THIRD CERCLA FIVE-YEAR REVIEW AND THIRD NON-CERCLA PERIODIC REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

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Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

µg/L	micrograms per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AFCEC	Air Force Civil Engineer Center
AST	aboveground storage tank
AWQS	Alaska Water Quality Standards
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical or contaminant of concern
COPC	contaminant of potential concern
DRO	diesel-range organics
ECs	engineering controls
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences
FAA	Federal Aviation Administration
FS	Feasibility Study
FYR	Five-Year Review
GRO	gasoline-range organics
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
ICs	institutional controls
IRA	Interim Remedial Action
LRRS	Long-Range Radar Station
LTM	long-term monitoring
LUC	land use control
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
NEC	Notice of Environmental Contamination
NFRAP	No Further Response Action Planned
NOAA	National Oceanic and Atmospheric Administration
NWF	National Wildlife Refuge
PA	Preliminary Assessment
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PHCs	petroleum hydrocarbons
POL	petroleum, oil, and lubricant
PRG	Preliminary Remediation Goal
RAO	remedial action objective

LIST OF ABBREVIATIONS & ACRONYMS (continued)

RCRA	Resource Conservation & Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RRO	residual range organics
SI	Site Investigation
SQuiRTs	Screening Quick Reference Tables
Stantec	Stantec Consulting Services, Inc.
SVOCs	semivolatile organic compounds
TAH	total aromatic hydrocarbon
TAqH	total aqueous hydrocarbons
TCLP	toxicity characteristic leaching procedure
TEL	threshold effects level
TPH	total petroleum hydrocarbons
TSCA	Toxic Substances Control Act
USAF	U.S. Air Force
UCL	upper confidence limit
USFWS	U.S. Fish & Wildlife Service
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure
VOC	volatile organic compound

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) or Periodic Review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR or Periodic Review reports such as this one. In addition, FYR and Periodic Review reports identify issues found during the review, if any, and document recommendations to address them.

The United States Air Force (USAF) conducted a statutory FYR and a policy Periodic Review of environmental remedies at Cape Romanzof Long-Range Radar Station (LRRS), Alaska. This is the first FYR for Sites SS016 and SS017 and the third FYR for Site LF003. FYRs are required for these three sites because hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) are present at concentrations exceeding levels that allow for unlimited use and unrestricted exposure (UU/UE). The triggering action for this FYR is the July 2013 signature date on the prior FYR report for Site LF003.

This is the first Periodic Review for SS010; the second Periodic Review for Sites DP011, SS014, and ST009; and the third Periodic Review for Sites SS013 and SS015. A Periodic Review is performed per Department of Defense policy for sites where non-CERCLA contaminants regulated by the State are present at concentrations exceeding levels that allow for UU/UE. The triggering action for this Periodic Review is the July 2013 signature date on the prior Periodic Review report for Sites DP011, SS013, SS014, SS015, and ST009.

The status of Sites DP011, SS013, SS014, SS015, and ST009 in the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Database is "Cleanup Complete with Institutional Controls (ICs)" (ADEC, 2017a). Sites LF003, SS010, SS016, and SS017 are identified as "Active" in the ADEC Contaminated Sites Database (ADEC, 2017a). **Figure 1** provides an overview map of Cape Romanzof LRRS and illustrates the relative location of each site.

There are seven additional Environmental Restoration Program (ERP) sites at Cape Romanzof that are not included in this FYR and Periodic Review. Sites LF002, LF012, OT005, OT006, SS001, SS007, and SS008 are identified by ADEC as "Cleanup Complete" status (ADEC, 2017a). Sites identified as Cleanup Complete are not subject to FYRs or Periodic Reviews. The ADEC Contaminated Sites Database also lists LF004 as an ERP site with "Cleanup Complete with ICs" status. However, LF004, a permitted landfill (Permit Nos. 9021-BA012 and 9740-BA007-CR1), is not an ERP site and is managed by 611 CES Compliance (Mr. Richard Mauser, personal communication, 7 November 2018). Compliance sites are not evaluated in FYRs or Periodic Reviews.

This FYR and Periodic Review was led by Stantec Consulting Services, Inc. (Stantec) on behalf of the Air Force Civil Engineer Center (AFCEC) under Contract Number FA8903-16-D-0032, Task Order 0069. Participants included AFCEC, Stantec, United States Environmental Protection Agency (EPA), and ADEC staff with expertise in site investigation and remediation. The review began in August 2017. References cited in this report are provided in **Appendix A**, and figures are included at the end of the report.

Site Background

Cape Romanzof LRRS is located in the Yukon-Kuskokwim region at the western end of the Askinuk Mountains and on a small peninsula that extends into the Bering Sea (Figure 1). The LRRS is approximately 540 air miles west of Anchorage, 165 miles northwest of Bethel, and 170 miles southeast of Nome (USAF, 2013a). The USAF property at the installation encompasses about 4,900 acres of land situated within the boundaries of the Yukon-Kuskokwim Delta National Wildlife Refuge (NWF), a federally-protected habitat area (USAF, 2013a).

The nearest local communities are Scammon Bay (estimated population 498), and Hooper Bay (approximate population 1,137), which are located about 15 miles east and south of the installation, respectively (USAF, 2013a and 2013b). The communities are not connected to Cape Romanzof LRRS by roads; however, winter trails provide some access to the installation and surrounding NWF for recreational and subsistence hunting and fishing (USAF, 2013b).

The Cape Romanzof LRRS was one of the 10 original aircraft control and warning sites in the Alaska Air Defense System. Installation construction was completed in 1952 and operations began in 1953 (USAF, 2013a). The White Alice Communication Station, which replaced the original communication and warning system, became operational in 1958. By 1977, Cape Romanzof LRRS was operating as a Minimally Attended Radar Station (USAF, 2013a). The installation is operated by approximately six personnel, who reside at the LRRS year-round (USAF, 2013b).

The Cape Romanzof installation is comprised of two main areas: the Lower Camp, where the main camp facilities (i.e. housing, power plant, and bulk fuel storage area) are located, and the Upper Camp, where the LRRS equipment is located (USAF, 2013a). The Lower Camp lies at the head of a valley next to tundra fields and ephemeral streams, and the Upper Camp is situated at the top of Towak Mountain (elevation 2,250 feet above mean sea level). The two areas are connected by a gravel road and tramway service (USAF, 2013a). A 1-mile-long gravel runway serving the installation is located near the beach at Kokechik Bay.

A composite facility, consisting of two dome-type structures, was constructed at the Lower Camp in 1984 and provides working and living facilities for installation personnel and a small machine shop (USAF, 2013a and 2013b). A small building located at the end of the airstrip is used as a weather station (Building 4101). Almost all the original Cape Romanzof LRRS facilities, including 24 buildings, eight foundations, and antennas, were demolished in 1988 (USAF, 2013b). Non-hazardous debris was placed into a landfill at the LRRS (Site LF012), and hazardous materials were shipped off-base for disposal (USAF, 2013b). After demolition, the affected areas were covered with 2 to 3 feet of crushed rock (USAF, 2013b).

Past activities at Cape Romanzof LRRS, including spills and leaks of diesel fuel and motor gasoline from drums disposed in landfills or from petroleum, oil, and lubricant (POL) tanks or pipes, resulted in the release of contaminants into the environment. Environmental investigations were initiated in 1989 in order to determine whether contaminants associated with past installation activities posed an unacceptable level of risk (USAF, 2013a).

Sites LF003, SS016, and SS017 are the only sites included in this FYR where CERCLA hazardous substances pose an unacceptable risk to human health and/or the environment (USAF, 2013a). Fuel contamination is the primary environmental concern at Sites DP011, SS010, SS013, SS014, SS015, and ST009 (USAF, 2013a). The following sections provide more detailed background information on the sites that are the subject of this FYR and Periodic Review.

Site DP011

Site DP011, the Upper Camp Debris Area, is located in the valley east of Towak Mountain and includes two glacially-carved bowls (cirques) that drain into Ekashluak Creek (**Figure 2**). Ekashluak Creek flows into Scammon Bay and, eventually, into the Bering Sea. The two cirques divide DP011 into two topographical units: the northern cirque and the southern cirque. DP011 consists of a former disposal area where discarded debris was deposited during the years that the Upper Camp was active (USAF, 2013a). Both the northern cirque and the southern cirque contain discarded drums and debris (USAF, 2013a).

A 2001 preliminary survey of DP011 identified approximately 1,300 to 1,500 drums at the site and approximately 200 drums in the Fowler Creek drainage area, northwest of DP011. The drums were primarily empty (USAF, 2013a). Additional debris, including batteries, electrical components, appliances, old paint cans, auto parts, and tower/cable parts, was also noted at DP011. The majority of the drums are located in the northern cirque (USAF, 2013a). Approximately 148 drums were removed from the Fowler Creek drainage area in 2001; however, accessibility issues prevented the removal of the drums at DP011 (USAF, 2013a).

A 2004 Remedial Investigation (RI)/Feasibility Study (FS) concluded that soil is scarce at DP011, but that diesel-range organics (DRO) and polychlorinated biphenyls (PCBs) are present in soil at the site. The detected PCB concentration at one location exceeded the ADEC Method Two cleanup level of 1 milligram per kilogram (mg/kg); however, the 95 percent upper confidence limit (UCL) of the mean PCB concentration of 0.83 mg/kg was below the cleanup level (USAF, 2008). Because the 95 percent UCL was below the cleanup level, PCBs were not identified as contaminants of concern (COCs) at DP011. DRO concentrations exceed the ADEC cleanup level of 250 mg/kg (USAF, 2013a); therefore, DRO is the primary COC at DP011. The RI/FS determined that soil and sediment downgradient of DP011 have not been impacted by PCB or DRO contamination (USAF, 2013a). ADEC issued the "Cleanup Complete with ICs" determination for DP011 in February 2008 (ADEC, 2017a).

Site LF003

Site LF003, Landfill No. 2, consists of a former, capped landfill located on the south side of the access road between the Lower Camp and the airstrip (**Figure 3**). Fowler (Nilumat) Creek lies approximately 250 feet south of the landfill, with two small tributaries located between the landfill and the creek. One tributary is directly adjacent to the landfill and receives surface flow and effluent flow from the landfill (USAF, 2013a). In the late 1980s, vegetation around the landfill was reported to be dead (USAF, 2013a). PCBs are the primary COCs at LF003.

LF003 was used by the LRRS for debris and household and industrial waste (USAF, 2013a). The landfill received garbage, rubbish, wood, metal, plastic, construction and demolition debris, shop wastes, and incinerator ash until the mid-1970s. Environmental investigations initiated in 1989 included the installation of monitoring wells, samples from which were routinely analyzed for DRO; gasoline-range organics (GRO); benzene, toluene, ethylbenzene, and xylenes (BTEX); and PCBs (USAF, 2013a).

The 1990 RI/FS identified exposed debris, stained soil, points of effluent discharge, and active surface water drainages at LF003 (USAF, 2013a). Total petroleum hydrocarbons (TPH) were identified in sediment and soil at the site, and PCBs and TPH were detected in surface water near

the landfill and the associated drainage channels (USAF, 2013a). Long-term monitoring (LTM) was conducted at LF003 from 1996 through 2004 and included groundwater, surface water, and sediment sampling. DRO, residual-range organics (RRO), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and metals concentrations exceeded their cleanup levels in groundwater, surface water, and sediment LTM samples. PCB concentrations in surface water and sediment LTM samples also exceeded their cleanup levels (USAF, 2013a).

In 2002, a Record of Decision (ROD) for Interim Remedial Action (IRA) at LF003 was signed by the USAF and ADEC. The 2002 IRA ROD specified landfill closure with associated capping and groundwater LTM and a PCB removal action. However, sampling completed in 2003 and 2004 indicated that complete removal of the PCB-impacted soil was impractical (USAF, 2013a). Based on this finding, the IRA was not implemented and, instead, further investigation was conducted to fully delineate PCB contamination at LF003 (USAF, 2013b). A Final ROD was issued in 2013.

Site SS010

Site SS010 is located approximately 600 feet east of the southwest end of the Cape Romanzof LRRS airstrip (**Figure 4**). The site includes a Weather Station Building (Building 4101), two utility trenches, and a newly-installed weather observation tower (USAF, 2013b). The old weather observation building (Building 4000) was demolished in 2003 (USAF, 2008). The following two aboveground storage tanks (ASTs) were removed from the site in the early 1990s: Tank #11, a 25,000-gallon diesel fuel AST; and Tank #4, a 1,100-gallon diesel fuel AST (USAF, 2013b). The former location of the 25,000-gallon AST is the Spill/Leak No. 4 area.

A water supply well (Well No. 2) was reportedly associated with SS010. The well was drilled in 1962 and was reportedly located near the southeast corner of the old Weather Station Building (USAF, 2013b). Groundwater from this well was contaminated with fuel oil in 1964; however, the source of contamination was never identified, and no quantitative data have ever been successfully collected (USAF, 2013b). The well was abandoned sometime prior to 1989.

An RI completed in 1989 did not identify any evidence of contamination at SS010 (USAF, 2013b). In 1990, a RI/FS was completed at SS010 and a well (Well No. 3) was installed uphill and upgradient from the former fuel tank location. BTEX was not detected and TPH was detected at very low levels in the groundwater sample from Well No. 3 (USAF, 2013b). Based on these findings, SS010 was withdrawn from the investigation program in 1990 and granted No Further Response Action Planned (NFRAP) status by ADEC in 1993 (USAF, 2013b).

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 (USAF, 2013b). In 2008, as part of an RI, DRO was detected in surface soil at concentrations below the ADEC cleanup level of 10,250 mg/kg. A large area of DRO-impacted subsurface soil was identified at approximately 11 to 17 feet below ground surface (bgs) at the former location of the 25,000-gallon AST (USAF, 2013b). DRO was detected at a maximum concentration of 11,000 mg/kg in subsurface soil at SS010. Attempts to install groundwater wells during the 2008 RI were unsuccessful due to large, subsurface boulders present throughout the site.

There are no CERCLA hazardous substances exceeding acceptable exposure levels protective of human health and the environment at SS010 (USAF, 2013b). The primary COCs at SS010 are

DRO in subsurface soil and potential petroleum hydrocarbon (PHC) contamination in groundwater (USAF, 2013b).

Site SS013

Site SS013, also known as Spill/Leak No. 5 and ROM-1S, is located approximately 1,000 feet south of the Lower Camp and is accessible via the north-south road from Lower Camp (**Figure 5**). Fowler (Nilumat) Creek runs through the site, which may be hydraulically connected to the Lower Camp's drinking water supply (USAF, 2013a).

SS013 was used until 1982 to store new, drummed products and liquid wastes (USAF, 2013a). Contamination at SS013 resulted from a 14,000-gallon diesel fuel spill in 1979. A fuel bladder ruptured, releasing diesel fuel over an area of approximately 10 to 15 acres (USAF, 2013a). The spill flow path was defined by a swath of dead vegetation and continued for several hundred feet toward Fowler (Nilumat) Creek. The soil and tundra in the flow path were stained and smelled strongly of diesel, and the spill percolated down to the water table in some areas (USAF, 2013a).

Investigations completed at SS013 in the 1990s and early 2000s identified TPH in soil and groundwater at the site (USAF, 2013a). PHCs were the only COCs identified at SS013. LTM of soil, sediment, and groundwater was initiated in 1999. In 2002, an Interim ROD was completed, and the SS013 remedy was identified as Monitored Natural Attenuation (MNA) and ICs (USAF, 2011). Groundwater LTM data from 1999 through 2004 indicated that PHCs were naturally attenuating at SS013; therefore, monitoring was discontinued in 2004 (USAF, 2013a). LTM of soil and sediment continued until 2011, when the Final ROD, which identified the SS013 remedy as ICs, was issued and "Cleanup Complete with ICs" status was approved by ADEC (USAF, 2013a).

Site SS014

Site SS014 consists of a former drum storage area located along the south side of Fowler Creek, adjacent to Kokechik Bay (**Figure 6**). The site was used to stage drummed POL waste for shipment off-site on the annual barge (USAF, 2013a). Shallow groundwater at SS014 is affected by saltwater intrusion and is not considered drinking water by application of the requirements specified in 18 Alaska Administrative Code (AAC) 75.350 (USAF, 2008 and 2013a). A groundwater use determination was prepared in accordance with the criteria specified in 18 AAC 75.350 and presented in the Proposed Plan to meet the public notice requirement of 18 AAC 75.350. No comments were received from the public regarding the groundwater use determination. ADEC and USAF agree that the groundwater at Site SS014 meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source (USAF, 2008).

