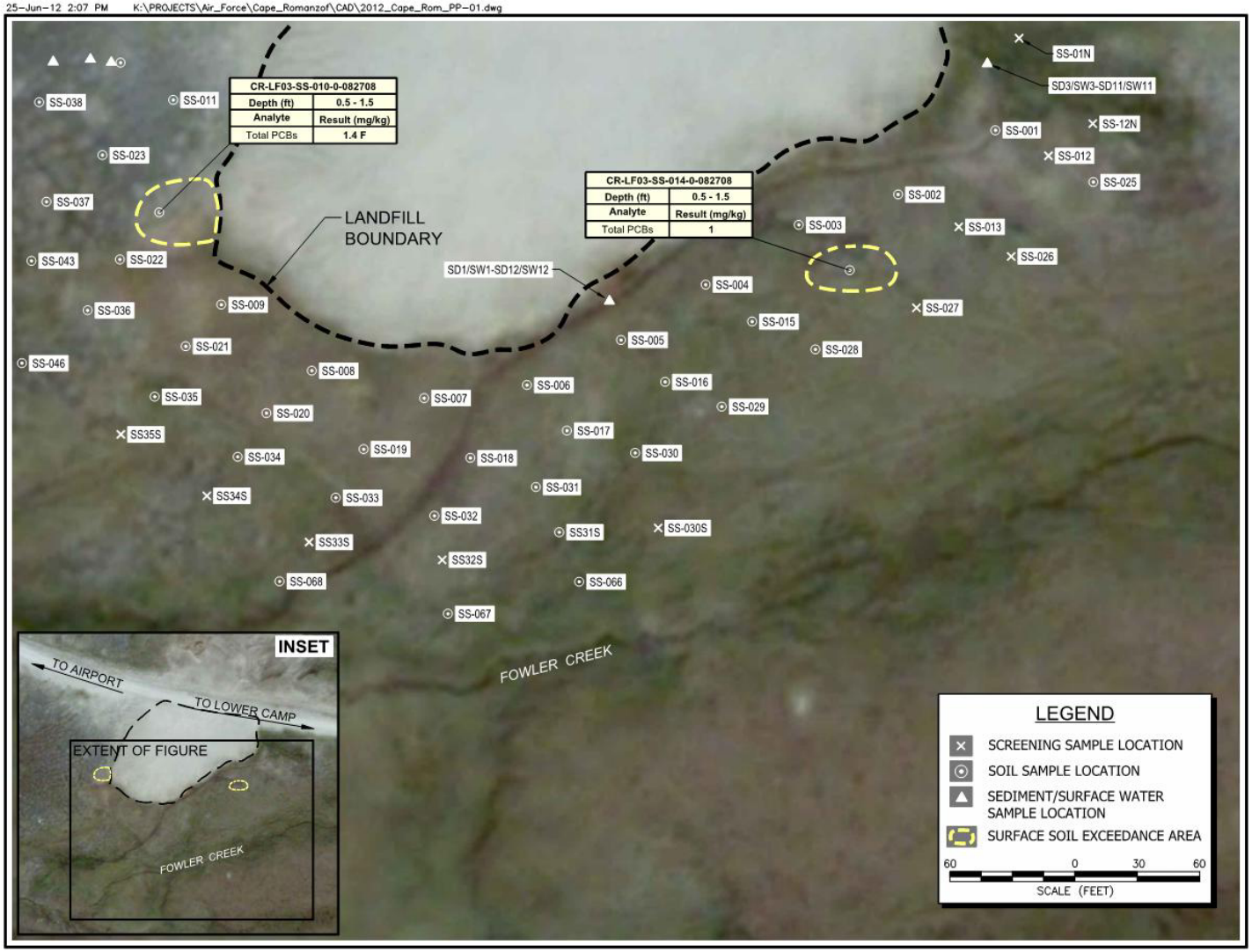


Figure 5: SS010 Soil Analytical Exceedances
2008 Remedial Investigation

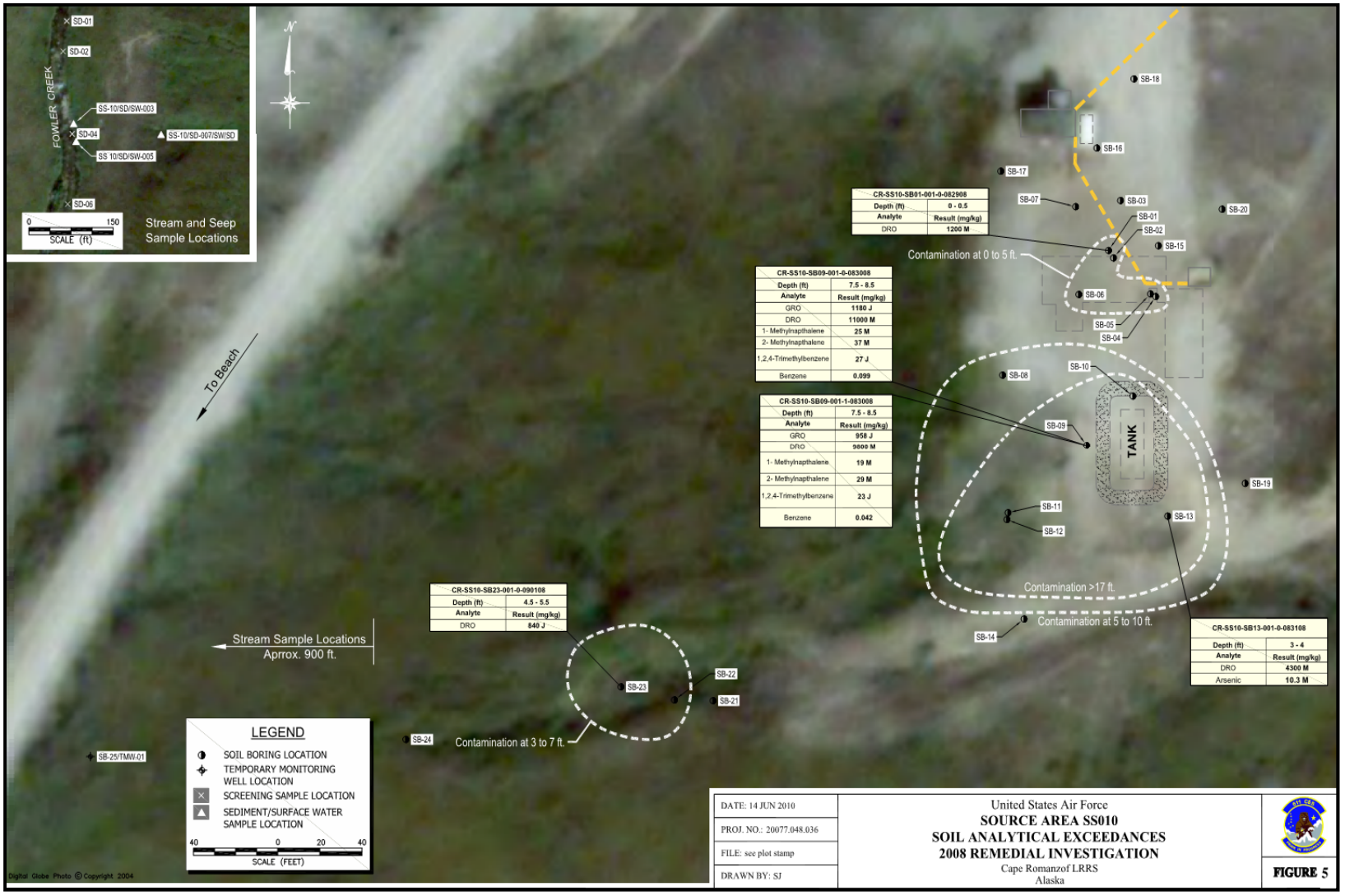