Environmental investigations were initiated at SS014 in 1989, when a dark-stained area approximately 0.25 acre in size was discovered at the site. Vegetation within the affected area was dead, and analytical samples collected from the stained soil confirmed PHC contamination (USAF, 2013a). DRO and GRO were detected in soil at concentrations exceeding their cleanup levels of 250 mg/kg and 300 mg/kg, respectively. The contamination is attributed to historical spills from the storage of drummed POL waste (USAF, 2013a).

In 1994, an excavation was conducted to remove the impacted soil (USAF, 2013a). Soil was excavated from an area covering approximately 25,000 square feet to depths ranging from 3 to 8 feet bgs. However, approximately 2,000 cubic yards of contaminated soil extending across the road from the excavated area was not removed during the 1994 field program (USAF, 2013a).

In 2004, soil and groundwater samples were collected from SS014 as part of a Site Investigation (SI) (USAF, 2008). DRO was detected in soil at a maximum concentration of 5,780 mg/kg. DRO concentrations at six sample locations exceeded the ADEC Method Two cleanup level of 250 mg/kg (USAF, 2008). GRO was detected in one soil sample at a concentration exceeding its 300 mg/kg ADEC Method Two cleanup level. Arsenic and chromium were detected at concentrations exceeding their cleanup levels; however, the detected concentrations were consistent with naturally-occurring background levels (USAF, 2008). Three groundwater wells were installed and sampled at SS014. Groundwater results indicated that groundwater was not adversely affected by POL contamination at SS014 (USAF, 2008 and 2013a).

Also in 2004, surface water and sediment samples were collected from three locations on the periphery of SS014. Samples were collected from Fowler Creek and from a beaver pond southwest of the site and analyzed for VOCs, polycyclic aromatic hydrocarbons (PAHs), PCBs, and metals. No analytes were detected in surface water. Arsenic was the only analyte detected in sediment; and the detected concentrations were above its National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs) threshold effects level (TEL). However, the arsenic concentrations were determined to be representative of natural conditions at the site (USAF, 2008). Surface water and sediment were not adversely affected by POL contamination at SS014 (USAF, 2013a).

In February 2008, ADEC approved the "Cleanup Complete with ICs" determination for SS014 (ADEC, 2017a). The ICs are required because soil is contaminated by PHCs at concentrations above State of Alaska cleanup levels protective of UU/UE.

Site SS015

Site SS015, also known as the underground storage tank (UST) Spill Area, is located 200 feet south of the Lower Camp, north of Site SS013 (**Figure 7**). The site is the former location of two diesel USTs (USAF, 2013a).

In 1991, during an excavation of fuel-contaminated soil and buried fuel lines adjacent to an AST, two USTs were discovered at SS015 (USAF, 2013a). Diesel fuel was reportedly released from the USTs through the vent pipe due to overfilling. The 5,000-gallon and 15,000-gallon USTs were removed along with approximately 900 cubic yards of PHC-impacted soil in 1991 (USAF, 2013a).

In 1993, an RI/FS identified PHC contamination in soil and groundwater at SS015. DRO was detected in soil at concentrations above its ADEC cleanup level, and BTEX, DRO, and GRO concentrations in groundwater exceeded their ADEC cleanup levels (USAF, 2013a). In 2002, an Interim ROD was completed, and the Interim ROD identified the SS015 remedy as MNA and ICs (USAF, 2011).

Monitoring data were collected in 2003, 2004, 2006, 2007, and 2008 in support of the MNA remedy identified in the Interim ROD. The stable-to-shrinking groundwater plume size documented by the monitoring data suggested that natural attenuation was occurring at SS015. Based on these findings, the Final ROD, approved in 2011, identified the SS015 remedy as MNA with ICs (USAF, 2011).

Site SS016

Site SS016, also known as the Upper Tram Terminal Area, is located at the top of a steep slope at the Upper Camp tramway building (**Figure 8**). Tramway lines required lubrication, resulting in

POL and occasionally PCB contamination at the base of the buildings, generally beneath the tram line (USAF, 2013b).

SS016 was initially investigated as part of a 1999 Preliminary Assessment (PA)/SI, which was designed to determine if petroleum-based lubrication was used on the tramway cable. Surface soil sampling indicated the presence of PCBs, DRO, and RRO at concentrations exceeding their cleanup levels (USAF, 2013b). In 2002, contaminated soil was excavated from the site and shipped off-site for disposal. However, post-excavation soil samples indicated that residual PCB, DRO, and RRO concentrations remained above the cleanup levels (USAF, 2013b).

In 2008, an RI identified PCBs and lead in SS016 surface soil (less than 2 feet bgs) at concentrations exceeding cleanup levels (USAF, 2013b). Elevated PCB concentrations were detected in surface soil south of the tram terminal, near the tram docking area, and near the elevated walkway. Lead was detected above cleanup levels in surface soil along the northern wall of the tram terminal (USAF, 2013b).

Site SS017

Site SS017, also known as the Lower Tram Terminal Area, is located at the toe of a steep slope at the Lower Camp tramway building (**Figure 9**). Tramway lines required lubrication, resulting in POL and occasionally PCB contamination at the base of the buildings, generally beneath the tram line (USAF, 2013b).

SS017 was initially investigated as part of a 1999 PA/SI, which was designed to determine if petroleum-based lubrication was used on the tramway cable. Surface soil sampling indicated the presence of PCBs, DRO, and RRO at concentrations exceeding their cleanup levels (USAF, 2013b). In 2002, contaminated soil was excavated from the site and shipped off-site for disposal. However, post-excavation soil samples indicated that residual PCB, DRO, and RRO concentrations remained above the cleanup levels (USAF, 2013b).

In 2008, an RI was conducted to delineate the extent of PCB and lead contamination in SS017 surface (less than 2 feet bgs) and subsurface (greater than 2 feet bgs) soil (USAF, 2013b). The volume of lead contamination was not determined, but approximately 180 cubic yards of surface soil and an estimated 12 cubic yards of subsurface soil were estimated to be contaminated with PCBs (USAF, 2013b).

Site ST009

Site ST009, also known as Truck Fueling Station and ROM-10, consists of a former truck fueling station located downstream of Lower Camp, less than 200 feet east of Kokechik Bay and north of the barge landing area (**Figure 10**). The site is located near a former beach warehouse (now demolished) and the northern wall of a passive biocell used to treat fuel-contaminated soil (USAF, 2013a). ST009 is graded and covered in pit rut material. All structures and buildings in the area were removed at an unknown date prior to 1989 (USAF, 2013a). Shallow groundwater at ST009 is affected by saltwater intrusion and is not considered drinking water by application of the requirements specified in 18 AAC 75.350 (USAF, 2008 and 2013a). A groundwater use determination was prepared in accordance with the criteria specified in 18 AAC 75.350 and presented in the Proposed Plan to meet the public notice requirement of 18 AAC 75.350. No comments were received from the public regarding the groundwater use determination. ADEC and

USAF agree that the groundwater at Site ST009 meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source (USAF, 2008).

In 1989, a RI/FS was conducted at ST009. Soil samples were collected in the area where the old truck fueling station was shown on historical site maps (USAF, 2013a). PHC-impacted soil was identified at ST009, and the contamination was attributed to historical fuel spills reportedly associated with tank filling and transfers since the 1950s (USAF, 2013a). The RI/FS recommended excavation and landfarming of the PHC-impacted soil.

In 1991, a 4,000-gallon fuel spill at ST009 was reported to ADEC. The spill was attributed to an active, 1.5-inch buried steel pipeline between the bulk storage area and the abandoned truck fill stand. Only 1,000 gallons of spilled fuel was collected (USAF, 2013a). It was determined later that two abandoned USTs connected to the active pipeline and had leaked, and that the pipeline was not the direct or main contributor to the release. The spill estimate was revised subsequently to 46,000 gallons of product released to the environment (USAF, 2013a).

In 1994, approximately 955 cubic yards of contaminated soil were estimated to be present at ST009 (USAF, 2013a). The soil was left in place during initial investigation activities and later characterized during a 2004 SI. The SI determined that over 3,300 cubic yards of DRO-impacted soil were present at ST009 (USAF, 2013a). DRO-contaminated soil was identified at the groundwater interface in subsurface samples and DRO-contaminated groundwater was identified in wells located downgradient of the area with surface soil contamination (USAF, 2013a).

The SI included the collection of surface water and sediment samples from two locations on the periphery of ST009. Samples were collected from Fowler Creek and Kokechik Bay and analyzed for VOCs, PAHs, PCBs, and lead. No analytes were detected in surface water. Lead was the only analyte detected in sediment; however, the detected lead concentrations were below the NOAA SQuiRTs TEL for lead (USAF, 2008).

In February 2008, ADEC approved a "Cleanup Complete with ICs" determination for ST009 (ADEC, 2017a). The ICs are required to restrict land use and prevent exposure to PHCs in soil and groundwater at concentrations above State of Alaska cleanup levels protective of UU/UE.

FYR AND PERIODIC REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, & ST009, Cape Romanzof Long Range Radar Station		
EPA ID: Not applicable		
Region: 10	**State:** AK	**City/County:** Cape Romanzof/Kulsivak Census Area
SITE STATUS		
NPL Status: Non-NPL		
Multiple OUs? No	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]*:** USAF		
Author name (Federal or State Project Manager): Stantec, on behalf of AFCEC		
Author affiliation: Contractor		
Review period: 8/1/2017 - 2/28/2018		
Date of site inspection: August 2017		
Type of review: Statutory review for LF003, SS016, and SS017; policy review for other sites		
Review number: 1st for SS010, SS016, & SS017 2nd for DP011, SS014, & ST009 3rd for LF003, SS013, & SS015		
Triggering action date: 7/24/2013		
Due date *(five years after triggering action date)*: 7/24/2018		

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II. RESPONSE ACTION SUMMARY

Basis for Taking Action

A response action was determined to be warranted under CERCLA at Sites LF003, SS016, and SS017 because PCB and/or lead concentrations present an unacceptable level of risk to human health and the environment. A response action was determined to be warranted under State of Alaska regulations at Sites DP011, SS010, SS013, SS014, SS015, and ST009 because PHC concentrations exceed ADEC cleanup levels that are protective of unrestricted use. **Table 1** lists the COCs identified in the ROD for each site included in this FYR and Periodic Review.

Table 1 Site COCs

Medium	COC	Applicable Site(s)
Soil	PCBs	LF003, SS016, and SS017
	Lead	SS016 and SS017
	DRO	DP011, SS010, SS013, SS014, SS015, and ST009
	GRO	SS010 and SS014
	RRO	SS010, SS013, and SS014
Sediment	PCBs	LF003
Surface Water	PCBs	LF003
Groundwater	DRO	SS010, SS015, and ST009
	GRO	SS010 and SS015
	RRO	SS010 and SS015
	Benzene[1]	SS015

Key:
1 – Although benzene is a CERCLA hazardous substance, its presence in SS015 groundwater is associated with a POL release and is, thus, subject to the CERCLA petroleum exclusion.
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
COC – contaminant of concern
DRO – diesel-range organics
GRO – gasoline-range organics
PCBs – polychlorinated biphenyls
POL – petroleum, oil, and lubricant
RRO – residual-range organics

Risk Summary

The following section summarizes the results of human health risk assessments (HHRA) and ecological risk assessments (ERA) performed for Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009.

Sites DP011, SS014, and ST009

As part of the SI, a HHRA and an ERA were performed for Sites DP011, SS014, and ST009 in 2006 (USAF, 2008). The following contaminants of potential concern (COPCs) were identified for each site: at DP011, PCBs in soil; at SS014, DRO and GRO in surface soil and RRO in groundwater; and at ST009, DRO in surface soil and GRO, DRO, and benzene in groundwater (USAF, 2008). For SS014 and ST009, the estimated hazards due to potential exposure to COPCs were below the threshold criterion (hazard quotient [HQ] less than 1). For DP011, the calculated HQ of 0.6 and the cumulative risk of 4×10^{-6} were below the threshold criteria of 1 and 1×10^{-5}, respectively. Therefore, the HHRA concluded that these sites did not pose an unacceptable level of risk to human health or the environment as long as there was no exposure to subsurface soil and/or groundwater (USAF, 2008). ICs are required to restrict land use at SS014 and ST009 to ensure compliance with exposure assumptions in the HHRA (i.e., no subsurface activities that allow exposure to subsurface soil and no groundwater use for water supply) (USAF, 2008).

In 1992, an ERA was completed for Cape Romanzof, and the results indicated that Sites DP011, SS014, and ST009 did not pose an unacceptable ecological risk (USAF, 2008). The SI results confirmed this conclusion, as investigations at Fowler Creek and other downgradient areas indicated no impacts from the sites at Lower Camp. In 2006, an ERA completed for SS014 and ST009 determined there were no complete ecological exposure pathways at these two sites (USAF, 2008). The 2006 ERA confirmed the earlier findings that DP011, SS014, and ST009 did not pose an unacceptable ecological risk (USAF, 2008).

Sites LF003, SS010, SS016, and SS017

In 2009, a baseline HHRA and an ERA were performed for Sites LF003, SS010, SS016, and SS017 (USAF, 2013b). The media evaluated were soil, sediment, groundwater, and biota, which accounts for potential risks from PCBs through the ingestion of wild foods. The results of the HHRA identified unacceptable risks to the recreational and subsistence population at Cape Romanzof due to the presence of PCBs in soil and/or sediment at Sites LF003, SS016, and SS017 (USAF, 2013b). Calculated human health risks for Site SS010 did not indicate adverse effects from exposure to DRO and GRO in surface soil (USAF, 2013b).

The results of the ERA identified unacceptable ecological risks at the four sites evaluated. Adverse ecological effects were attributed to the following: PCBs at LF003 in soil, sediment, and surface water; DRO, GRO, and RRO in soil at SS010; and PCB and lead contamination in soil at SS016 and SS017 (USAF, 2013b). Based on the findings of the HHRA and ERA, remedial action is under CERCLA and/or Alaska State law was determined to be warranted to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

Sites SS013 and SS015

PHCs are the only COCs at Sites SS013 and SS015. The ROD stated that bulk hydrocarbons (i.e., DRO, GRO, and RRO) are not included in cumulative risk calculations per Alaska's contaminated site regulations (USAF, 2011). Therefore, an HHRA was not conducted for SS013, where the only COPCs are bulk hydrocarbons, or for SS015, where the only COPCs are bulk hydrocarbons and benzene (USAF, 2011).

Ecological risks associated with SS013 were evaluated in the 1997 RI/FS and ecological risks associated with SS013 and SS015 were assessed as part of the 2000 SI (USAF, 2011). The ERAs

did not find unacceptable ecological risks associated with either site. PAHs were the only COPCs identified that could potentially cause ecological risk; however, PAHs were detected at low concentrations in only a few samples per site and therefore did not pose an unacceptable level of ecological risk at SS013 or SS015 (USAF, 2011).

Response Actions

There were no responses performed at Sites DP011, SS010, SS013, or ST009 prior to their RODs. Information regarding response actions completed at the other sites included in this FYR and Periodic Review is summarized below.

Site LF003

Response actions were initiated at LF003 in 1993. The USAF collected debris from the periphery of LF003, diverted the drainage at the toe of the landfill, and covered the landfill with a protective surface cap (USAF, 2013a). The cap was created by placing 18 inches of fill over the landfill, compacting the fill, laying sheets of impermeable liner and geotextile material over the landfill, placing an additional 18 inches of fill over the liners, and then applying a seed mixture to the new surface (USAF, 2013b). Additionally, active surface drainage was diverted away from the area (USAF, 2013b). No other response actions were completed at LF003 prior to the 2013 ROD.

Site SS014

In 1994, the USAF excavated 2,730 cubic yards of petroleum-contaminated soil from SS014 (USAF, 2013a). Due to the possible presence of PCBs, a PCB sampling grid was used to guide the excavation. The final excavation covered approximately 25,000 square feet, and most of the area was excavated down to approximately 3 feet bgs. At several locations, the contaminated soil was excavated to the water table (8 feet bgs). The volume of contaminated soil exceeded the initial estimate, and an estimated 2,000 cubic yards of contaminated soil was left in place (USAF, 2013a).

The soil excavated from SS014 was placed in Containment Cell 1, which was constructed near the coast at ST009. In 1996, the containment cell was converted into two biocells (soil piles constructed by the mechanical addition of air, water, and nutrients). The biocells were closed in 2004; the treated soil from one cell was placed in the main camp area, and the treated soil from the other cell was used as cover material for LF003 (USAF, 2013a).