Figure 6: SS016 Soil Analytical Exceedances
2008 Remedial Investigation

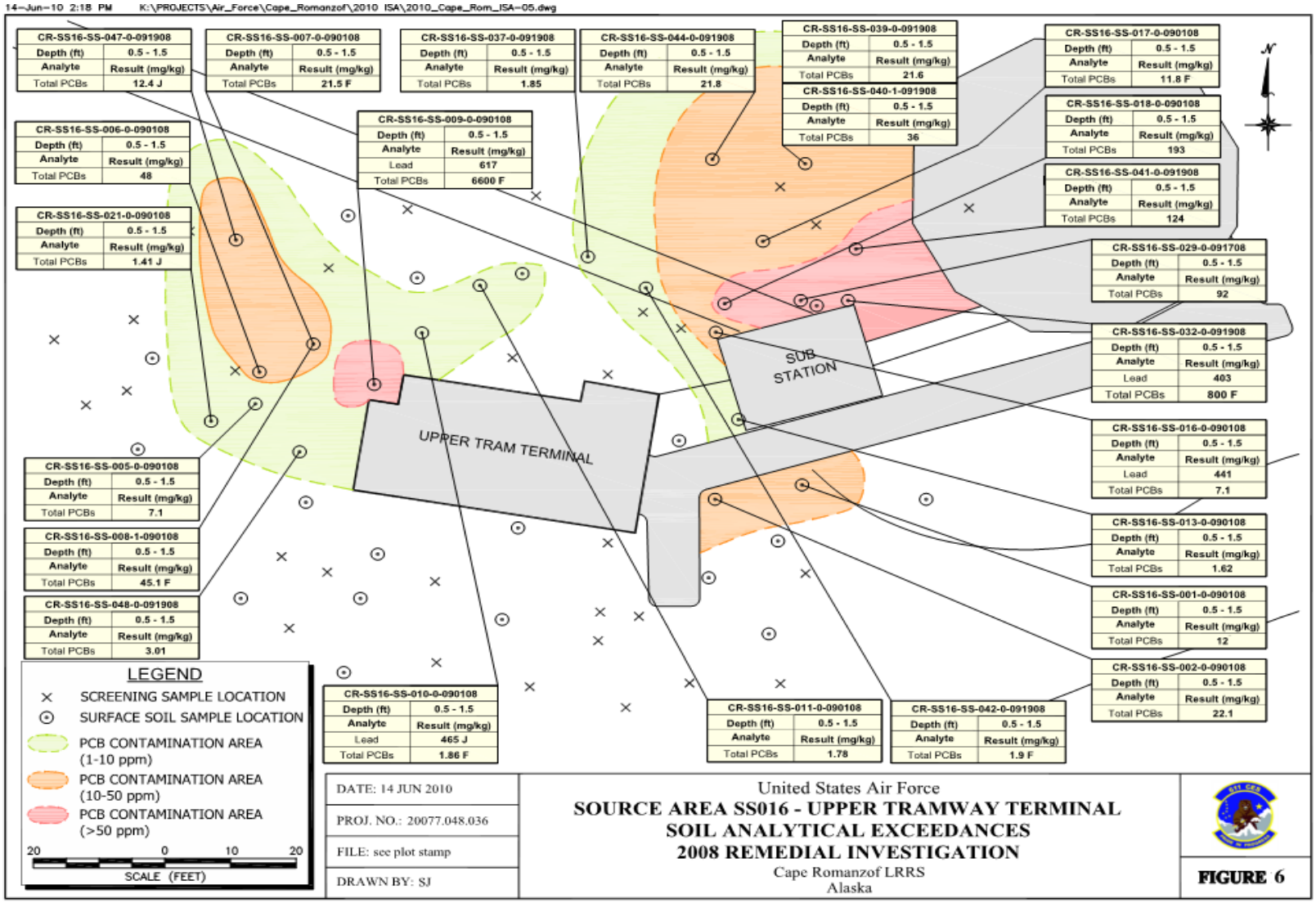
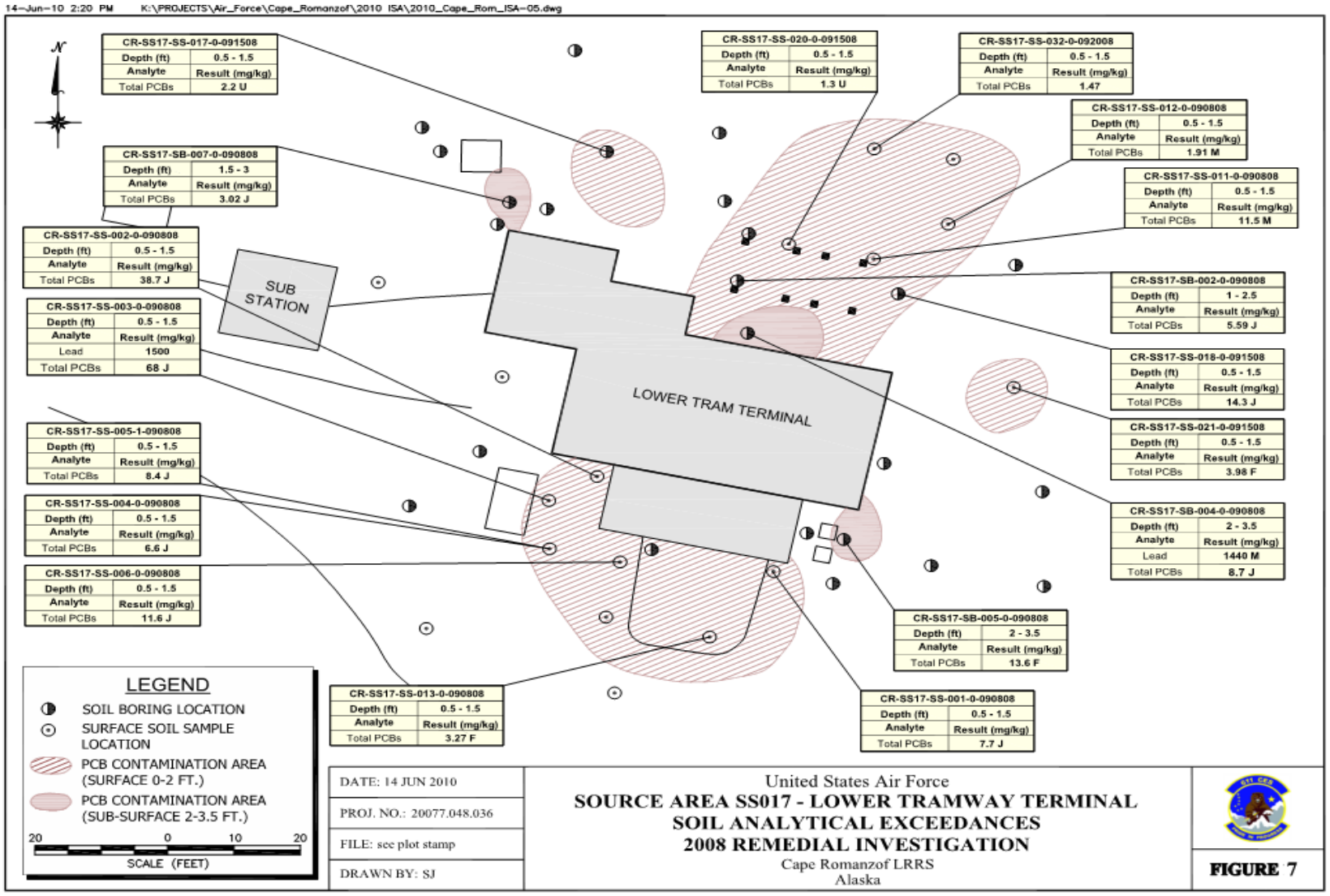


Figure 7: SS017 Soil Analytical Exceedances
2008 Remedial Investigation



EVALUATION CRITERIA FOR ALTERNATIVES ANALYSIS

The analysis of alternatives includes two steps: a detailed individual analysis in which each alternative is rated against evaluation criteria and a comparative analysis, in which the alternatives are compared against one another in relation to the criteria. This section describes the evaluation criteria used to analyze each alternative for each of the four ERP sites.

In accordance with the NCP, the remedial alternatives were evaluated against seven of the nine criteria described in Section 121(b) of CERCLA and the NCP §300.430(f)(5)(i), i.e., threshold criteria and balancing criteria, as described below. The final two criteria, modifying criteria, address public and state acceptance and are evaluated after completion of the public comment period for the Proposed Plan.

Threshold criteria are standards that an alternative must meet to be acceptable. The two threshold criteria are described below:

Overall protection of human health and the environment: Will the alter-native protect human health and plant and animal life?

Compliance with a*pplicable or relevant and appropriate requirements* (*ARARs*): Does the alternative meet all pertinent federal, state, and local environmental statutes, regulations, and requirements?

Balancing criteria weigh the tradeoffs between alternatives. These criteria represent the standards upon which a 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: How reliable is the alternative for protection in the long run? Does it permanently address risk?

Reduction of toxicity, mobility, and volume through treatment: Does the alternative use treatment to reduce the amount and/or harmful effects of the contamination?

Short-term effectiveness: How soon will risks be reduced? Are there short-term hazards that could occur during the cleanup?

Implementability: Is the alternative technically and administratively feasible?

Cost: How much does it cost to implement the alternative?

Modifying criteria evaluate public acceptance and can therefore only be fully considered after public comment is received on the Proposed Plan. In the final analysis, modifying criteria and balancing criteria are of equal importance. The final two criteria are considered modifying criteria:

Community acceptance: Do residents of the community accept the alternative? What comments are offered during the comment period?

State acceptance: Does ADEC agree with the alternative?

ERP SITE ALTERNATIVES - DESCRIPTION AND ANALYSIS

The following subsections describe and evaluate each of the selected alternatives for each of the four ERP Sites individually against the evaluation criteria, including cost.

LANDFILL NO. 2 (LF003)

Cleanup Levels

The relevant cleanup levels and complete exposure pathways for ***contaminants of concern (COCs)*** identified at LF003 during the 2008 RI are presented in Table 3 below. These COCs and affected media are the focus of the remedial action at this ERP Site.

Table 3: LF003 Contaminants of Concern and Cleanup Levels

Area	Media	Estimated Volume	ARAR[1, 2]	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 75.341	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 (Eroded Soil)	20 CY	18 AAC 75.341	PCBs	1 mg/kg	230 mg/kg	Dermal absorption; ingestion
Near Historical Location SS-18	Surface Water	Not Determined	18 AAC 70 ADEC Surface Water Cleanup Levels	PCBs	0.0005 mg/L	0.014 mg/L	Dermal absorption; ingestion of wild foods

Notes:
[1] 18 AAC 75 Method Two Soil Cleanup Levels, Tables B1 and B2 Under 40-Inch Zone; as amended through September 24, 2009 (18 AAC 75.341).
[2] 18 AAC 70 ADEC Water Quality Standards, as amended through May 26, 2011).

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	mg/L	milligrams per liter
COC	contaminant of concern	PCB	polychlorinated biphenyls

Cleanup Objective at LF003

The cleanup objective for ERP Site LF003 is to protect human health and the environment by:

- Removing surface soil and sediment contaminated with ≥1 milligram per kilogram (mg/kg) PCBs currently present and any that may potentially migrate from the landfill in the future.

Alternatives for Surface Soil at LF003

The following remedial alternatives were developed to address LF003 PCB contaminated surface soil:

- LF03SS1 – No Action;
- LF03SS2 – Institutional Controls, Engineering Controls, and Containment
- LF03SS3 - PCB Soil (≥10 mg/kg): Excavation and Off-Site Disposal; PCB Soil (≥1 mg/kg 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 - Excavation of Entire Landfill (Debris and Soil Removal) and Off-Site Disposal

These alternatives are summarized below:

LF03SS1: No Action

Evaluation of the No Action alternative is required by CERCLA as a baseline to reflect current conditions without remediation. This alternative does not include any treatment, containment, or monitoring.

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 at the location where surface soil is located at concentrations above cleanup levels. 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.

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

In accordance with ADEC regulations, soils with PCB concentrations ≥10 mg/kg would need to be removed, and remaining impacted soils would require a cap and institutional controls (notice of contamination placed on property records and warning signs at the site). 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:

(1) Surface soil at LF003 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.

(2) 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 migration 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 off-site migration of runoff 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.

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 would be excavated and treated on-site using high temperature incineration to destroy the PCBs. The treated soil would be monitored (i.e., sampled and analyzed) to confirm the technology is working. When the samples reached the cleanup level, the soil would be disposed of on-site. Soil from a local borrow source would be used to backfill the excavation.

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

In this alternative, surface soil where PCBs are present above one mg/kg (above cleanup levels protective of human health and the environment), would be excavated and disposed of off-site at a landfill permitted to accept PCB-contaminated soil. The soil would be excavated, loaded onto barges, and shipped to a commercially operated landfill in Oregon 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.