Site SS015

In 1991, SS015 site personnel reported a fuel seep adjacent to the AST impoundment at the abandoned Lower Camp facility. Spill response activities involved construction of a sump to collect fuel seeping from surficial soils and excavation of buried fuel lines to determine the source of the release. Excavation of fuel-impacted soil adjacent to the AST uncovered two USTs, immediately north of the AST impoundment (USAF, 2013a). Approximately 1,900 gallons of fuel and an estimated 7,800 gallons of water were pumped from the USTs into an abandoned 25,000-gallon AST within the AST impoundment. The two USTs and approximately 900 cubic yards of fuel-impacted soil were removed, and the soil was stockpiled in a lined and bermed containment area constructed at SS015. Additional fuel seepage, reported to be diesel, was recovered from the UST excavation (USAF, 2013a).

In 1994, the USAF removed the PHC-contaminated, stockpiled soils from SS015 and placed the materials in a lined cell for storage and treatment (USAF, 2013a). The treated soil was later used as landfill capping material at Site LF003.

Site SS016

In 2002, a remedial excavation was completed at SS016. The excavation targeted areas where surface soil detections of PCBs, DRO, and RRO exceeded cleanup levels. The contaminated soil was shipped off-site for disposal. However, post-excavation soil samples indicated that residual PCB and DRO concentrations remained above the cleanup levels (USAF, 2013b). The excavations were not backfilled due to the presence of potentially-contaminated sandblast material (USAF, 2013b). No other response actions were completed at SS016 prior to the 2013 ROD.

Site SS017

In 2002, a remedial excavation was completed at SS017. The excavation targeted areas where surface soil detections of PCBs, DRO, and RRO exceeded cleanup levels. The contaminated soil was shipped off-site for disposal. However, post-excavation soil samples indicated that residual PCB and DRO concentrations remained above the cleanup levels (USAF, 2013b). The excavations were not backfilled due to the presence of potentially-contaminated sandblast material (USAF, 2013b). No other response actions were completed at SS017 prior to the 2013 ROD.

Remedial Action Objectives

Remedial Action Objectives (RAOs) provide a general description of what the cleanup will accomplish. RAOs established in the ROD for each site included in this FYR are described below.

Site DP011

For Site DP011, the 2008 ROD identified the following RAOs for human health under Alaska State law (USAF, 2008):

- Document that PHCs in surface soil exceed levels protective of unrestricted use.
- Restrict excavation and transportation of contaminated soil to prevent migration of contaminants.

Sites LF003, SS010, SS016, and SS017

For Sites LF003, SS010, SS016, and SS017, the 2013 ROD identified the following RAOs for human health under CERCLA and Alaska State law (USAF, 2013b):

- Prevent ingestion of, dermal contact with, inhalation of dust from, and uptake by biota of contaminants from soil, sediment, or groundwater containing COC concentrations in excess of Preliminary Remediation Goals (PRGs) and/or resulting in a cancer risk greater than 1×10^{-5} or hazard index (HI) greater than 1 by preventing exposure to soils containing PCBs greater than 1 mg/kg and lead greater than 400 mg/kg.
- Prevent migration of groundwater containing COCs to nearby surface water body (i.e., Fowler Creek) that could result in surface water concentrations in excess of PRGs and/or presenting a cancer risk greater than 1×10^{-5} or HI greater than 1 by preventing exposure

to groundwater containing GRO greater than 2.2 milligrams per liter (mg/L), DRO greater than 1.5 mg/L, and RRO greater than 1.1 mg/L.

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

- Prevent the possible migration of COCs in soil, sediment, or groundwater to surface water resulting in surface water concentrations exceeding Alaska Water Quality Standards (AWQS).

Site SS013

The 2011 ROD identified the following RAO for Site SS013 to address petroleum hydrocarbons under Alaska State law (USAF, 2011):

- Restrict use of the site to commercial/industrial use.

Site SS014

For Site SS014, the 2008 ROD identified the following RAOs for human health under Alaska State law (USAF, 2008):

- Restrict direct contact with petroleum-contaminated subsurface soil and document that petroleum hydrocarbons in surface and subsurface soil exceed levels protective of unrestricted use.
- Restrict excavation and transportation of contaminated soil to prevent migration of contaminants.

Site SS015

The 2011 ROD identified the following RAOs for Site SS015 to address petroleum hydrocarbons under Alaska State law (USAF, 2011):

- Clean up contaminated groundwater to the ADEC Table C cleanup levels.
- Restrict access to contaminated groundwater until it is cleaned up.

Site ST009

For Site ST009, the 2008 ROD identified the following RAOs for human health under Alaska State law (USAF, 2008):

- Ensure that groundwater contamination is not migrating downgradient into Kokechik Bay at levels that could be detrimental to surface water quality.
- Restrict use of the groundwater as long as the groundwater DRO concentrations exceed the ADEC Table C cleanup levels, which are protective of drinking water.
- Restrict direct contact with petroleum-contaminated subsurface soil and document that petroleum hydrocarbons in surface and subsurface soil exceed levels protective of unrestricted use.
- Restrict excavation and transportation of contaminated soil to prevent migration of contaminants.

Remedy Components

The remedies selected in the ROD for each site included in this FYR and Periodic Review to satisfy the RAOs are detailed below.

Site DP011

The remedy for Site DP011 to address PHC contamination is ICs (USAF, 2008). The ICs are designed to restrict access to contaminated subsurface soil and will consist of excavation and construction restrictions within the site boundaries and a requirement that future land use remains non-residential (USAF, 2008). The major components of the selected remedy are as follows:

- Delineate the boundaries of soil with DRO above Method Two cleanup levels.
- Document the ICs in the USAF's Real Property records, including a map indicating the IC locations. File appropriate notice with the U.S. Fish & Wildlife Service (USFWS).
- Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC no less often than once every 5 years.

Site LF003

The remedy for Site LF003 is excavation and off-site disposal to address PCB-contaminated surface soil; excavation, off-site disposal, and LTM to address PCB-contaminated sediment; and ICs for the landfill (USAF, 2013b). The major components of the selected remedy are as follows:

- Surface soil and sediment with PCB concentrations greater than 1 mg/kg will be excavated and containerized for transport off-site. All soil or sediment that contains PCBs in excess of 50 mg/kg will be considered a Resource Conservation & Recovery Act (RCRA) Subtitle C hazardous waste.
- Confirmation sampling of soil, sediment, and surface water following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavations. The excavated areas will be revegetated to help reduce the chance of erosion.
- While the excavation will remove the sediment currently present, it may not remove the source of the PCBs, which is thought to be the landfill itself. Therefore, contaminated sediment may continue to migrate from the landfill via the seep and into the sediment near the toe of the landfill. Eroded soil control barriers will be constructed on-site to prevent the off-site migration of runoff water that may contain PCB-contaminated sediment in order to protect the surface water that flows around the landfill and further away (Fowler Creek).
- Implement ICs that prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and maintain the landfill cap at LF003 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the Land Use Control (LUC) Plan for LF003.
- Signs warning that PCB buried solid waste and potentially hazardous materials are present and site access is restricted will be constructed and maintained at the site to alert personnel

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

- Eroded soil barriers, collected sediment, and signs will be managed and maintained by the USAF until it is determined that sediments no longer pose an unacceptable risk to human health and the environment and allow for UU/UE. Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and Alaska Department of Natural Resources' (ADNR) land records.
- Buried solid wastes remaining at LF003 will be managed through ICs, including development restrictions and signage described above, and LTM. Annual inspections will be completed for the first 5 years after remedial activities, and FYRs will be required (USAF, 2013b).

The ROD for LF003 states that all soil or sediment that contains PCBs in excess of 50 mg/kg will be considered a RCRA Subtitle C hazardous waste; however, the Toxic Substances Control Act of 1976 (TSCA) regulates bulk remediation waste such as soil or sediment contaminated with PCBs in excess of 50 mg/kg. PCBs are exempt from federal RCRA regulations (40 CFR 261.8) and are not listed RCRA hazardous wastes (EPA, 1994). Soil or sediment is regulated for disposal if the PCB concentration is greater than or equal to 1 mg/kg. The disposal options for soil or sediment with PCB concentrations greater than 1 mg/kg but less than 50 mg/kg are established in §761.61(a)(5)(v)(A) and include a state-approved municipal or non-municipal non-hazardous waste landfill (EPA, 1994).

Site SS010

The remedy for Site SS010 to address fuel-impacted subsurface soil is ICs and engineering controls (ECs) and to address fuel-impacted groundwater is ICs, ECs, natural attenuation, and LTM (USAF, 2013b). The major components of the selected remedy are as follows:

- Install three groundwater monitoring wells at the source area (one well) and downgradient of the source area upgradient of Fowler Creek (two wells). If groundwater is determined to be contaminated but poses no unacceptable risk to surface water quality at Fowler Creek, the USAF will perform periodic monitoring of groundwater contaminant levels and risk to surface water quality at Fowler Creek. If groundwater is determined to be contaminated and poses an unacceptable risk to surface water quality at Fowler Creek, the USAF will identify and conduct appropriate remedial action to protect surface water quality.
- If groundwater is determined to be contaminated, the seeps and sediments adjacent to Fowler Creek (downgradient of the site) will be monitored to ensure that contamination does not reach the creek.
- Implement ICs that prevent access to subsurface soil and groundwater until cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system, prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and conduct LTM at SS010. ICs will be incorporated into the LUC Plan for SS010.

- Annual inspections of the ICs, signs, and control barriers will be completed for the first 5 years after remedial activities, and FYRs will be required (USAF, 2013b).
- LUCs will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as LUC boundaries will encompass all areas where subsurface soil contaminant levels pose an unacceptable risk to human health and the environment and will be surveyed and a map designating their locations will accompany notations placed on land records.

Contaminated subsurface soil and groundwater will be left in place to attenuate naturally (USAF, 2013b). When groundwater contaminant concentrations are below groundwater cleanup levels for two consecutive sampling events and risk to surface water quality at Fowler Creek is determined to be acceptable, LTM will be discontinued (USAF, 2013b).

Site SS013

The final remedy for Site SS013 to address PHC contamination is ICs (USAF, 2011). The ICs are designed to restrict access to contaminated soil and will consist of excavation restrictions within the site boundaries and a requirement that future land use is restricted to commercial/industrial purposes (USAF, 2011). The major components of the selected remedy are as follows:

- Implement ICs by taking the following actions:
  - Use USAF's dig permit and construction review system or similar to restrict incompatible activities at the site.
  - Document the ICs in the USAF's Real Property records, including a map indicating the IC locations. File appropriate notice with the USFWS.
  - Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC no less often than once every 5 years.

Site SS014

The remedy for Site SS014 to address PHC contamination is ICs (USAF, 2008). The ICs are designed to restrict access to contaminated subsurface soil and will consist of excavation and construction restrictions within the site boundaries and a requirement that future land use remains non-residential (USAF, 2008). The major components of the selected remedy are as follows:

- Delineate the boundaries of soil with DRO or GRO above Method Two cleanup levels.
- Document the ICs in the USAF's Real Property records, including a map indicating the IC locations. File appropriate notice with the USFWS.
- Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC no less often than once every 5 years.

Site SS015

The final remedy for Site SS015 to address PHC contamination is MNA with ICs (USAF, 2011). The ICs are designed to restrict access to contaminated soil and groundwater and will consist of excavation restrictions within the site boundaries and a requirement that future land use is

restricted to commercial/industrial purposes (USAF, 2011). The major components of the selected remedy are as follows:

- Implement ICs by taking the following actions:
  - Use USAF's dig permit and construction review system or similar to restrict incompatible activities at the site.
  - Document the ICs in the USAF's Real Property records, including a map indicating the IC locations. File appropriate notice with the USFWS.
  - Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC no less often than once every 5 years.
  - Prohibit the installation of water supply wells within site boundaries as long as the aquifer fails ADEC Table C cleanup levels protective of drinking water.
- Conduct MNA, as follows:
  - Monitor one source area monitoring well (WW-01) and two downgradient monitoring wells (WW-05 and WW-06) no less often than once every 5 years. Analyze groundwater samples for DRO, GRO, and BTEX.
  - Continue groundwater monitoring until 18 AAC 75.350 Table C groundwater cleanup levels are reached and cumulative risk is below Alaska threshold levels or until the groundwater plume is steady state or shrinking, contaminant concentrations are decreasing, and concentrations meet applicable cleanup levels at an approved alternative point of compliance.

Site SS016

The remedy for Site SS016 to address PCB- and lead-contaminated surface soil is excavation, to the extent feasible, and off-site disposal (USAF, 2013b). The major components of the selected remedy are as follows:

- Surface soil with PCB concentrations greater than 1 mg/kg and lead concentrations greater than 400 mg/kg will be excavated and containerized for transport off-site. All soil that contains PCBs in excess of 50 mg/kg will be considered TSCA PCB remediation waste and lead soils that fail the toxicity characteristic leaching procedure (TCLP) will be considered RCRA hazardous.
- Confirmation soil sampling following the excavation will document the effectiveness of the remedy.
- Soil from a local borrow source will be used to backfill the excavations. The excavated areas will be revegetated to help reduce the chance of erosion.
- SS016 is located on a steep slope in an area covered with large boulders, so it may not be possible to remove all soil with PCB concentrations above 1 mg/kg or lead above 400 mg/kg. If impacted soil with PCB or lead concentrations above the cleanup level is left in place, the following actions will be implemented:

- A cap will be placed over remaining surface soil contaminated with PCBs and/or lead above cleanup levels (1 mg/kg and 400 mg/kg, respectively) protective of human health and the environment to prevent access and exposure to contaminated soil.
- ECs, such as warning signs, will be erected at the location of surface soil with concentrations above cleanup levels.
- ICs will be implemented to prohibit the development and use of the property for residential housing and prevent the use of contaminated soil, dig permits will be required in the event of excavation, and a soils maintenance plan will be implemented and cap maintenance will be performed, as needed, to prevent direct exposure and water infiltration.
- The cap and signs will be managed and maintained by the USAF until it is determined that soil no longer poses an unacceptable risk to human health and the environment and allows for UU/UE. Locations of the cap and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.
- FYRs will be required, and annual performance reports will be completed for the first 5 years after remedial activities (USAF, 2013b).

In August 2018, the USAF issued an Explanation of Significant Differences (ESD) to amend the SS016 remedy identified in the 2013 ROD (USAF, 2018a). Following are the changes to the remedy specified in the ESD:

- Contaminated soil that could not be excavated or capped due to safety or logistical concerns will remain uncapped until the Upper Tram Terminal and the high-voltage power cable are removed and the slope is stabilized.
- The locations of the uncapped cells will be surveyed and recorded in the land records, including the Base Master Plan and ADNR land records.
- Uncapped cells will meet the same requirements for LUCs, FYRs, and performance reports as stated in the ROD.

It is expected that the remaining soil contamination at SS016 will be removed once the abandoned Upper Tram Terminal is removed and the high-voltage cable is relocated or powered down (USAF, 2018a).

Site SS017

The remedy for Site SS017 to address PCB- and lead-contaminated surface and subsurface soil is excavation and off-site disposal (USAF, 2013b). The major components of the remedy are as follows:

- Surface and subsurface soil with PCB concentrations greater than 1 mg/kg and lead concentrations greater than 400 mg/kg will be excavated and containerized for transport off-site. All soil that contains PCBs in excess of 50 mg/kg will be considered TSCA PCB remediation waste and lead soils that fail the TCLP will be considered RCRA hazardous. The quantity of surface soil requiring excavation at the site is estimated to be approximately 179 cubic yards with a maximum PCB concentration of 68 mg/kg, and the quantity of

subsurface soil requiring excavation is estimated to be 11.7 cubic yards with a maximum PCB concentration of 13.6 mg/kg. All lead-contaminated areas are located within the PCB-contaminated areas and will be excavated with the PCB-contaminated soil.

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

In August 2018, the USAF issued an Explanation of Significant Differences (ESD) to amend the SS017 remedy identified in the 2013 ROD (USAF, 2018a). Following are the changes to the remedy specified in the ESD:

- Current areas of contaminated soil with PCB concentrations greater than or equal to 1 mg/kg and lead concentrations greater than or equal to 400 mg/kg will remain in place with capped cells and those areas unexcavated and inaccessible will remain until the Lower Tram Terminal is removed and the high-voltage power cable can be relocated.
- LUCs will be implemented until the Lower Tram Terminal is removed and the power to the high-voltage cables can be relocated as follows:
    - ECs, such as signs warning of contamination, will be erected at the location where soil is located at concentrations above cleanup levels protective of human health and the environment.
    - ICs that prohibit development and use of property for residential housing, prevent use of contamination soil for restricted uses, require a dig permit in the event of excavation, and implement a soil management plan at SS017 to prevent direct exposure.
    - ICs will be incorporated into the LUC Plan.
    - Annual site inspections will be performed to check the condition of the cap and signs; maintenance will be completed as needed. The signs will be maintained by the USAF until such time that is it is determined that PCB-contaminated soil no longer poses an unacceptable risk to human health and the environment and allow of UU/UE at the site.
    - Locations of the cap will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.