This alternative is preferred over the other soil alternatives for LF003 because it eliminates unacceptable risk from PCBs present without the need for Institutional Controls when complete. Other alternatives either require Institutional Controls be put in place after completion or require costly and potentially hazardous treatment technologies.

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.

Alternatives for Sediment at LF003

The following remedial alternatives were developed to address LF003 PCB contaminated sediment:

- LF03SD1 - No Action
- LF03SD2 - Institutional Controls and Engineering Controls
- LF03SD3 - Excavation and Off-Site Disposal
- LF03SD4 - Excavation, Ex-Situ Treatment and On-Site Disposal

These alternatives are summarized below:

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 contaminated 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.

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. 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 offsite migration of contaminated sediments or runoff 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 would remain on site.

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

In this alternative, sediment within source area LF003, where PCBs are present above cleanup levels protective of human health and the environment, would be excavated and disposed off-site at a landfill permitted to accept PCB-contaminated wastes. The sediment would be excavated, properly containerized, loaded onto barges, and shipped to a commercially operated landfill in Oregon 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 offsite 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 potentially 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 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 sediments may be present at the sediment control barriers.

Over time, it is expected that as PCBs continue to migrate from the source area, the concentrations found in the sediment will decrease as the source concentrations decrease. When PCB concentrations in sediments 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.

This is the preferred alternative for PCB contaminated sediment at LF003 because it is most effective at eliminating risk to human health and the environment and provides

effective management of potential risk posed by potential future contaminant migration from source material. Other alternatives do not provide for removal of contaminated sediment or require costly and potentially hazardous treatment technologies on site.

LF03SD4: Excavation, Ex-Situ Treatment and On-Site Disposal

In this alternative, sediment contaminated with PCBs above cleanup levels 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 runoff 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 above, 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.

Results of the Alternatives Analysis for LF003

The results of the evaluation of LF003 surface soil and sediment alternatives are summarized in Table 4. Each alternative was rated pass or fail for the threshold criteria and balancing criteria were rated whether the alternative was highly effective "H"/fully meeting the criteria, moderately effective "M"/partially meeting the criteria, or ineffective "I"/not meeting the criteria. Preferred Alternatives are highlighted in bold text.

Table 4: LF003 Alternatives Evaluation Criteria Rating Summary

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 (C=Capital Costs O= O&M Costs T=Total Present Value)
Surface Soil Alternatives							
LF03SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
LF03SS2 – Institutional Controls, Engineering Controls, and Containment	PASS	PASS	M	I	H	H	C = $723,212 O = $468,575 **T = $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	C = $860,236 O = $468,573 **T = $1,328,809**
LF03SS4 – PCB Soil (≥1 mg/kg): Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	H	M	C = $1,867,601 O = $26,639 **T = $1,894,240**
LF03SS5 – PCB Soil (≥1 mg/kg): Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	C = $798,630 O = $26,639 **T = $816,269**
LF03SS6 – Excavation of Entire Landfill (debris and soil removal) and Off-Site Disposal	PASS	PASS	H	I	M	M	C = $40,551,246 O = $26,639 **T = $40,577,885**
Sediment Alternatives							
LF03SD1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
LF03SD2 – Institutional Controls and Engineering Controls	FAIL	FAIL	M	I	M	H	C = $149,082 O = $506,064 **T = $655,146**
LF03SD3 – Excavation and Off-Site Disposal	PASS	PASS	M	I	H	M	C = $796,694 O = $275,322 **T = $1,072,016**
LF03SD4 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	M	M	H	M	C = $1,853,258 O = $275,322 **T = $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
mg/kg	milligrams per kilogram
NA	not applicable
PCB	polychlorinated biphenyl
TPV	total present value

SPILL/LEAK NO. 4 AT THE WEATHER STATION BUILDING (SS010)

Cleanup Levels

The relevant cleanup levels and complete exposure pathways for COCs identified at SS010 during the 2008 RI are presented in Table 5 below. These COCs and affected media are the focus of the remedial action at this ERP Site.

Table 5: SS010 Contaminants of Concern and Cleanup Levels

Area	Media	Estimated Volume	Compliance with Regulations[1,2]	COC	Cleanup Level	Maximum Concen-tration	Complete Exposure Pathways
Near Tank No. 11 (7-17 feet bgs)	Subsurface Soil	3,518 CY	18 AAC 75.341	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 (NA)	18 AAC 75.345	Fuel (possibly GRO, DRO, or RRO)	See Note No. 2 below	No quantitative data available	None

Notes:

[1] 18 AAC 75 Method Two Soil Cleanup Levels, Tables B1 and B2 Under 40-Inch Zone; as amended through 2009 (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
bgs	below ground surface
COC	contaminant of concern
CY	cubic yards
DRO	diesel range organics
GRO	gasoline range organics
mg/kg	milligrams per kilogram
NA	not applicable
RRO	residual range organics

Cleanup Objectives

The cleanup objectives for ERP Site SS010 are to protect human health and the environment by:

- Preventing exposure of human and environmental receptors to subsurface soil contaminated with DRO at concentrations exceeding 10,250 mg/kg.
- Preventing exposure of human and environmental receptors to groundwater contaminated with DRO at concentrations exceeding 1.5 mg/L and preventing migration of contaminated groundwater to surface water that causes a visible sheen on the surface of the water, imparts an odor or taste to the water or results in a TAH concentration exceeding 10 µg/L or TAqH concentration exceeding 15 µg/L.

Alternatives for Subsurface Soil at SS010

The following remedial alternatives were developed to address DRO contamination in subsurface soil:

- SS10SB1 – No Action
- SS10SB2 – Institutional Controls and Engineering Controls
- SS10SB3 – Institutional Controls, Engineering Controls, In-Situ Treatment, and LTM
- SS10SB4 – Excavation, Ex-Situ Treatment and On-Site Disposal
- SS10SB5 – Excavation and Off-Site Disposal

These alternatives are summarized below:

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 surface soil at Source Area SS010. 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.

SS10SB2: Institutional Controls and Engineering Controls – *Preferred Alternative*

In this alternative a notice would be placed on the property records to notify current and potential owners of the presence of contaminants. 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 contamination has degraded to below cleanup levels. Future analysis of subsurface soil would likely be required for site closure.

Monitoring wells would be installed at the site to assess the condition of the groundwater beneath the contaminated subsurface soil. The ultimate goal is to prevent any groundwater contamination from migrating to surface water (Fowler/Nilamut Creek). Three GW monitoring wells would be installed and sampled for fuel constituents. If groundwater contamination is found, risk to human health and the environment will be assessed and further remedial actions may be necessary.

This is the preferred alternative because exposure risk to subsurface soil is low and contaminant concentrations are currently close to meeting cleanup levels. In-situ treatment would be significantly more costly and may not be effective due to site geology.

SS10SB3: Institutional Controls, Engineering Controls, In-Situ Treatment, and LTM

In this alternative, surface 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. Additionally, signs would be erected at the location 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 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.