It is expected that the remaining soil contamination at SS017 will be addressed in 2023 during the removal of the Lower Tram Terminal and relocation of the high-voltage cable (USAF, 2018a).

Site ST009

The remedy for Site ST009 to address PHC contamination is groundwater LTM and ICs (USAF, 2008). The ICs are designed to restrict access to contaminated soil and prevent the use of groundwater contaminated above ADEC Table C cleanup levels protective of drinking water. The ICs will consist of excavation and construction restrictions within the site boundaries and

requirements that future land use remains non-residential and that no water supply wells be installed within the site boundaries as long as PHC concentrations exceed ADEC cleanup levels (USAF, 2008). The major components of the selected remedy are as follows:

- Complete annual monitoring of three groundwater wells (MW-4, MW-7, and MW-9) and one surface water location (SW-5) for a minimum of 3 years. Groundwater samples will be analyzed for DRO, GRO, and BTEX, and surface water samples will be analyzed for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH).
- After 3 consecutive years of monitoring, the data will be evaluated using a statistically-valid trend analysis. If monitoring data show that downgradient wells (MW-7 and MW-9) do not have increasing levels of DRO, GRO, or BTEX, and surface water results are consistently below AWQS and not increasing, sampling will be discontinued. Otherwise, the monitoring program will be reviewed for protectiveness and representativeness, revised if appropriate, and extended until 3 consecutive years of monitoring data establish that the criteria listed above have been met.
- Delineate the boundaries of soil with DRO above Method Two cleanup levels.
- Document the ICs in the USAF's Real Property records, including a map indicating the IC locations. File appropriate notice with the USFWS.
- Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC no less often than once every 5 years.

Table 2 summarizes the cleanup levels specified in the RODs for the sites included in this FYR and Periodic Review.

Table 2 ROD Cleanup Levels

Site	Medium	COCs	Maximum Detection	ROD Cleanup Level
DP011	Soil	DRO	502 mg/kg	1,200 mg/kg[1]
LF003	Surface Soil	PCBs	110 mg/kg	1 mg/kg
	Sediment		230 mg/kg	1 mg/kg
	Surface Water		79 µg/L	0.014 µg/L
SS010	Subsurface Soil	DRO	11,000 mg/kg	10,250 mg/kg
	Groundwater	PHCs (possibly GRO, DRO, or RRO)	No quantitative data available	GRO – 2.2 mg/L DRO – 1.5 mg/L RRO – 1.1 mg/L
SS013	Soil	DRO	110,000 mg/kg	205,000 mg/kg[1]
		RRO	51,600 mg/kg	204,000 mg/kg[1]
SS014	Soil	DRO	5,780 mg/kg	12,500 mg/kg[1]
		GRO	616 mg/kg	1,400 mg/kg[1]
		RRO	1,300 mg/kg	11,000 mg/kg

Table 2 (Cont.) ROD Cleanup Levels

SS015	Soil	DRO	8,000 mg/kg	10,250 mg/kg
	Groundwater	DRO	400 mg/L	1.5 mg/L
		GRO	8.38 mg/L	2.2 mg/L
		Benzene	1.3 mg/L	0.005 mg/L
SS016	Surface Soil	PCBs	6,600 mg/kg	1 mg/kg
		Lead	617 mg/kg	400 mg/kg
SS017	Surface Soil	PCBs	68 mg/kg	1 mg/kg
		Lead	1,500 mg/kg	400 mg/kg
	Subsurface Soil	PCBs	13.6 mg/kg[3]	1 mg/kg
		Lead	1,440 mg/kg[4]	400 mg/kg
ST009	Surface and Subsurface Soil	DRO	11,100 mg/kg	12,500 mg/kg[1]
	Groundwater	DRO	4.14 mg/L	15 mg/L[2]

Key:
1 – A site-specific ADEC Method Three cleanup level was calculated. The ADEC Method Two cleanup level for DRO is 250 mg/kg, for GRO is 300 mg/kg, and for RRO is 11,000 mg/kg.
2 – The ADEC Table C groundwater cleanup level for DRO was adjusted upward to a concentration equal to ten times the cleanup level (USAF, 2008). The ADEC Table C cleanup level for DRO is 1.5 mg/L.
3 – Subsequent investigations at SS017 have identified PCBs in subsurface soil at a higher maximum concentration of 18.4 mg/kg (USAF, 2017a).
4 – Subsequent investigations at SS017 have identified lead in subsurface soil at a higher maximum concentration of 2,160 mg/kg (USAF, 2017a).
ADEC – Alaska Department of Environmental Conservation
COC – contaminant of concern
DRO – diesel-range organics
GRO – gasoline-range organics
mg/L – milligrams per liter
mg/kg – milligrams per kilogram
PCBs – polychlorinated biphenyls
PHCs – petroleum hydrocarbons
ROD – Record of Decision
RRO – residual-range organics

Status of Implementation

The remedies for Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009 include ICs and/or LUCs. In December 2017, the USAF issued the Revised LUC Management Plan for the Pacific Air Forces Regional Support Center Installation (LUC Management Plan) (USAF, 2017b), which includes Cape Romanzof LRRS. The LUC Management Plan identifies that there are LUCs in effect at these sites. A table of the LUCs in effect and a map identifying the LUC boundaries are provided in **Appendix B**.

The following sections detail the status of implementation for the other components of the site remedies.

Site DP011

The remedy for DP011 consists of ICs. In 2008, ADEC approved DP011 for conditional site closure, which is now referred to as "Cleanup Complete with ICs" (USAF, 2013a). ADEC established the IC record for DP011 on 28 February 2008 (ADEC, 2017a). The DP011 ICs also are documented in the 2017 LUC Management Plan (USAF, 2017b), as described above. In accordance with the ROD, a site inspection was completed as part of this Periodic Review. The results of the inspection are described in Section IV, *Site Inspection*.

The IC specifications include a requirement to file an appropriate notice with the USFWS. Appropriate notice includes agency review of decision documents. The USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property.

Site LF003

The remedy for LF003 includes ICs, excavation and off-site disposal of PCB-contaminated soil and sediment, and LTM (USAF, 2013b and 2017a). The status of each remedy component is described below.

As described above, the LF003 ICs are documented in the 2017 LUC Management Plan (USAF, 2017b). In addition, annual landfill cap and IC inspections are completed at LF003 (USAF, 2015 and 2016a). The results of prior cap and IC inspections and the FYR inspection are provided in Section IV, *Site Inspection*. LUC signs were installed at the site in 2016 and 2017 (USAF, 2016b and 2017b).

The IC specifications include a requirement to file a notice in ADNR's land records. A Notice of Environmental Contamination (NEC) was filed in ADNR's land records in May 2018. Although not required by the IC specifications, the USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property. Other concerns regarding potential impacts from PCB sources within LF003 were addressed by the final remedy, which includes eroded soil control barriers and surface soil, surface water, and sediment sampling. However, the eroded soil control barriers have not yet been installed at the site (Mr. Richard Mauser, personal communication, 7 November 2018).

In 2016, the excavation portion of the LF003 remedy was initiated (USAF, 2017a). The remedial excavation targeted soil and sediment with PCB concentrations above 1 mg/kg and/or lead concentrations above 400 mg/kg. Approximately 730 tons of PCB- and lead-contaminated soil were excavated from the four excavation areas at LF003 and shipped offsite for disposal. Areas 1 and 2 are co-located and include the main drainage channel; Area 3 is an isolated area on the southwestern edge of the landfill; and Area 4 is another isolated area located approximately 70 feet from the southeastern boundary of the landfill (USAF, 2017a). Post-excavation confirmation samples, collected from the sampling cells shown on Figure 3, verified that residual PCB and lead concentrations were below the ADEC cleanup levels at Areas 1, 2, and 4, and excavation was deemed complete at these three areas (USAF, 2017a). At Area 3, lead concentrations in three

sidewall samples remained above the 400 mg/kg cleanup level; however, buried debris was encountered in this area and further excavation ceased to avoid further disturbance of the buried debris (USAF, 2017a). The residual lead concentrations above the ADEC standard in Area 3 soils ranged from 455 mg/kg to 543 mg/kg (USAF, 2017a).

The ROD stated that LTM was to be initiated at LF003 after completion of the remedial excavations. In 2017, surface soil, sediment, and surface water sampling was conducted at the site (USAF, 2017c). The results of the LTM sampling are provided in Section IV, *Data Review*.

Site SS010

The remedy for SS010 includes ICs, ECs, and LTM (USAF, 2013b). The status of each remedy component is described below.

As described above, the SS010 ICs are documented in the 2017 LUC Management Plan (USAF, 2017b). In addition, IC inspections are completed at SS010 (USAF, 2015). The results of prior IC inspections and the Periodic Review inspection are provided in Section IV, *Site Inspection*. LUC signs were installed at the site in 2016 and 2017 (USAF, 2016b and 2017b).

The IC specifications include a requirement to file a notice in ADNR's land records. A NEC was filed in ADNR's land records in May 2018.

In 2014, three groundwater monitoring wells were installed at SS010, in accordance with the ROD (USAF, 2015). Soil samples were collected from the three soil borings that were completed as wells. Groundwater sampling was performed in 2014 and 2015. The results of the groundwater and soil sampling are provided in Section IV, *Data Review*. Groundwater sampling ceased in 2015 because the ROD requirement for two consecutive sampling events with all COCs below groundwater cleanup levels was met by the 2014 and 2015 sampling events (USAF, 2016a and 2016b).

Site SS013

The remedy for SS013 includes ICs. ADEC established the IC record for SS013 on 24 February 2011 (ADEC, 2017a). The SS013 ICs also are documented in the 2017 LUC Management Plan (USAF, 2017b), as described above. In accordance with the ROD, a site inspection was completed as part of this Periodic Review. The results of the inspection are described in Section IV, *Site Inspection*.

The IC specifications include a requirement to file an appropriate notice with the USFWS. Appropriate notice includes agency review of decision documents. The USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property.

Site SS014

The remedy for SS014 includes ICs. ADEC established the IC record for SS014 on 27 February 2008 (ADEC, 2017a). The SS014 ICs also are documented in the 2017 LUC Management Plan (USAF, 2017b), as described above. In accordance with the ROD, a site inspection was completed

as part of this Periodic Review. The results of the inspection are described in Section IV, *Site Inspection*.

The IC specifications include a requirement to file the appropriate notice with the USFWS. Appropriate notice includes agency review of decision documents. The USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property.

Site SS015

The remedy for SS015 includes MNA and ICs. ADEC established the IC record for SS015 on 24 February 2011 (ADEC, 2017a). The SS015 ICs also are documented in the 2017 LUC Management Plan (USAF, 2017b), as described above, and IC inspections are completed at the site. The results of prior IC inspections and the Periodic Review inspection are provided in Section IV, *Site Inspection*. LUC signs were installed at the site in 2016 and 2017 (USAF, 2016b and 2017b).

The IC specifications include a requirement to file the appropriate notice with the USFWS. Appropriate notice includes agency review of decision documents. The USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property.

Annual groundwater sampling is completed at SS015 to support the MNA component of the remedy. The results of the groundwater sampling are provided in Section IV, *Data Review*. The groundwater LTM portion of the remedy is being implemented in accordance with the ROD.

Site SS016

The original remedy for SS016 includes excavation and off-site disposal of PCB- and lead-contaminated surface soil and, if complete removal is not feasible, a cap and ICs (USAF, 2013b). In 2018, the SS016 remedy was amended via an ESD that specified that contaminated soil that could not be excavated or capped due to safety or logistical concerns would remain uncapped until the Upper Tram Terminal and the high-voltage power cable are removed and the slope is stabilized. The status of each remedy component is described below.

As described above, the SS016 ICs are documented in the 2017 LUC Management Plan (USAF, 2017b). In addition, IC inspections are completed at SS016 (USAF, 2017c). The results of the FYR inspection are provided in Section IV, *Site Inspection*. LUC signs were installed at the site in 2017 (USAF, 2017c).

The IC specifications include a requirement to file a notice in ADNR's land records. A NEC was filed in ADNR's land records in May 2018.

In 2016, the excavation portion of the SS016 remedy was initiated (USAF, 2017a). The remedial excavation targeted soil with PCB concentrations above 1 mg/kg and/or lead concentrations above 400 mg/kg, and SS016 was divided into 30 15-by-15-foot cells (USAF, 2018a). Approximately 130 tons of PCB- and lead-contaminated soil were excavated at SS016 and shipped offsite for

disposal. However, approximately 256 cubic yards of contaminated soil remain at the site (USAF, 2018a). Analytical results from 12 of the 30 post-excavation samples collected from the sampling cells shown on Figure 8 identified PCBs and/or lead at concentrations exceeding ADEC cleanup standards (USAF, 2017a). The instability of the slope around the Upper Tram Terminal and the required safety zone around a surface-laid, high-voltage power cable prevented access, removal, or capping of the PCB-contaminated soils at Cells 1 through 6 (USAF, 2017a). Powering down and moving the high-voltage cable is not feasible due to operational requirements of both the USAF and the Federal Aviation Administration (FAA) (USAF, 2018a). **Table 3** provides the status of the site's cells at the end of the 2016 remedial response action. The amended remedy allows the inaccessible contaminated soil to remain uncapped until the Upper Tram Terminal and the high-voltage power cable are removed and the slope is stabilized (USAF, 2018a).

Table 3 SS016 Cell Status after 2016 Remedial Action

Cell Number	Clean/Capped	PCB/Lead Sample Results Floor (f)/Wall (w)
1 through 5	No*	**PCBs ≥ 1 mg/kg** **Lead ≥ 400 mg/kg**
6	No**	**PCBs ≥ 1 mg/kg** **Lead ≥ 400 mg/kg**
7 and 8	Clean	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
9	Capped	**PCBs – 1.9 mg/kg (f)**
10	Capped	**PCBs – 86 mg/kg (f)**
11 through 23	Clean	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
24	Capped	**PCBs – 34 mg/kg (w)**
25 and 26	Clean	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
28	Capped	**PCBs – 34 mg/kg (w)**
29 and 30	Clean	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg

Source: USAF, 2018a

Bold = Concentration exceeds cleanup level

*The cells were not capped or excavated due to the safety zone around the high-voltage power cables.

**Excavation activities were discontinued due to unsafe working conditions associated with unstable or dislodged large rocks.

The amended remedy requires that the locations of the uncapped cells be surveyed and recorded in the land records, including the Base Master Plan and ADNR land records (USAF, 2018a). This portion of the amended remedy has not yet been implemented.

Site SS017

The original remedy for SS017 includes excavation and off-site disposal of PCB- and lead-contaminated surface and subsurface soil (USAF, 2013b). In 2018, the SS017 remedy was amended via an ESD that specified that current areas of contaminated soil with PCB concentrations greater than or equal to 1 mg/kg and lead concentrations greater than or equal to 400 mg/kg would remain in place with capped cells and those areas unexcavated and inaccessible would remain until the Lower Tram Terminal is removed and the high-voltage power cable can be relocated. In addition, the ESD amended the remedy to include LUCs, including ECs and ICs, to restrict site use (USAF, 2018a). The status of each remedy component is described below.

As described above, ICs are in place at SS017, as documented in the 2017 LUC Management Plan (USAF, 2017b). LUC signs were installed at the site in 2017 (USAF, 2017c). In addition, IC inspections are completed at SS017 (USAF, 2017c). The results of the FYR inspection are provided in Section IV, *Site Inspection*.