Soil sample collection and analysis (LTM) would occur periodically to ensure effectiveness of the treatment. Periodic site inspections would be performed to check the condition of the signs; maintenance would be completed as needed.

Monitoring wells would be installed at the site to assess the condition of the groundwater beneath the contaminated subsurface soil. The ultimate goal is to prevent any groundwater contamination from migrating to surface water (Fowler/Nilamut Creek). Three GW monitoring wells would be installed and sampled for fuel constituents. If groundwater contamination is found, 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 18 AAC 75.345 Groundwater Cleanup Levels, but groundwater contamination does not pose an unacceptable risk to surface water quality in 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/Nilamut Creek (down-gradient of the site) would be monitored to ensure that contamination does not reach this water body.

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 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 of on-site.

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.

Alternatives for Groundwater at SS010

The following remedial alternatives were developed to address potential fuels (DRO, GRO, or RRO) contamination in groundwater at SS010:

- SS10GW1 – No Action
- SS10GW2 – Institutional Controls, Engineering Controls, Natural Attenuation and LTM
- SS10GW3 - Institutional Controls, Engineering Controls, In-Situ Treatment, and LTM
- SS10GW4 – Ex-Situ Treatment And On-Site Disposal

These alternatives are summarized below:

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 the source area SS010. Contaminated groundwater would remain in place and be left to naturally degrade with no enhancements or follow-up monitoring.

SS10GW2: Institutional Controls, Engineering Controls, Natural Attenuation and LTM – *Preferred Alternative*

In this alternative, signs would be erected at locations where groundwater is suspected to be contaminated at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated groundwater is present and that intrusive activities should be avoided. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Potentially contaminated groundwater would remain on site under this alternative. However, over time, natural degradation (attenuation) of the contaminants is expected to occur and LTM will provide the data necessary to determine when the contamination is below cleanup levels. When ground-water meets cleanup levels, the institutional and engineering controls would be removed.

Three monitoring wells would be installed; one at the source area and two downgradient of the contaminated subsurface soil so that ground-water could be sampled and analyzed to check if contamination migrates from the site. The subsurface soil is suspected to be the potential source of any contamination in area ground-water. 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 18 AAC 75.345 Groundwater 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. When contaminant concentrations were below 18 AAC 75.345 Groundwater Cleanup Levels monitoring would be ceased and signs would be removed. Additionally, the seeps and sediments adjacent to Fowler Creek (down-gradient of the site) would be monitored to ensure that contamination does not reach this water body.

The condition of the signs would be assessed during LTM activities, and maintenance would be completed as needed. This is the preferred alternative for potentially contaminated groundwater at SS010 because it is cost effective and provides for protection of human health and the environment. Other alternatives are more costly and require treatment technologies that may be extremely difficult to implement at the site and require long term maintenance and operation.

SS10GW3: Institutional Controls, Engineering Controls, In-Situ Treatment, and LTM

In this alternative, signs would be erected at the location where groundwater is located at concentrations above cleanup levels protective of human health and the environment. The signs would warn that contaminated ground-water is present and that intrusive activities should be avoided. A notice would be placed on the property records to notify current and potential owners of the presence of contami-nants. Restrictive covenants may also be conveyed that prevent certain kinds of activities at these locations.

In this alternative, groundwater within source area SS010 with contaminants above cleanup levels would be treated in-situ using bioremedi-iation. The enhanced bioremediation process would include the injection of a chemical oxygen releaser directly into contaminated groundwater. The oxygen releaser would pro-vide 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. This in-situ treatment method was selected because it is likely to be effective and poses a lower risk to workers, site visitors, and the environment than

other in-situ methods such as chemical oxidation. Confirmation monitoring (LTM) would be performed at the site to assess changes in groundwater contaminant concentrations over time. Additionally, the condition of the signs would be assessed and maintenance would be completed as needed.

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.

Results of the Alternatives Analysis for SS010

Evaluation results are summarized in Table 6. Each alternative were rated pass or fail for the threshold criteria and balancing criteria were rated whether the alternative was highly effective / fully meeting the criteria, moderately effective / partially meeting the criteria or ineffective / does not meet the criteria. Preferred alternatives are highlighted in bold text.

Table 6: SS010 Alternatives Evaluation Criteria Rating Summary

Alternative	Overall protection of human health and the environment	Compliance with Regulations	Long-term effectiveness and permanence	Reduction of toxicity, mobility, or volume through treatment	Short-term effectiveness	Implementability	Cost (C=Capital Costs O= O&M Costs T=Total Present Value)
Subsurface Soil Alternatives							
SS10SB1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS10SB2 – Institutional Controls and Engineering Controls	PASS	PASS	M	I	M	H	C = $172,136 O = $502035 **T = $674,171**
SS10SB3 – Institutional Controls, Engineering Controls, In-Situ Treatment and LTM	PASS	PASS	H	H	M	M	C = $982,110 O = $751,346 **T = $1,733,456**
SS10SB4 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	H	C = $889,826 O = $26,639 **T = $916,465**
SS10SB5 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	C = $13,034,984 O = $26,639 **T = $13,061,623**
Groundwater Alternatives							
SS10GW1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS10GW2 – Institutional Controls, Engineering Controls, Natural Attenuation, and LTM	PASS	PASS	M	I	M	M	C = $434,645 O = $607,095 **T = $1,041,740**
SS10GW3 – Institutional Controls, Engineering Controls, In-Situ Treatment and LTM	PASS	PASS	M	M	M	M	C = $1,083,763 O = $500,461 **T = $1,584,224**
SS10GW4 – Ex-Situ Treatment and On-Site Disposal	PASS	PASS	M	M	H	M	C = $515,074 O = $861,651 **T = $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
LTM	long-term monitoring
NA	not applicable
TPV	total present value

UPPER TRAM TERMINAL AREA (SS016) AND LOWER TRAM TERMINAL AREA (SS017)

Cleanup Levels for SS016 and SS017

Based on the 2008 RI the COCs identified at SS016 and SS017 relevant cleanup levels and complete exposure pathways are located in Table 7. These COCs and affected media are the focus of the remedial action at this ERP Site.

Cleanup Objectives

The cleanup objectives for Site SS016 are to protect human health and the environment by:

- Removing surface soil contaminated with ≥1 milligram per kilogram (mg/kg) PCBs.

The cleanup objective for Site SS017 is to protect human health and the environment by:

- Removing surface and subsurface soil contaminated with ≥1 milligram per kilogram (mg/kg) PCBs.
- Removing surface and subsurface soil contaminated with ≥400 milligram per kilogram (mg/kg) lead.

Alternatives for Surface Soil at SS016

The following remedial alternatives were developed to address SS016 PCB and Lead contamination in surface soil.

- SS16SS1 – No Action
- SS16SS2 – Institutional Controls, Engineering Controls; and Containment
- SS16SS3 – PCB Soil Hot Spot (≥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
- SS16SS4: PCB Soil ≥1 mg/kg Excavation, to the extent feasible, and Off-Site Disposal

These alternatives are summarized below:

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 unrestricted 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 the facility to assess site conditions over time.

SS16SS2: Institutional Controls, Engineering Controls, and Containment

In this alternative, a gravel cap would be placed over surface soil contaminated with PCBs at concentrations above cleanup levels protective of human health and the environment (≥1 mg/kg for unrestricted land use). Given the steep, boulder-covered exposed slope at this site, the only 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. 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. 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.

Table 7: SS016 and SS017 Contaminants of Concern and Cleanup Levels

Area	Media	Estimated Volume (CY]	ARAR[1,2]	COC	Cleanup Level	Maximum Concentration	Complete Exposure Pathways
SS016							
Three areas: 1) South of facility, 2) Tram docking area, and 3) Elevated walkway	Surface Soil	1) 18, 2) 133, and 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 sampling areas: SS-009, SS-010, SS-016, and SS-032	Surface Soil	Not determined	18 AAC 75 Method Two Cleanup Levels	Lead	400/800[3] mg/kg	617 mg/kg	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
SS017							
Four areas: 1) Tram docking area (near SS-020), 2) elevated access ramp (near SS-013), 3) SS-021, and 4) SS-017	Surface Soil	1) 94, 2) 69, and 3) 5.5, and 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	400/800[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, and 3) SB-007	Subsur-face Soil	1) 5.5, 2) 3.6, and 3) 3.1 CY 11.7 CY total	18 AAC 75 Method Two Cleanup Levels	PCBs	1 mg/kg	13.6	Dermal absorption; ingestion; inhalation of airborne suspended particles; ingestion of wild foods
SB-004	Subsur-face Soil	Not determined	18 AAC 75 Method Two Cleanup Levels	Lead	400/800[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, Tables B1 and B2 Under 40-Inch Zone, as amended through September 24, 2009 (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.

AAC Alaska Administrative Code
ARAR applicable or relevant and appropriate requirement
CY cubic yards
COC contaminant of concern
mg/kg milligrams per kilogram
PCBs polychlorinated biphenyls

SS16SS3: PCB Soil Hot Spot (≥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

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 institutional controls. 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 (refer to **Figure 6**) are located within these hot spots, and would be excavated along with the PCB soil. This excavated soil would then be treated ex-situ with 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 (refer to **Figure 6**) 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 runoff 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. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Restrictive covenants may also be conveyed that prevent certain kinds of activities at these locations. Periodic site inspections would be performed to check the condition of the signs; maintenance would be completed as needed.

SS16SS4: PCB Soil ≥1 mg/kg Excavation, to the extent feasible, and Off-Site Disposal – *Preferred Alternative*

In this alternative, surface soil, where PCB concentrations exceed one mg/kg, would be excavated, loaded onto barges, and shipped to a commercially operated landfill in Oregon (that accepts 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 (refer to **Figure 6**) are located within the PCB contaminated areas, and would be excavated with the PCB contaminated soil. Confirmation sampling would include analysis for lead to confirm that all soil with 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 of, 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, it may not be possible to remove all PCB soil ≥1 mg/kg due to safety and logistics. 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 installed. Periodic maintenance of the signs and cap would be performed as long as soil concentrations remain above one mg/kg. The cost increase for this alternative for cap and IC installation and maintenance for 30 years would be approximately $409,643.

This is the preferred alternative for PCB contaminated soil at SS016 because it eliminates risks to human health and the environment posed by PCB and lead contaminated soil. Other alternatives do not eliminate risk completely or require costly and potentially hazardous treatment methods.

Alternatives for Surface Soil at SS017

The following remedial alternatives were developed to address PCB and lead contamination in surface soil at SS017:

- 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

These alternatives are summarized below:

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.

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 offsite migration of runoff water that may contain contaminated sediment. 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. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Restrictive covenants may also be conveyed that prevent certain kinds of activities at these locations. 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.

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 would be used to backfill the excavation.

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

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, loaded onto barges, and shipped to a commercially operated landfill in Oregon 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.

This is the preferred alternative for PCB contaminated surface soil at SS017 because it completely eliminates risks to human health and the environment posed by PCB and lead contaminated soil. Other alternatives do not eliminate risk completely or require costly and potentially hazardous treatment methods.

Alternatives for Subsurface Soil at SS017

The following remedial alternatives were developed to address PCB and lead contamination in subsurface soil at SS017:

- SS17SB1 – No Action
- SS17SB2 – Institutional Controls and Engineering Controls
- SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal
- SS17SB4 – Excavation and Off-Site Disposal

These alternatives are summarized below:

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 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.

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. A notice would be placed on the property records to notify current and potential owners of the presence of contaminants. Restrictive covenants may also be conveyed that prevent certain kinds of activities at these locations.

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

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 would be used to backfill the excavation.

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

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, loaded onto barges, and shipped to a commercially operated landfill in Oregon for disposal. Confirmation sampling following the excavation and disposal would document the effectiveness of the remedy.

This is the preferred alternative for PCB contaminated subsurface soil at SS017 because it completely eliminates risks to human health and the environment posed by PCB and lead contaminated soil. Other alternatives do not eliminate risk completely or require costly and potentially hazardous treatment methods.

Results of the Alternatives Analysis for SS016 and SS017

Evaluation results are summarized for SS016 and SS017 in Table 8. Each alternative was rated pass or fail for the threshold criteria and balancing criteria were rated whether the alternative was highly effective / fully meeting the criteria, moderately effective / partially meeting the criteria or ineffective / does not meet the criteria. Preferred alternatives are highlighted in bold text.

Table 8: SS016 and SS017 Alternatives Evaluation Criteria Rating Summary

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 (C=Capital Costs O= O&M Costs T=Total Present Value)
SS016 Surface Soil Alternatives							
SS16SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS16SS2 – Institutional Controls, Engineering Controls, and Containment	PASS	PASS	M	I	M	H	C = $545,864 O = $482,311 **T = $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	C = $4,388,794 O = $468,572 **T = $4,857,366**
SS16SS4: PCB Soil ≥1 mg/kg Excavation, to the Extent Feasible, and Off-Site Disposal	PASS	PASS	M	I	M	M	C = $769,104 O = $26,639 **T = $795,743**
SS017 Surface Soil Alternatives							
SS17SS1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS17SS2 – Institutional Controls, Engineering Controls and Containment	PASS	PASS	M	I	H	H	C = $417,599 O = $482,311 **T = $899,910**
SS17SS3 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	M	C = $4,224,595 O = $26,639 **T = $4,251,234**
SS17SS4 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	C = $673,229 O = $26,639 **T = $699,868**
SS017 Subsurface Soil Alternatives							
SS17SB1 – No Action	FAIL	FAIL	NA	NA	NA	NA	NA
SS17SB2 – Institutional Controls and Engineering Controls	PASS	PASS	M	I	M	H	C = $113,279 O = $476,173 **T = $589,452**
SS17SB3 – Excavation, Ex-Situ Treatment and On-Site Disposal	PASS	PASS	H	H	M	M	C = $4,218,375 O = $26,639 **T = $4,245,013**
SS17SB4 – Excavation and Off-Site Disposal	PASS	PASS	H	I	H	H	C = $212,489 O = $26,639 **T = $239,127**

Notes:

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

INSTITUTIONAL CONTROLS

USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with ADEC's contaminated site regulations. The purpose of the ICs is to help prevent inappropriate handling of groundwater contaminated above ADEC Table C groundwater cleanup levels at SS010 and help prevent the future handling of surface soil or sediment contaminated above ADEC Method Two cleanup levels at LF003 and SS016 in ways that are inconsistent with ADEC's contaminated site regulations.