In 2016, the excavation portion of the SS017 remedy was initiated (USAF, 2017a). The remedial excavation targeted soil with PCB concentrations above 1 mg/kg and/or lead concentrations above 400 mg/kg, and SS017 was divided into 23 cells (USAF, 2018a). Approximately 455 tons of PCB- and lead-contaminated soil were excavated from SS017 and shipped offsite for disposal. Analytical results from 12 of the 23 post-excavation samples collected from the sampling cells shown on Figure 9 identified PCBs and/or lead at concentrations exceeding ADEC cleanup standards. However, safety concerns regarding live, high-voltage power cables and stabilization or removal of the building require resolution prior to additional excavation activities at the site (USAF, 2017a). Upon completion of the 2016 excavation and sampling activities, the floor and sidewalls of those areas containing PCBs at concentrations greater than 1 mg/kg and lead concentrations above 400 mg/kg were covered with a geotextile to delineate the contaminated area for future removal actions. Clean fill from the installation borrow source was placed on top of the liner as backfill to match the surrounding grade, effectively acting as a cap to the contamination (USAF, 2017a). **Table 4** provides the status of the site's cells at the end of the 2016 remedial response action. The amended remedy allows the inaccessible contaminated soil to remain uncapped until the Lower Tram Terminal is removed and the high-voltage power cable is relocated (USAF, 2018a).

Table 4 SS017 Cell Status after 2016 Remedial Action

Cell Number	Clean/Capped	Estimated Soil Remaining (cubic yards)	PCB/Lead Sample Results Floor (f)/Wall (w)
1	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
2	Capped	8.3	**PCBs – 1 mg/kg (w)**
3 through 5	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
6	Capped	8.3	**PCBs – 1.6 mg/kg (f)**
7 and 8	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
9	Capped	8.3	**Lead – 660 mg/kg (w)**
10	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
11	Capped	8.3	PCBs – 18.4 mg/kg (w) Lead – 2,160 mg/kg (w)
12	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
13	Capped	8.3	**PCBs – 1.4 mg/kg (f)**
14	Clean	--	PCBs ≤ 1 mg/kg Lead ≤ 400 mg/kg
15	No*	16.6 (2-foot depth)	**PCBs ≥ 1 mg/kg** **Lead ≥ 400 mg/kg**
16	Capped	8.3	**PCBs – 3.3 mg/kg (f)**
17	Capped	8.3	**PCBs – 8.3 mg/kg (w)**
18	No*	16.6 (2-foot depth)	**PCBs ≥ 1 mg/kg** **Lead ≥ 400 mg/kg**
19	Capped	8.3	**PCBs – 1.6 mg/kg (f)**
20	Capped	8.3	**PCBs – 8.3 mg/kg (w)**
21 and 22	No*	16.6 (2-foot depth)	**PCBs ≥ 1 mg/kg** **Lead ≥ 400 mg/kg**
23	Capped (disposal pit)	8.3	**PCBs – 3.5 mg/kg (w)**

Source: USAF, 2018a

Bold = Concentration exceeds cleanup level

*The cells were not capped or fully excavated due to the safety zone around the high-voltage power cables.

An estimated 240 cubic yards of contaminated soil remains to be excavated at SS017, including approximately 90 cubic yards of contaminated soil discovered under the Lower Tram Terminal and contaminated soil that could not be accessed due to the buffer zone around the high-voltage

power cable. The live, high-voltage power cable prevents access to the contaminated soil at Cells 15, 18, 21, and 22 and further characterization of contaminated soil in Cells 19, 20, and 23 (USAF, 2017a). Powering down and moving the high-voltage cable is not feasible due to operational requirements of both the USAF and the FAA.

The amended remedy requires that the locations of the cap be surveyed and recorded in the land records, including the Base Master Plan and ADNR land records (USAF, 2018a). This portion of the amended remedy has not yet been implemented.

Site ST009

The remedy for ST009 includes LTM and ICs (USAF, 2008). ADEC established the IC record for ST009 on 27 February 2008 (ADEC, 2017a). The ST009 ICs also are documented in the 2017 LUC Management Plan (USAF, 2017b), as described above. IC inspections are completed at ST009 (USAF, 2015). The results of prior IC inspections and the Periodic Review inspection are provided in Section IV, *Site Inspection*.

The IC specifications include a requirement to file the appropriate notice with the USFWS. Appropriate notice includes agency review of decision documents. The USFWS reviewed the Proposed Plan in 2013 and identified concerns regarding the proposed remedy, primarily in relation to the use of LUCs if there was a possibility the USAF would relinquish its withdrawal of the LRRS property from the refuge. However, the USAF does not have any current or future plans to relinquish the withdrawal of the LRRS property.

LTM at ST009 includes the collection of groundwater and/or surface water samples. LTM was initiated in 2014 at ST009. The results of the LTM sampling are provided in Section IV, *Data Review*. The LTM portion of the remedy is being implemented in accordance with the ROD.

LUC Summary Table

Table 5 summarizes the LUCs that have been implemented for the sites included in this FYR and Periodic Review.

Table 5 Summary of Planned and/or Implemented LUCs

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	LUCs Needed	LUCs Called for in the Decision Documents	Impacted Parcel(s)	LUC Objective	Title of LUC Instrument Implemented and Date (or Planned)
Restrictions are in place that prohibit residential development and prevent exposure to contaminated media.	Yes	Yes	DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009	No unauthorized soil disturbance or use of contaminated media and no residential development	LUC Management Plan for the Pacific Air Forces Regional Support Center Installation, 2015

Table 5 (Cont.) Summary of Planned and /or Implemented LUCs

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	LUCs Needed	LUCs Called for in the Decision Documents	Impacted Parcel(s)	LUC Objective	Title of LUC Instrument Implemented and Date (or Planned)
LUC signs are present at the site.	Yes	Yes	LF003, SS010, SS015, SS016, SS017, and ST009	No unauthorized soil disturbance or use of contaminated media	Signs installed: 2016 and/or 2017
NECs were filed in ADNR's land records.	Yes	Yes	LF003, SS010, and SS016	Document LUCs/ICs in effect at each site	NECs filed: May 2018
Gravel caps were installed over areas with PCB-contaminated soil.	Yes	Yes	SS016 and SS017	Prevent exposure to contaminated soil	2016
Eroded soil control barriers will be constructed to prevent off-site migration of runoff water that may contain PCB-contaminated sediment.	Yes	Yes	LF003	Protect surface water that flows around the landfill and further away (Fowler Creek)	Planned: Summer 2019

Key:
ADEC – Alaska Department of Environmental Conservation
ADNR – Alaska Department of Natural Resources
LUC – land use control
IC – institutional control
NEC – Notice of Environmental Contamination
UU/UE – unlimited use/unrestricted exposure

Source: USAF, 2017b

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III. PROGRESS SINCE THE LAST REVIEW

This is the first Periodic Review for SS010, SS016, and SS017.

This is the third FYR for Site LF003. The second FYR for LF003, completed in 2013, identified the remedy as "not protective" and included the following protectiveness statement: "*The selected remedies for LF003 in the 2002 Interim ROD are not protective of human health and the environment, and do not comply with federal and state requirements that are legally applicable or relevant and appropriate. A new ROD was approved and signed in March 2013.*" The "not protective" determination applied to the IRA ROD; therefore, no issues were identified based on the 2013 FYR conclusion that the Final ROD for LF003 addressed the protectiveness issues at the site. Recommendations regarding well repairs and continued monitoring, which did not affect remedy protectiveness, were identified for LF003 in the 2013 FYR (USAF, 2013a).

This is the second Periodic Review for Sites DP011, SS014, and ST009 and the third Periodic Review for Sites SS013 and SS015. The prior Periodic Review for these sites, completed in 2013, identified the remedy as "protective" and included the following protectiveness statement:

> "*The selected remedies for Sites SS013, SS015, ST009, SS014, and DP011 comply with federal and requirements that are legally applicable or relevant and appropriate, and are considered cost-effective. The remedies currently meet the RAOs established in the Decision Documents by containing contaminants within the site, restricting excavation, and transportation of contaminants, and preventing exposure to the contaminants.*"

No issues were identified that affected the protectiveness of the remedies at these five sites, but recommendations that do not affect remedy protectiveness, including inspection and/or repair of monitoring wells, were identified (USAF, 2013a).

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IV. FYR AND PERIODIC REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by newspaper posting in *The Delta Discovery Newspaper* on 4 October 2017, stating that there was a FYR and Periodic Review and inviting the public to submit any comments to the USAF (**Appendix C**). No comments were received. The FYR and Periodic Review report will be made available in the Cape Romanzof LRRS Administrative Record, a copy of which is available online at http://afcec.publicadmin-record.us.af.mil/.

During the FYR and Periodic Review process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The following people were interviewed on the dates specified as part of the FYR and Periodic Review process:

- Mr. Richard Mauser, Restoration Project Manager, AFCEC – March 12, 2018;
- Mr. Louis Howard, Environmental Program Specialist, ADEC – February 26, 2018;
- Ms. Lita Page, Station Chief, ArcTec Alaska – August 9, 2017.

The results of the interviews are summarized below, and complete interview records are provided in **Appendix D**. Stantec contacted the USFWS Supervisory Wildlife Refuge Specialist for an interview; however, he did not have any personal experience at the sites and could not provide answers to the interview questions.

Mr. Mauser stated that there have been no breaches or complaints filed about the ICs at the sites. He noted that the ICs are enforced through signage, periodic site inspections, environmental self-audits, LUC briefings, and review/approval of dig permits for the installation. Mr. Mauser identified the following actions that occur if a LUC/IC violation is verified: the USAF initially notifies ADEC of the LUC/IC violation and follows up within 10 days of the LUC/IC violation with a written notice and corrective action taken to ADEC. Mr. Mauser highlighted training of station personnel and site signage with maps as important tools to avoid IC violations.

Mr. Howard confirmed that the USAF provides the required LUC reports to ADEC and that the LUCs are functioning as expected. However, Mr. Howard requested that a Notice of Environmental Contamination be placed in ADNR's records for Sites DP011, SS014, and ST009 and confirmation that such notice had been placed for the sites that require such notice as part of their remedy.

Ms. Page, who works at the Cape Romanzof LRRS, stated that restoration projects and monitoring occur regularly at the installation. She stated that there are no site visitors and that the nearest community is over 15 miles away. She was not aware of any incidents of vandalism or trespassing at the installation. She noted that onsite maintenance staff does not conduct O&M at the sites included in this FYR, as that work is completed by USAF consultants. She was not aware of any problems regarding the cleanup activities or remedy implementation.

Data Review

No analytical data were collected at Sites DP011, SS013, or SS014 during the period of this review (2013 through 2018). Data collected during the period of this review at Sites SS016 and SS017 consist only of post-excavation confirmation sampling, as described in Section II, *Status of*

Implementation. Data collected at Sites LF003, SS010, SS015, and ST009 during the period of this review are summarized below.

Site LF003

Data collected at LF003 during the period of this FYR (2013 to 2018) include soil, surface water, and sediment sampling. The post-excavation confirmation soil samples are described in Section II, *Status of Implementation*. The results of the 2017 LTM samples are summarized below.

In 2017, four surface water and sediment samples were collected from a seep, west of the landfill site, and four surface soil samples were collected from LF003 (USAF, 2018b). The samples were analyzed for PCBs. The PCB compound Aroclor-1260 was detected at three of the surface water sampling locations (SW-01, SW-02 and SW-04) at concentrations of 0.55 ug/L, 0.731 ug/L and 21.5 ug/L, respectively, all exceeding the cleanup level for composite PCB concentrations of 0.5 ug/L (USAF, 2018b). PCBs were detected at all four sediment sample locations, with three locations (SED-01, SED-02 and SED-04) exceeding the 18 AAC 27 Method Two Tables B1 and B2 Soil cleanup levels of 1 mg/kg. Sediment sample locations SED-01, SED-02 and SED-04 had PCB concentrations reported at 129 mg/kg, 96.4 mg/kg, and 106 mg/kg, respectively (USAF, 2018b). The soil sample results identified PCBs (maximum of 0.147 mg/kg) in two of the four samples at concentrations below the 1 mg/kg cleanup level (USAF, 2018b).

Site SS010

Data collected at SS010 during the period of this Periodic Review (2013 to 2018) include soil and groundwater sampling. The sampling reports from 2014 and 2015, which are available in the Cape Romanzof Administrative Record, were reviewed and are summarized below.

During the 2014 monitoring well installation activities, nine soil samples were collected from the three soil borings advanced at SS010 and completed as monitoring wells (USAF, 2015). The soil samples were analyzed for DRO, GRO, and RRO. GRO was not detected in any of the soil samples; DRO was detected in only one sample at a concentration of 50.5 mg/kg, which is below its ADEC cleanup level; and RRO was detected in six of the samples at a maximum concentration of 494 mg/kg, which is below the ADEC cleanup level (USAF, 2015). No additional soil samples were collected at SS010 during the period of this Periodic Review.

Groundwater LTM was completed at SS010 in 2014 and 2015. Groundwater samples were collected from wells SS010-MW01, -MW02, and -MW03 in 2014 (USAF, 2015). In 2015, only wells SS010-MW01 and -MW02 were sampled, as there was insufficient water in well SS010-MW03 (USAF, 2016a). The groundwater samples were analyzed for DRO, GRO, and RRO, and all analytes were detected at concentrations below their ADEC cleanup levels (USAF, 2015 and 2016a). **Table 6** summarizes the results of the 2014 and 2015 groundwater LTM samples at SS010. Groundwater sampling was not conducted at SS010 in 2016 or in subsequent years (USAF, 2016b).

Table 6 SS010 Groundwater Detections, 2014 and 2015

Well	Analyte	Detected Concentration (mg/L)		ROD Cleanup Level[1] (mg/L)
		2014	2015	
SS010-MW01	DRO	ND	ND	1.5
	GRO	0.0356 J	ND	2.2
	RRO	0.393 J	ND	1.1
SS010-MW02	DRO	ND	ND	1.5
	GRO	ND	ND	2.2
	RRO	ND	ND	1.1
SS010-MW03	DRO	ND	NS	1.5
	GRO	0.0326 J	NS	2.2
	RRO	0.705	NS	1.1

Key:
1 – The ROD cleanup levels are consistent with the current ADEC cleanup levels (ADEC, 2017c).
DRO – diesel-range organics
GRO – gasoline-range organics
J – The analyte was positively identified; the quantitation limit is estimated.
mg/L – milligrams per liter
ND – not detected at a concentration above the reporting limit
NS – not sampled (insufficient water)
ROD – Record of Decision
RRO – residual-range organics
Sources: USAF, 2015 and 2016a

Site SS015

Data collected at SS015 during the period of this Periodic Review (2013 to 2018) includes groundwater sampling. The LTM reports from 2014, 2015, 2016, and 2017, which are available in the Cape Romanzof Administrative Record, were reviewed and are summarized below.

Groundwater samples were collected from three existing wells (WW-01, WW-05, and WW-06) at Site SS015 in 2014, 2015, 2016, and 2017. The samples from 2014 and 2015 were analyzed for DRO, GRO, BTEX, and for MNA parameters (USAF, 2015 and 2016a). The samples from 2016 and 2017 were analyzed for DRO, GRO, and BTEX (USAF, 2017d and 2018). DRO, GRO, and benzene are the only analytes detected in SS015 groundwater at concentrations exceeding their ROD and/or ADEC cleanup levels (USAF, 2015, 2016a, 2017c, and 2018). **Table 7** summarizes the DRO, GRO, and benzene detections at SS015 from 2014 through 2017. The 2015 LTM report noted that well WW-01 was damaged at the surface, and the well was open at the ground level for surface inputs into groundwater (USAF, 2016a).

Table 7 SS015 DRO, GRO, and Benzene Detections in Groundwater, 2014 to 2017

Well	Analyte	Detected Concentration (mg/L)				ROD Cleanup Level (mg/L)	ADEC Cleanup Level (mg/L)
		2014	2015	2016	2017		
WW-01	DRO	**3.16**	**19.7**	**12 MQ**	**8.69**	1.5	1.5
	GRO	0.191 J	1.04	0.46 MQ	0.249	1.1	1.1
	Benzene	0.00221 J	**0.0876**	**0.07 J**	**0.0567**	0.005	0.0046
WW-05	DRO	0.418	0.887	**2.3 M**	1.36	1.5	1.5
	GRO	ND	0.0703 J	**4.2 MQ**	0.807	1.1	1.1
	Benzene	ND	0.00449	**0.067 Q**	**0.0666 J**	0.005	0.0046
WW-06	DRO	**1.56**	0.421 J	**3.1 M**	**1.84**	1.5	1.5
	GRO	0.0461	ND	ND	ND	1.1	1.1
	Benzene	ND	ND	ND	ND	0.005	0.0046

Key:
ADEC – Alaska Department of Environmental Conservation
DRO – diesel-range organics
GRO – gasoline-range organics
J – The analyte was positively identified; the quantitation limit is estimated.
M – Duplicate injection precision not within control limits; therefore, the result is estimated.
mg/L – milligrams per liter
ND – not detected at a concentration above the reporting limit
Q – One or more quality control criteria failed.
ROD – Record of Decision
Bold – the detected concentration exceeds the ROD cleanup level
Sources: ADEC, 2017c; USAF, 2015, 2016a, 2017c, and 2018

Site ST009

Data collected at ST009 during the period of this Periodic Review (2013 to 2018) includes soil, groundwater, and surface water sampling. The LTM reports from 2014, 2015, 2016, and 2017, which are available in the Cape Romanzof Administrative Record, were reviewed and are summarized below.