The specific ICs proposed for ERP Sites LF003, SS010, and SS016 are listed below:

- At LF003, SS010, and potentially SS016, the presence of contaminated soil above levels allowing unrestricted use will be documented. Any excavation within these areas must include procedures to screen any excavated soils and provide for soil remediation contingency scenarios. Any contaminated ground-water that is encountered (i.e. dewatering for construction within an area of groundwater contamination) will be managed properly.
- At LF003, SS010, and potentially SS016, future land use will be restricted to commercial/ industrial land use.
- At SS010, the installation of water supply wells will be prohibited within the site boundaries as long as the aquifer fails ADEC Table C groundwater cleanup levels protective of drinking water.

USAF proposes to implement the ICs by taking the following actions:

- Delineate the boundaries of Sites LF003, SS010, and potentially SS016 to obtain a property description suitable for recording purposes.
- 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 Alaska Department of Natural Resources land records. As part of the update to the Base Master Plan, the USAF will produce maps showing locations of residual contamination for LF03, SS010, SS016, and will provide these maps to ADEC. At Site SS010, delineate groundwater with DRO, GRO, or RRO above ADEC Table C groundwater cleanup levels to obtain a property description suitable for recording purposes.

Use USAF's dig permit and construction review system or similar system developed by the *Base Operation Support* (***BOS***) contractor to restrict incompatible activities from Sites LF003 and SS016.

- Document the ICs in USAF's Real Property records and in the ROD for LF003, SS010, SS016, and SS017 (which will be available in the Administrative Record). The Real Property records will contain a map indicating IC locations. Appropriate notice will be filed with the U.S. Fish and Wildlife Service.

Notify ADEC prior to making any changes to the ICs. The ICs will be reviewed within a five year period and at least once every five years thereafter to ensure that land use has not changed and ICs remain effective in limiting public access due to the remaining presence of contamination in soil and groundwater that does not allow for unlimited use and unrestricted exposure. The 611th Civil Engineer Squadron/Civil Engineer (CES/CE) is the point of contact for the ICs.

FIVE-YEAR REVIEW REQUIREMENTS

The National Contingency Plan (NCP) (40 CFR 300.430(f)(4)(ii)) states:

> "If a remedial action results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE), such remedial action shall be reviewed no less often than every five years after initiation of the selected remedial action."

The purpose of the Five-Year Review is to assess the remedy's performance and whether the remedy is, or is expected to be, protective of human health and the environment. These reviews need not be separate five year review documents for each source area at Cape Romanzof LRRS where a remedial action was selected which does not allow for UU/UE. Typically the requirement for five year reviews begins with the first remedial action that (based on when the Record of Decision was signed) leaves hazardous substances on the site at levels that do not allow for unlimited use and unrestricted exposure.

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. In cases where there are multiple remedial actions, the earliest remedial action that leaves such substances on site should trigger the initial review, even if it is an interim remedial action.

PUBLIC PARTICIPATION REQUEST

USAF would like community members to review and comment on the recommendations in this Proposed Plan. The final decision for the sites will be made after the end of the 30-day comment period (July 18 to August 17, 2012).

After consideration of comments, USAF will document the decision for each site in a ROD.

All comments received by the USAF will be summarized in the Responsiveness Summary section of the ROD.

You can send comments in writing or by email. If a public meeting is held, comments may also be presented at the public meeting.

For your convenience, a pre-addressed comment form has been included at the end of this publication.

If you have questions or wish to provide comments on this project, please contact one of the following people:

Mr. Tommie Baker, USAF Community Relations, at (800) 222-4137 or
Email: tommie.baker@us.af.mil

Mr. Keith Barnack, USAF Project Manager, at (907) 552-5160 or
Email: keith.barnack@us.af.mil

If You Would Like More Information About This Project:

Copies of the documents relied upon for the restoration of Cape Romanzof LRRS are stored in the ***Administrative Record*** located at Elmendorf Air Force Base.

The Administrative Record is available on the internet at **www.adminrec.com**. Alternatively, access to the Administrative Record is available by appointment. Contact Tommie Baker, USAF Community Involvement Coordinator, at (907) 552-4506 or (800) 222-4137 to make an appointment.

For an electronic copy of this proposed plan, go to:

http://dec.alaska.gov/spar/csp/list.htm#Western

http://dec.alaska.gov/spar/csp/federal.htm#ci

Detailed descriptions of site conditions can be found in the 2009 **Remedial Investigation and 2011 Feasibility Study Report for LF003, SS010, SS016 and SS017**, available in the Administrative Record.

GLOSSARY OF TERMS

ACWS – Aircraft Control and Warning System

Administrative Record – A file that contains information used by the USAF to decide on the cleanup for an ERP site. This file is available for public review.

Alaska Department of Environmental Conservation (ADEC) – the lead regulatory agency for Cape Romanzof LRRS.

Applicable or relevant and appropriate requirements (ARARs) - The Federal and State environmental laws that a selected remedy will meet. These requirements may vary among sites and alternatives.

AST – above-ground storage tank.

bgs – below ground surface.

benzene – A colorless, volatile, inflammable, carcinogenic liquid (C_6H_6) used in a variety of chemical products, including motor fuel. Compounds containing benzene are called aromatic compounds.

BOS – Base Operation Support

BTEX – Benzene, toluene, ethylbenzene, and xylenes. Volatile organic chemicals (aromatic compounds) that are constituents of petroleum products.

CERCLA – Comprehensive Environmental Restoration, Compensation and Liability Act

cleanup level – The concentration of a hazardous substance that may be present within a specified medium (i.e., soil, groundwater, or surface water) without posing an unacceptable risk to human health, safety, welfare, or the environment. ADEC provides tabulated cleanup levels in 18 AAC 75 that are applicable to contaminated soil and groundwater sites in Alaska.

COC – contaminant of concern. A COC is a chemical that exists at a concentration that potentially poses an unacceptable risk to human health and/or the environment. The concentration at which a chemical poses an unacceptable risk depends on many factors, including toxicity and the frequency or chance that an individual may become exposed to the chemical. Therefore, the location and size of a contaminated area affects the potential risk.

diesel range organics (DRO) – A mixture of organic compounds found in diesel fuel, jet fuel, and heating oil. Polynuclear aromatic hydrocarbons (PAHs), such as naphthalene, are included in this range. DRO are generally less volatile and less soluble than GRO.