Groundwater samples were collected annually from 2014 through 2017 from three existing wells (MW-4, MW-7, and MW-9) at ST009. The samples were analyzed for DRO, GRO, and BTEX (USAF, 2015, 2016a, 2017c, and 2018). DRO is the only analyte detected in ST009 groundwater at concentrations exceeding its ADEC cleanup level in the samples from 2014 through 2017 (1.5 mg/L); however, the detections are all below the ROD cleanup level of 15 mg/L. The ADEC groundwater cleanup levels do not apply to ST009 groundwater, as ADEC agreed in the 2008 ROD that site groundwater meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source (USAF, 2008). The shallow groundwater is not suitable as drinking water since it is brackish and unfit for human consumption and it is not within a recharge area for a

private/public drinking water well, a well protection area, or a sole source aquifer. **Table 8** summarizes the DRO detections in groundwater at ST009 from 2014 through 2017.

Table 8 ST009 DRO Detections in Groundwater, 2014 to 2017

Well	DRO Concentration (mg/L)				ROD Cleanup Level (mg/L)
	2014	2015	2016	2017	
MW-4	1.21	5.44	1.2	4.53	15
MW-7	2.87	2.58	2.3	1.27	
MW-9	1.04	3.48	2.9	1.5	

Key:
DRO – diesel-range organics
mg/L – milligrams per liter
ROD – Record of Decision

Sources: USAF, 2015, 2016a, 2017c, and 2018

In 2016 and 2017, groundwater contaminant plume behavior modeling was conducted for three groundwater water sample locations at Site ST009 (MW-4, MW-7, and MW-9) to determine the potential trends for natural attenuation. The analysis, monitoring, and evaluation process used historical and recent data collected from the existing groundwater wells (USAF, 2017d). A Mann-Kendall statistical test was implemented, using 5 years of ST009 groundwater analytical data. The 2016 modeling results indicated decreasing trends in DRO concentrations observed at the furthest upgradient monitoring wells (MW-4 and MW-7) and a slightly increasing trend in the DRO concentration observed at the farthest down-gradient monitoring well (MW-9) (USAF, 2017d). The 2017 modeling results did not find any conclusive trends; therefore, a timeline for reaching DRO cleanup levels could not be estimated (USAF, 2018b).

In 2014 and 2015, a surface water sample and a duplicate sample were collected from Fowler Creek, which flows through ST009. The samples were analyzed for PAHs, VOCs, and BTEX in order to calculate TAH and TAqH concentration values (USAF, 2015 and 2016a). No analytes were detected at concentrations above the limit of detection in the 2014 or 2015 surface water samples (USAF, 2015 and 2016a). The resulting TAH and TAqH results were below the AWQS for TAH and TAqH of 10 micrograms per liter (µg/L) and 15 µg/L, respectively. Based on these findings, the 2015 report recommended that surface water sampling be discontinued (USAF, 2016a). Surface water monitoring was not conducted at ST009 in 2016 or in subsequent years (USAF, 2016b).

In 2017, one surface soil sample was collected from an area of stained soil. The soil sample was analyzed for DRO, RRO, and PCBs (USAF, 2018b). DRO (9.05 mg/kg), RRO (45.2 mg/kg), and PCBs (maximum of 0.287 mg/kg) were detected in the surface soil sample at concentrations below the respective cleanup levels of 250 mg/kg, 10,000 mg/kg, and 1 mg/kg (USAF, 2018b).

Site Inspection

Site inspections were conducted in August 2017 as part of the FYR and Periodic Review. The following sections summarize the findings of the site inspections. The complete site inspection checklists and photographic logs are provided in **Appendix E**.

Site DP011

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. Site access is highly monitored and is limited to site personnel only. Minor debris, consisting of 55-gallon drums, was observed between large boulders at the site. No issues were identified that affect the protectiveness of the remedy at DP011.

Site LF003

Annual IC and cap inspections are completed at LF003. In 2014 and 2015, the top of the cap was sparsely vegetated, but vegetative cover was up to 90 percent on the eastern and southern edges of the landfill. Vegetative cover in 2016 was somewhat less in 2016 than 2015 due to remediation activities conducted at the site (USAF, 2017d). Vegetative cover could not be evaluated in 2017 because the inspection was conducted in winter conditions and the landfill was covered in snow (USAF, 2018b). Surface erosion was noted on the western sidewall of the landfill in 2014 and 2016 and additional erosion channels were observed on the eastern sidewall in 2015 (USAF, 2015 and 2016a). Erosion channels from the adjacent road reportedly direct runoff from the road over the landfill cap (USAF, 2015 and 2016a). Partially-buried debris was also noted at LF003 in 2014 and 2015, and tire tracks were observed on the cap surface (USAF, 2015 and 2017c). In 2016, exposed inert metal and plastic debris was observed as well as possible exposed liner along the southwestern boundary of the site (USAF, 2017d). The 2014 and 2015 inspection reports recommended placement of additional fill to cover the exposed debris at LF003 (USAF, 2015). In 2016, LUC signs were installed at LF003. In 2017, monitoring well CMW3 was observed to be damaged and MW1 was frost-jacked (USAF, 2018b).

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signage is also present along the site access road. Site access is highly monitored and is limited to site personnel only. Erosion was not observed; however, debris is visible along the southwest toe of the landfill. Five wells (CMW3, CMW7, MW1, MW2, and MW3) are frost-heaved, unlocked, and are missing expansion plugs. All other wells are intact and in good condition.

Site SS010

Annual IC inspections are completed at SS010. The site is actively used by installation personnel year-round for industrial and station operations, primarily during weather monitoring flights (USAF, 2015). No issues were identified at SS010 in 2014. In 2015 and 2016, debris was noted on the western slope of the site and consisted of metal, construction debris, plastic, and a battery (2015 only) (USAF, 2016a and 2017c). A 55-gallon drum was observed south of the dry streambed, while some metal debris was noted in the streambed itself (USAF, 2016a). In 2016 and 2017, a large runoff channel that is actively eroding was observed on the eastern slope (USAF, 2017d and 2018). However, the gravel pad does not appear to be eroding from the eastern slope runoff source (USAF, 2018b).

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. Site access is highly monitored and is limited to site personnel only. All monitoring wells were observed to be in good condition and were locked. No issues were identified that affect the protectiveness of the remedy at SS010.

Site SS013

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signs were also observed at the site boundary. Site access is highly monitored and is limited to site personnel only. One monitoring well was present in approximately the location of MW-3, where 2010 site maps show a decommissioned well. No issues were identified that affect the protectiveness of the remedy at SS013.

Site SS014

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. Site access is highly monitored and is limited to site personnel only. Three monitoring wells were observed at the site and are locked; however, wells MW-1 and MW-3 are not plumb with the ground surface. No issues were identified that affect the protectiveness of the remedy at SS014.

Site SS015

Annual IC inspections are completed at SS015. In 2016, a large channel that appeared to be eroding was noted running west across the site (USAF, 2017d). However, runoff and associated sediment did not appear to be migrating offsite, as sediment was deposited within the site boundaries. No erosion channels were noted in 2017; however, the inspection was conducted when there was heavy snow cover (USAF, 2018b). Partially-buried, inert debris, including copper wire and rebar, was noted as being prevalent throughout the site in 2016, and one crushed drum was observed on the western boundary of SS015 (USAF, 2017d).

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signs are present at the site boundary. Site access is highly monitored and is limited to site personnel only. Four monitoring wells were observed at the site, and three of the wells (WW-1, WW-3, and WW-5) are damaged. All four wells are unlocked. No issues were identified that affect the protectiveness of the remedy at SS015. Well WW-1 was repaired in 2017 (USAF, 2018b).

Site SS016

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signage is also present on the Upper Tram Terminal Building. Site access is highly monitored and is limited to site personnel only. No evidence of land disturbance was observed. No issues were identified that affect the protectiveness of the remedy at SS016.

Site SS017

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signage is also present on the Lower Tram Terminal Building. Site access is highly monitored and is limited to site personnel only. No evidence of land disturbance was observed. No issues were identified that affect the protectiveness of the remedy at SS017.

Site ST009

Annual IC inspections are completed at ST009. The site is used for storage of shipping containers; however, the site is not accessible during the winter months, as the access road is not plowed. In

2014, 2015, 2016, and 2017, erosion was observed along the southern edge of the site, adjacent to the beach, and several 55-gallon drums were observed within the eroding bank and at the shoreline below the high tide mark (USAF, 2015, 2016a, and 2017c); however, these drums were used as a bank retaining wall and were not part of a drum dump (Mr. Richard Mauser, USAF, personal communication, 30 August 2018). In 2015 and 2016, stains were observed on the ground surface in the parking and equipment storage area (USAF, 2016a and 2017c). The stained soil was sampled in 2017, as described in Section IV, *Data Review*. Strong petroleum odors were noted in the monitoring wells in 2014 (USAF, 2015), and the purge water from wells MW-4 and MW-7 was noted to have a strong petroleum odor and sheen in 2015 (USAF, 2016a). One warning sign was observed at the site, and the 2014 and 2015 inspection reports recommended that a second warning sign be installed along the eastern side of Fowler Creek on the western edge of the ST009 site boundary (USAF, 2015). Additional signage was installed in 2017 (USAF, 2018b).

During the 2017 inspection, maps showing the LUC boundaries were observed in the personnel housing and work areas. LUC signage is also present at the site boundary. Site access is highly monitored and is limited to site personnel only. All monitoring wells were observed to be in good condition, except MW5, which is frost-heaved. Wells MW-4, MW-5, MW-7, and MW-9 require locks and/or replacement locks.

V. TECHNICAL ASSESSMENT

QUESTION A: *Is the remedy functioning as intended by the decision documents?*

The review of documents, site data, and the results of the site inspections indicate that the remedies at Sites DP011, SS010, SS013, SS014, SS015, and ST009 are functioning as intended by the RODs. The remedy at Site LF003 is not functioning as intended by the ROD. Exposed debris was observed along the perimeter of the landfill at LF003. Fill placement is required at LF003 to cover exposed debris observed at the site and restore the integrity of the landfill cap. In addition, the eroded soil control barriers have not yet been installed at LF003; however, installation of silt fencing is planned for the 2019 field season (Mr. Richard Mauser, personal communication, 7 November 2018). The remedies at Sites SS016 and SS017 are also not functioning as intended by the ROD, as inaccessible, contaminated soil remains at these two sites.

ICs and LUCs are in place to prevent exposures to contaminated media at Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009. The LUCs have been recorded in the LUC Management Plan for the Pacific Air Forces Regional Support Center Installation (USAF, 2017b). LUC inspections are conducted and reports are submitted to ADEC. The NECs required for Sites LF003, SS010, and SS016 were filed in May 2018, and the USFWS was given appropriate notice, through their review of the Proposed Plan, of the ICs in place for Sites DP011, SS013, SS014, and SS015.

The remedies for Sites LF003, SS010, SS015, and ST009 require LTM. LTM was initiated at LF003 in 2017, and the results indicate that PCBs are present in surface water and sediment at concentrations exceeding cleanup levels. Sample results indicate TSCA-level PCBs and remediation waste will need to be addressed in accordance with 40 CFR § 761.3. The USAF is planning to conduct further remedial actions to address the sediment contamination. If further remedial action does not address the continued release of PCBs into sediment, then the USAF will determine appropriate action to address the continuing source of PCBs within the landfill and/or to install a groundwater diversion barrier to prevent groundwater from traveling through the LF003 landfill and leaching into the sediments. Monitoring will continue at LF003.

LTM was completed at SS010 in 2014 and 2015 in accordance with the ROD, and no analytes were detected at concentrations above their cleanup levels. Therefore, LTM is no longer conducted at SS010 as the ROD requirement for two consecutive sampling events with all COCs below groundwater cleanup levels was met.

LTM data from 2014 through 2017 for SS015 indicate that contaminant concentrations in groundwater remain elevated relative to ADEC cleanup levels. DRO, GRO, and benzene are the only analytes present in SS015 groundwater at concentrations exceeding their ADEC cleanup levels of 1.5 mg/L, 1.1 mg/L, and 0.005 mg/L, respectively. The LTM components of the remedy for Site SS015 is being implemented in accordance with the ROD, and groundwater LTM will continue at the site.

LTM data from 2014 through 2017 identified DRO as the only analyte present in ST009 groundwater at concentrations exceeding its ADEC cleanup level. However, ADEC agreed in the 2008 ROD that ST009 groundwater meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source. The shallow groundwater is not suitable as drinking water since it is brackish and unfit for human consumption. The shallow groundwater is not within a recharge area

for a private/public drinking water well, a well protection area, or a sole source aquifer. Therefore, Table C groundwater cleanup levels do not apply at ST009. DRO concentrations are below the 15 mg/L cleanup level established in the ROD for all groundwater results from 2014 through 2017. Groundwater monitoring will cease upon approval of this Periodic Review. Surface water monitoring did not identify any exceedances of TAH (10 µg/L) or TAqH (15 µg/L) in surface water samples collected during 2004, 2006, 2007 through 2009, or 2012 through 2015. Surface water sampling ceased in 2015.

The excavation portion of the remedies for Sites LF003, SS016, and SS017 were initiated in 2016. However, residual PCB and/or lead contamination remains at all three sites at concentrations above ADEC cleanup levels. Further excavation may not be feasible due to buried debris at LF003 and safety concerns at SS016 and SS017. The excavation component of the remedies for Sites LF003, SS016, and SS017 have been not yet been fully implemented. Approximately 256 cubic yards (396 tons) of PCB- and lead-contaminated soil remain at SS016, and an estimated 240 cubic yards (372 tons) of contaminated soil remains at SS017. The USAF issued ESDs to amend the remedies for Sites SS016 and SS017 in 2018. The ESDs amended the remedies to allow inaccessible contaminated soil that could not be excavated or capped to remain until the Upper Tram Terminal and the Lower Tram Terminal are removed, the high-voltage power cable is removed or relocated, and the slope is stabilized. The amended remedies include the expectation that the inaccessible contaminated soil at SS016 and SS017 will be excavated after the removal of the Upper and Lower Tram Terminals and removal/relocation of the high-voltage power cable. These activities are expected to occur at SS017 in 2023 (USAF, 2018a). The ESD included a statutory determination that the selected remedies for SS016 and SS017, as modified, will be protective of human health and the environment (USAF, 2018a).

QUESTION B: *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

The exposure assumptions, toxicity data, and RAOs used at the time of the remedy selection are still valid. However, revised human health risk-based cleanup levels have been promulgated since the RODs were signed. In February 2017, ADEC issued amended AWQS. However, the AWQSs of 10 µg/L for TAH and 15 µg/L for TAqH were not changed (ADEC, 2017b).

In 2017, ADEC issued updates to 18 AAC 75 that included revisions to soil and groundwater cleanup levels (ADEC, 2017c). Benzene, ethylbenzene, and toluene in groundwater are the only ROD COCs for which the cleanup level was revised. The benzene groundwater cleanup level decreased from 0.005 mg/L to 0.0046 mg/L; the ethylbenzene cleanup level decreased from 0.7 mg/L to 0.005 mg/L; and the toluene cleanup level increased from 1 mg/L to 1.1 mg/L. BTEX concentrations are monitored at SS015 as part of the ongoing LTM, and LUCs are in place to prevent groundwater use. Therefore, the change in the benzene cleanup level does not affect the protectiveness of the SS015 remedy.