EPA – United States Environmental Protection Agency.

Environmental Restoration Program (ERP) - The Air Force Environmental Restoration Program (AFI 32-7020) focuses on identifying and cleaning up hazardous waste sites that were contaminated prior to 1984. Federal and state regulations, as well as legal agreements with federal and state regulators drive specific cleanup requirements and schedules.

ex-situ treatment - Ex-situ treatments are remediation options where the affected medium (soil, water) is removed from its original location and cleaned on-site or off-site.

Feasibility Study (FS) – An evaluation of potentially applicable remediation goals and remedial actions to address contamination at a site.

gasoline range organics (GRO) – A mixture of organic compounds found in gasoline.

hazardous substance - A chemical that presents an imminent and substantial danger to the public health or welfare if it is released to the atmosphere, surface water, groundwater, or land surface. Regulatory definitions can be found in CERCLA § 101(14) and 102 and in the NCP40 CFR § 300.5, and in Alaska Statute (AS) 46.03.826 and AS 46.09.900. Petroleum hydrocarbons are specifically excluded from the CERCLA definition but included in the Alaska Statute definition.

in-situ treatment - in-place treatment. Typically, in-situ treatment can be expensive but becomes more cost effective when large amounts of contamination are present or would be difficult to remove.

Installation Restoration Program (IRP) – primarily addresses sites impacted by hazardous substances. These sites are similar sites across the country contaminated from past practices at industrial and commercial areas, such as municipal landfills and factories.

institutional controls (ICs) –Any type of physical, legal, or administrative mechanism to restrict the use of, or limit access to, real property to prevent exposure to contaminants above permissible levels.

The intent of the controls is to protect human health, the environment, and the integrity of an engineering remedy by limiting the activities that may occur at a

particular site. Common examples of *ICs* include physical barriers to a site (e.g., fences and signs) and land use restrictions (e.g., restricting the installation of drinking water wells).

LRRS – Long-Range Radar Site

MARS – Minimally Attended Radar Station

milligram per kilogram (mg/kg) – A solid concentration measurement. One milligram of a substance in one kilogram of soil, which is also equal to a concentration of one ***ppm*** for that substance in soil (see definition for parts per million).

milligram per liter (mg/L) – A liquid concentration measurement. One milligram of a substance in one liter of water.

monitored natural attenuation (MNA) – An environmental cleanup strategy in which naturally occurring processes are allowed to clean up contaminants. Environmental sampling and possibly also modeling are used to monitor the cleanup process.

National Contingency Plan (NCP) – The regulations that provide the structure and procedures for responding to discharges of oil and hazardous substances, as directed by CERCLA.

parts per million (ppm) - A unit of measure used to express extremely low concentrations of chemicals in media such as soil or water. As an analogy, one ounce of a chemical in a million ounces of soil is one ppm and is also equivalent to one second of time in a period of 11-1/2 days. Equivalent units for one *ppm* can be expressed as one mg/Kg (soil).

PCBs (Polychlorinated Biphenyls) - A group of related carcinogenic compounds formally used in transformers.

polynuclear (or polycyclic) aromatic hydrocarbons (PAHs) – A class of very stable organic molecules made up of only carbon and hydrogen (benzene rings). They occur naturally in crude oil and refined products (such as diesel fuel) and also occur as products of incomplete combustion. Some PAHs are highly carcinogenic (e.g., benzo(a)pyrene).

Proposed Plan – A document required by section 117(a) of CERCLA that informs the public about alternatives that are considered for cleanup of a contaminated site and identifies a preferred cleanup alternative. The document encourages public comment on all alternatives.

Record of Decision (ROD) – As required by CERCLA section 117(b), a document of the final cleanup decision under the site cleanup rules. The ROD documents the rationale for selection of the cleanup remedy and establishes performance goals for achieving cleanup. A ROD issued by or for ADEC is similar to a USAF Decision Document or an EPA ROD, but its format may differ. The format for an ADEC ROD is specified in the ADEC *Guidance on Decision Documentation Under the Site Cleanup Rules* (July 1999).

Remedial Investigation (RI) - The RI is conducted to identify the types, amounts, and locations of contamination at a facility. It also evaluates possible risks to the public and environment from exposure to contamination.

Residual range organics (RRO) – heavy-range petroleum products such a lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C25 to the beginning of C36 and a boiling point range between approximately 400° C and 500° C (definition from 18AAC75.341).

Responsiveness Summary – A summary of oral and/or written public comments received during a comment period and the responses to those comments. The responsiveness summary is part of the decision document or ROD.

Remedial Investigation (RI) – An evaluation of site conditions (RI).

SVOCs – Semi-volatile organic chemicals

total petroleum hydrocarbons (TPH) -- In Alaska, use of TPH as a bulk hydrocarbon measurement became obsolete when the Alaska Methods for measuring ***DRO*** (AK Method 102), ***GRO*** (AK Method 101), and ***RRO*** (AK Method 103) were developed, and Alaska cleanup levels were established for DRO, GRO, and RRO.

USAF – United States Air Force

UST – underground storage tank

VOCs – volatile organic chemicals

White Alice Communications System (WACS) – Communications systems built throughout rural Alaska in the 1950s for military and civilian use. White Alice communications systems sent very large signals skyward, and a small fraction of the signal would bounce off the earth's atmosphere to be received by another White Alice site beyond the horizon. The White Alice sites were self-contained outposts that were staffed 24 hours a day, 365 days a year and typically contained dormitories, large

generators and associated fuel storage facilities, and airstrips, in addition to the communications equipment. The White Alice sites were gradually replaced by more efficient earth satellite systems; the last White Alice site was deactivated in 1985.

PUBLIC COMMENT FORM – SITES LF003, SS010, SS016, and SS017 AT CAPE ROMANZOF LRRS

USE THE SPACE BELOW TO WRITE YOUR COMMENTS

Your comments and suggestions in the Proposed Plan for Final Actions at Sites LF003, SS010, SS016, and SS017 at Cape Romanzof LRRS are important to USAF. Public input provides valuable information in making final restoration decisions for the environmental sites addressed.

Use the space below to provide us your comments. To return your comments, just fold in half with the return address showing, and tape shut (no staples please). Be sure to affix proper postage, and then drop in the mail. **The public review period ends August 17, 2012**. If you would like more information you may contact the USAF Community Coordinator, Mr. Tommie Baker, at (800) 222-4137.

Name _____

Address _____

City _____

State _____ Zip _____

PUBLIC MEETING ANNOUNCEMENT

If there is sufficient interest for a public meeting on this Proposed Plan and requested before August 17, 2012, an acceptable meeting date will be scheduled before September 17, 2012 and the comment period extended.

Name_____
Address_____
City_____
State_____ Zip_____

Post office will not deliver without a stamp (Please affix proper return postage)

MR. TOMMIE BAKER
611 CES/CEAR
10471 20TH STREET, SUITE 302
JOINT BASE ELMENDORF-RICHARDSON, AK 99506-2201