Appendix F provides a comparison of the maximum detected concentrations of soil and/or groundwater COPCs at Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009 to the revised ADEC cleanup levels. Groundwater COPCs for SS014 and ST009 were not evaluated because ADEC groundwater cleanup levels do not apply to groundwater as these sites. Arsenic and/or chromium concentrations in soil at Sites DP011, SS010, and SS014 exceed the current ADEC cleanup level. However, arsenic and chromium are considered naturally-occurring due to their prevalence throughout the state and because there are no known or suspected sources

at these sites and were therefore not retained as COPCs. The detected PCB soil concentration at one DP011 location exceeded the ADEC Method Two cleanup level of 1 mg/kg; however, the 95 percent UCL of the mean PCB concentration was below the cleanup level so PCBs were not identified as COCs at DP011 (USAF, 2008). The comparison presented in Appendix F identified the following COPCs at concentrations exceeding the current ADEC cleanup levels:

- DP011 – DRO, PAHs, and mercury in soil
- LF003 – PCBs in soil; and DRO, benzene, and 1,4-dichlorobenzene in groundwater
- SS010 – DRO, benzene, chloroform, ethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1-methylnaphthalene, and 2-methylnaphthalene in soil
- SS013 – DRO, GRO, RRO, ethylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, total xylenes, and 2-methylnaphthalene in soil; and DRO in groundwater
- SS014 – DRO and GRO in soil
- SS015 – DRO and GRO in soil; and DRO, GRO, RRO, benzene, ethylbenzene, PAHs, 1-methylnaphthalene, and 2-methylnaphthalene in groundwater
- SS016 – DRO, PCBs, and lead in soil
- SS017 – DRO, RRO, PCBs, and lead in soil
- ST009 – DRO, ethylbenzene, and total xylenes in soil; and DRO and GRO in groundwater

ICs and LUCs are in place at Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009; therefore, changes to the ADEC cleanup levels do not affect the protectiveness of the remedies at these sites.

There have been no changes in the physical conditions of any sites except LF003 and ST009 that would affect the protectiveness of the remedy. At LF003, weathering has caused debris to be exposed along the landfill perimeter. At ST009, drums are exposed within the eroding bank and at the shoreline below the high tide mark; however, these drums were used as a bank retaining wall and were not part of a drum dump (Mr. Richard Mauser, USAF, personal communication, 30 August 2018). There are no changes to the exposure pathways at any of the sites.

QUESTION C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

No additional information has been identified that calls into question the protectiveness of the remedies for these nine sites.

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VI. ISSUES/RECOMMENDATIONS

This section identifies issues affecting the protectiveness of the remedies at Sites LF003 and ST009. No issues affecting the protectiveness of the remedies for Sites DP011, SS010, SS013, SS014, SS015, or ST009 were identified.

Issues/Recommendations
Sites without Issues/Recommendations Identified in the FYR and Periodic Review:
DP011, SS010, SS013, SS014, SS015, and ST009

Issues and Recommendations Identified in the FYR and Periodic Review:				
Site(s): LF003	**Issue Category: Institutional Controls**			
	Issue: Exposed debris is visible along the southwest toe of the landfill.			
	Recommendation: Place fill and install an impermeable liner and geotextile material at LF003 to cover exposed debris and restore the integrity of the landfill cap.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	USAF	ADEC	12/31/2020

Site(s): LF003	**Issue Category: Remedy Performance**			
	Issue: The remedy requires eroded soil control barriers be constructed at LF003 to prevent the off-site migration of runoff water that may contain PCB-contaminated sediment.			
	Recommendation: Install silt fencing to prevent off-site migration of PCB-contaminated eroded soil or sediment.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	USAF	ADEC	9/30/2019

Site(s): LF003	**Issue Category: Remedy Performance**			
	Issue: Contaminated sediments remain above the PCB cleanup level (1 mg/kg) at three locations.			
	Recommendation: Conduct remedial action to remove contaminated sediments and, if necessary, prevent further transport of contaminants from the landfill.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	USAF	ADEC	12/29/2023

Site(s): SS016	**Issue Category: Remedy Performance**			
	Issue: During the remedial action in 2016, six cells where not capped due to safety and logistical issues. Approximately 256 cubic yards of PCB- and lead-contaminated soil remain uncapped and unexcavated at SS016.			
	Recommendation: Excavate the remaining, inaccessible soil contamination after removal of the Upper Tram Terminal, relocation of the high-voltage power line, and stabilization of the slope.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	USAF	ADEC	12/29/2023

Site(s): SS017	**Issue Category: Remedy Performance**			
	Issue: Contaminated soil remains in place with capped cells and those areas unexcavated and currently inaccessible. Approximately 240 cubic yards of PCB- and lead-contaminated soil remain at SS017.			
	Recommendation: Excavate the remaining, inaccessible soil contamination after removal of the Lower Tram Terminal and relocation of the high-voltage power line.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	USAF	ADEC	12/29/2023

The following recommendations that do not affect the protectiveness of the site remedies were identified during this FYR and Periodic Review:

- The USAF should take action to repair and secure wells, as follows:
  - Five wells (CMW3, CMW7, MW1, MW2, and MW3) at Site LF003 are damaged, frost-heaved, or unlocked and are missing expansion plugs.
  - All four wells at Site SS015 are unlocked and two wells (WW-3 and WW-5) are damaged.

  - Well MW-5 at Site ST009 is frost-heaved, and four wells at the site (MW-4, MW-5, MW-7, and MW-9) are unlocked.

- A monitoring well was present at Site SS013 in the approximate location of MW-3, where 2010 site maps show a decommissioned well. The USAF should investigate this well and determine its status.
- Wells MW-1 and MW-3 at Site SS014 are not plumb; however, the remedy for Site SS014 does not include groundwater monitoring. The USAF should consider removing/decommissioning these monitoring wells.
- The USAF should survey the areas of inaccessible contaminated soil and/or the caps at Sites SS016 and SS017 and record them in the land records to fully implement the amended remedies.
- A 2008 groundwater use determination classified ST009 groundwater as a non-drinking water source, and data from 2014 through 2017 confirm that DRO concentrations are below the ROD cleanup level. Therefore, groundwater LTM at ST009 should cease upon approval of this Periodic Review report.
- A comparison of historical data to 2017 ADEC cleanup levels indicates that detected concentrations of some COPCs exceed current cleanup levels. LUCs are in place to prevent exposures; however, a risk evaluation of these COPCs should be conducted to evaluate potential risks prior to the termination of LUCs.

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VII. PROTECTIVENESS STATEMENTS

Protectiveness Statements		
Site: ***DP011***	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not applicable
Protectiveness Statement: The remedy at Site DP011 is protective of human health and the environment. There are no immediate threats from DP011, and the remedy is being implemented in accordance with the ROD. The remedy is protective currently and in the future because LUCs are fully implemented and inspections are performed. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.		
Site: **LF003**	*Protectiveness Determination:* **Not Protective**	*Planned Addendum Completion Date:* Not Applicable
Protectiveness Statement: The remedy at Site LF003 is not protective of human health and the environment. The remedy is being implemented in accordance with the ROD, as cap inspections are performed annually, LUCs are implemented, and excavation activities have been initiated. However, exposed debris is present at the site, eroded soil control barriers have not yet been installed, and PCB-contaminated sediment remains at the site. In order for the remedy to be protective, the integrity of the landfill cap must be restored through fill placement and maintenance, eroded soil control barriers must be installed, and contaminated sediment must be remediated in accordance with the ROD.		
Site: **SS010**	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not applicable
Protectiveness Statement: The remedy at Site SS010 is protective of human health and the environment. There are no immediate threats from SS010, and the remedy is being implemented in accordance with the ROD. LTM was conducted in accordance with the ROD and ceased in 2015 because the ROD requirements had been met. The remedy is protective currently and in the future because inspections are performed and LUCs are fully implemented. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.		

Site: **SS013**	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not Applicable

Protectiveness Statement: The remedy at Site SS013 is protective of human health and the environment. There are no immediate threats from SS013, and the remedy is being implemented in accordance with the ROD. The remedy is protective currently and in the future because LUCs are fully implemented and inspections are performed. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.

Site: **SS014**	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not applicable

Protectiveness Statement: The remedy at Site SS014 is protective of human health and the environment. There are no immediate threats from SS014, and the remedy is being implemented in accordance with the ROD. The remedy is protective currently and in the future because LUCs are fully implemented and inspections are performed. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.

Site: **SS015**	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not Applicable

Protectiveness Statement: The remedy at Site SS015 is protective of human health and the environment. There are no immediate threats from SS015, and the remedy is being implemented in accordance with the ROD. The remedy is protective currently and in the future because LUCs are fully implemented and LTM is ongoing. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.

Site: **SS016**	*Protectiveness Determination:* **Protectiveness Deferred**	*Planned Addendum Completion Date:* Not applicable

Protectiveness Statement: A protectiveness determination of the remedy at SS016 cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: excavate the inaccessible PCB- and lead-contaminated soil after removal of the Upper Tram Terminal, relocation of the high-voltage power line, and stabilization of the slope. It is expected that these actions will be conducted in 2023, at which time a protectiveness determination will be made.

Site: **SS017**	*Protectiveness Determination:* **Protectiveness Deferred**	*Planned Addendum Completion Date:* Not Applicable

Protectiveness Statement: A protectiveness determination of the remedy at SS017 cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: excavate the inaccessible PCB- and lead-contaminated soil after removal of the Lower Tram Terminal and relocation of the high-voltage power line. It is expected that these actions will be conducted in 2023, at which time a protectiveness determination will be made.

Site: **ST009**	*Protectiveness Determination:* **Protective**	*Planned Addendum Completion Date:* Not Applicable

Protectiveness Statement: The remedy at Site ST009 is protective of human health and the environment. There are no immediate threats from ST009, and the remedy is being implemented in accordance with the ROD. The remedy is protective currently and in the future because LTM is ongoing, inspections are performed, and LUCs are fully implemented. Continued compliance with the effective LUCs is required to maintain the long-term protectiveness of the remedy.

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VIII. NEXT REVIEW

The next FYR and Periodic Review for Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009 at Cape Romanzof LRRS will be completed 5 years from the USAF signature date on this FYR and Periodic Review.

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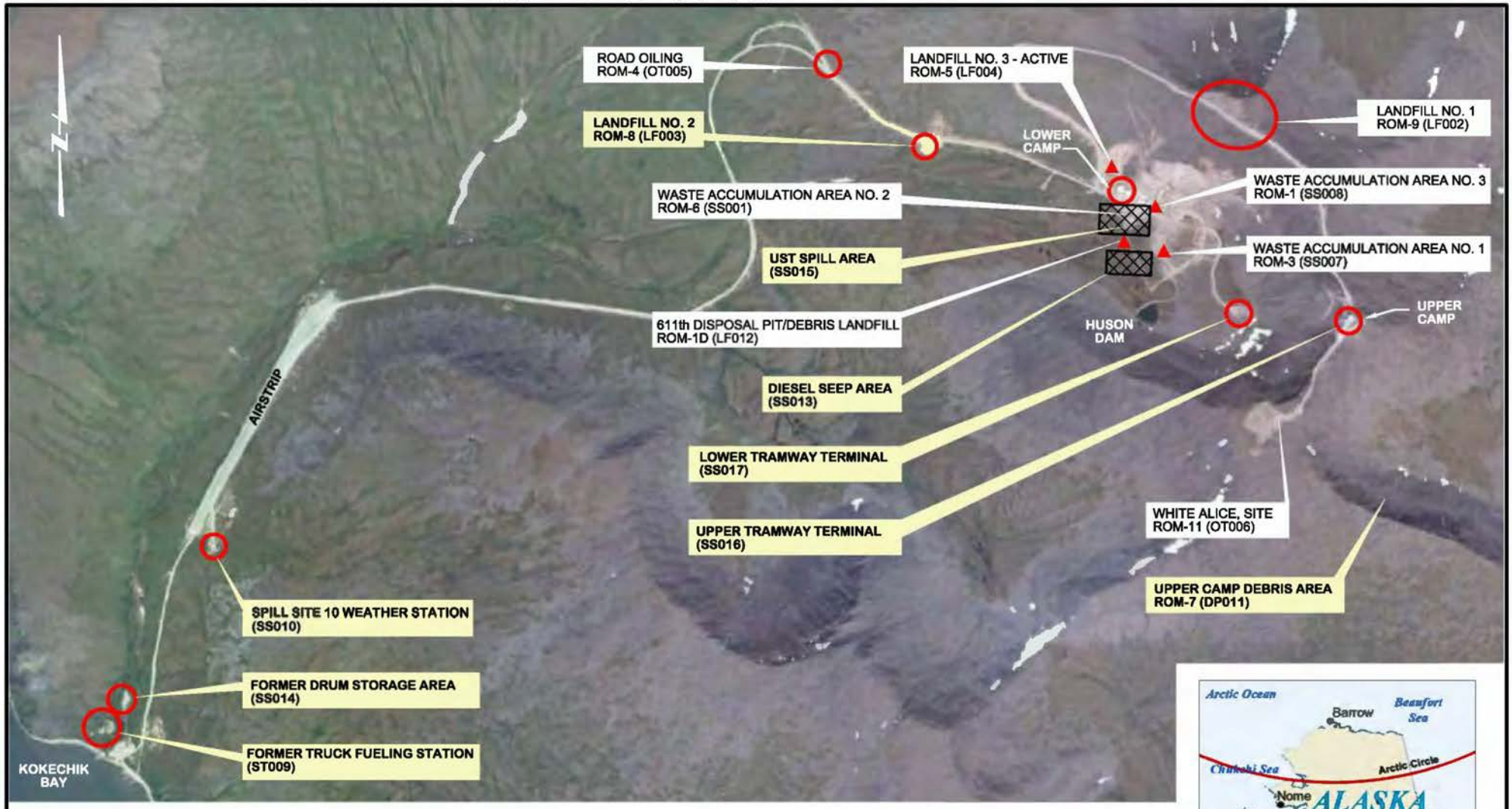
FIGURES

TIME: 11-MAY-2018 14:42 FILE: C:\D\CAD\Proj\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig01_location_and_vicinity_map .dgn

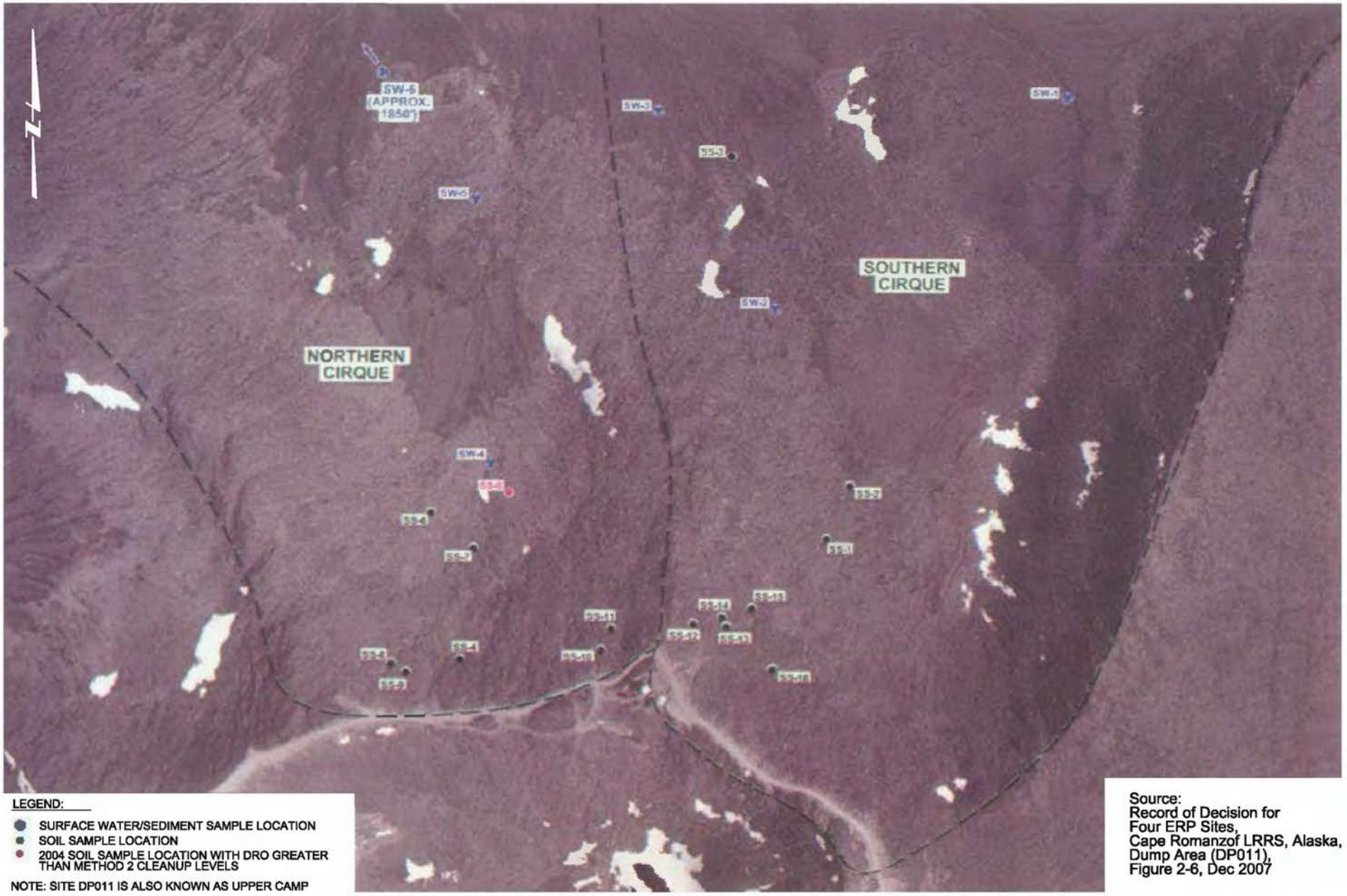


Source:
Cape Romanzof LRRS,
Environmental Restoration Program Sites,
Jacobs, 08 April 2013, Figure 1-1

NOTE:
SITES IDENTIFIED WITH YELLOW LABELS
ARE DISCUSSED IN THIS FYR AND PERIODIC REVIEW.

SCALE IN FEET 0 3500	UNITED STATES AIR FORCE JOINT BASE ELMENDORF-RICHARDSON, ALASKA 2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA	LOCATION AND VICINITY MAP	FIGURE 1 185750836. 100.69020401

TIME: 11-MAY-2018 14:52 FILE: C:\D\CAD\Proj\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig02_DP011.dgn



LEGEND:

- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- SOIL SAMPLE LOCATION
- 2004 SOIL SAMPLE LOCATION WITH DRO GREATER THAN METHOD 2 CLEANUP LEVELS

NOTE: SITE DP011 IS ALSO KNOWN AS UPPER CAMP

Source:
Record of Decision for
Four ERP Sites,
Cape Romanzof LRRS, Alaska,
Dump Area (DP011),
Figure 2-6, Dec 2007

APPROXIMATE SCALE IN FEET
0 450

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA
2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE DP011

FIGURE
2
185750836.
100.69020401

LEGEND

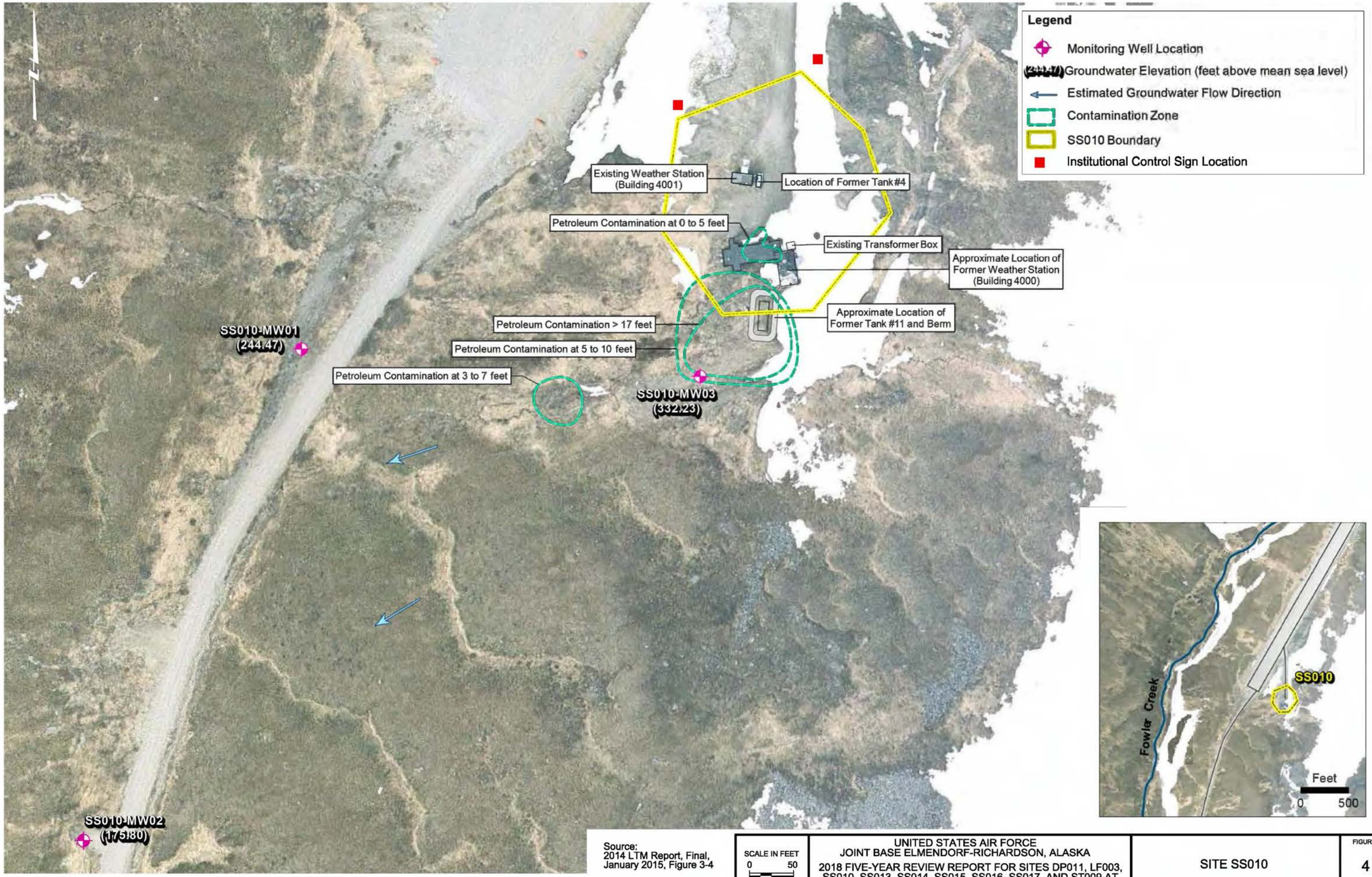
⊕	MONITORING WELL LOCATION
●	SURFACE SOIL SAMPLE LOCATION
▲	SURFACE WATER/SEDIMENT SAMPLE LOCATION
PCBs	POLYCHLORINATED BIPHENYLS
mg/kg	MILLIGRAMS PER KILOGRAM
mg/L	MILLIGRAMS PER LITER
■	INSTITUTIONAL CONTROL SIGN LOCATION

NOTE:
BOLD/RED TEXT INDICATES THAT THE CONCENTRATION EXCEEDS ADEC TABLE C GCL OR METHOD 2 SCL IN 18 AAC 75 OR PROJECT ACTION LIMIT.

Source:
Cape Romanzof Long Range Radar Site.
LTM - Remedial Actions - Operations, Figure 5. Date: Jan 2018.

FILE: C:\DICAD\Proj\AFCEC\2018 Cape Romanzof 5-year review report_185750836\May 2018\fig03_LF003.dgn
TIME: 11-MAY-2018 15:10

SCALE IN FEET 0 75	UNITED STATES AIR FORCE JOINT BASE ELMENDORF-RICHARDSON, ALASKA 2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA	SITE LF003	FIGURE 3 185750836.100.69020401



Source:
2014 LTM Report, Final, January 2015, Figure 3-4

SCALE IN FEET
0 50

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA

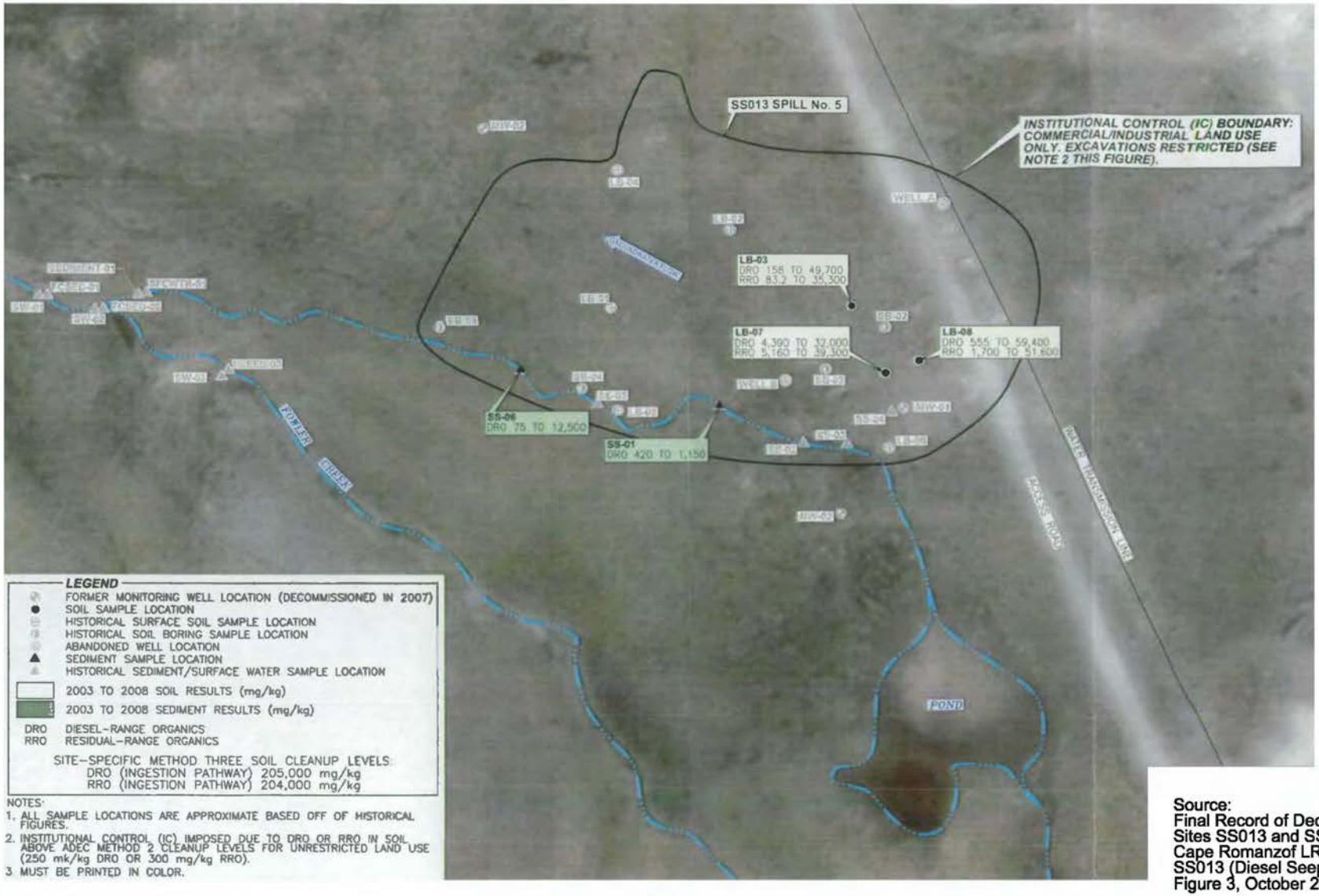
2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE SS010

FIGURE
4
185750836.100.69020401

FILE: C:\DICAD\Proj\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig04_SS010.dgn
TIME: 11-MAY-2018 15:26

TIME: 11-MAY-2018 15:33 FILE: C:\D\CAD\Pro\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig05_SS013.dgn



Source:
Final Record of Decision for Sites SS013 and SS015, Cape Romanzof LRRS, Alaska, SS013 (Diesel Seep Area), Figure 3, October 2010

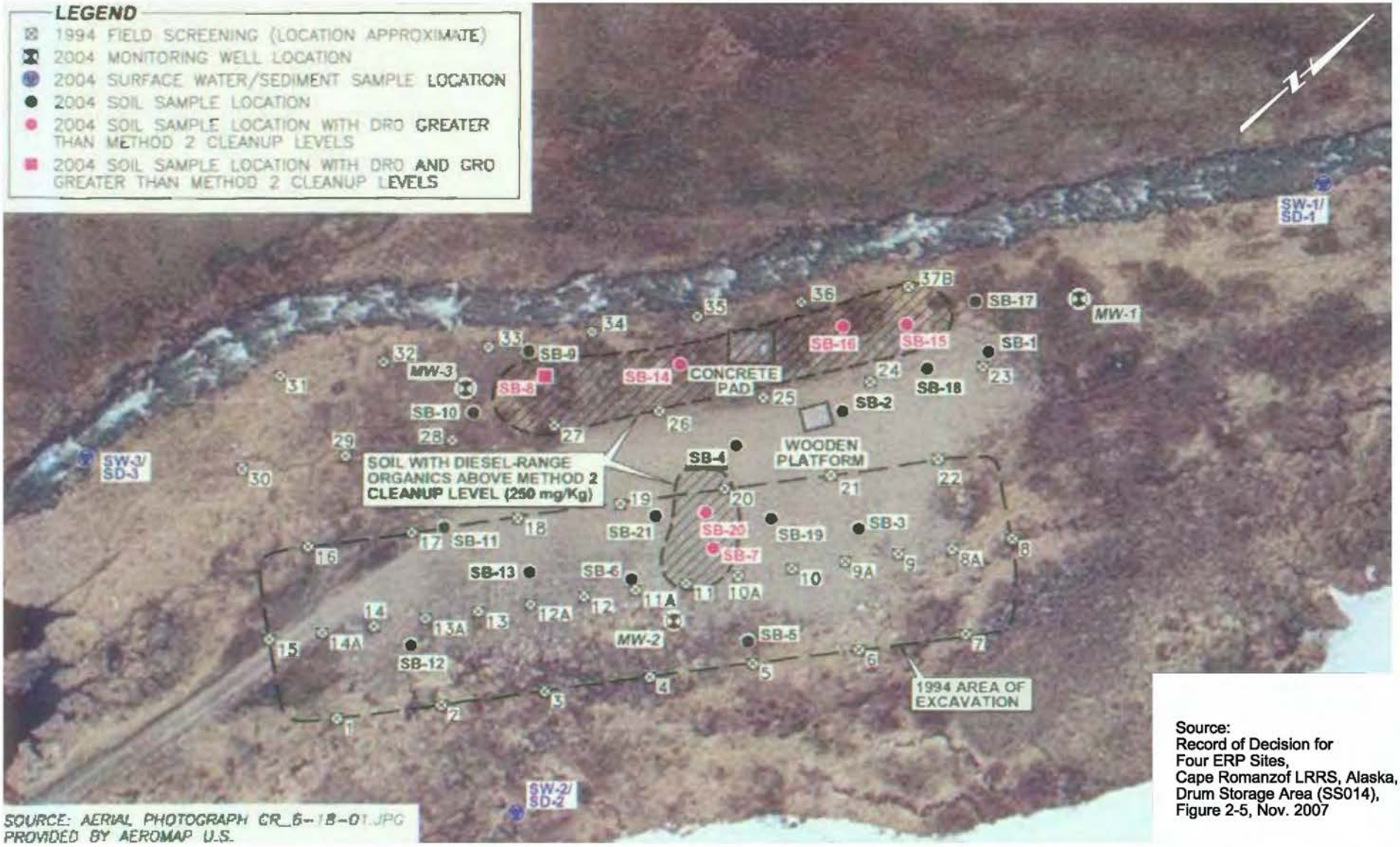
APPROXIMATE SCALE IN FEET
0 50

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA
2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE SS013

FIGURE
5
185750836.
100.69020401

TIME: 11-MAY-2018 15:39 FILE: C:\D\CAD\Pro\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig06_SS014.dgn



Source:
Record of Decision for
Four ERP Sites,
Cape Romanzof LRRS, Alaska,
Drum Storage Area (SS014),
Figure 2-5, Nov. 2007

APPROXIMATE SCALE IN FEET 0 30	UNITED STATES AIR FORCE JOINT BASE ELMENDORF-RICHARDSON, ALASKA 2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA	SITE SS014	FIGURE 6 185750836. 100.69020401

TIME: 11-MAY-2018 15:47 FILE: C:\D\CAD\Pro\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig07_SS015.dgn

LEGEND

⊕	MONITORING WELL LOCATION
GRO	GASOLINE-RANGE ORGANICS (mg/L)
DRO	DIESEL-RANGE ORGANICS (mg/L)
RRO	RESIDUAL-RANGE-ORGANICS (mg/L)
BTEX	BENZENE, TOLUENE, ETHYLBENZENE, XYLENES (mg/L)
mg/L	MILLIGRAMS PER LITER
ug/L	MICROGRAMS PER LITER

NOTE:
BOLD/RED TEXT INDICTES THAT THE CONCENTRATION EXCEEDS ADEC GCL IN 18 AAC 75.

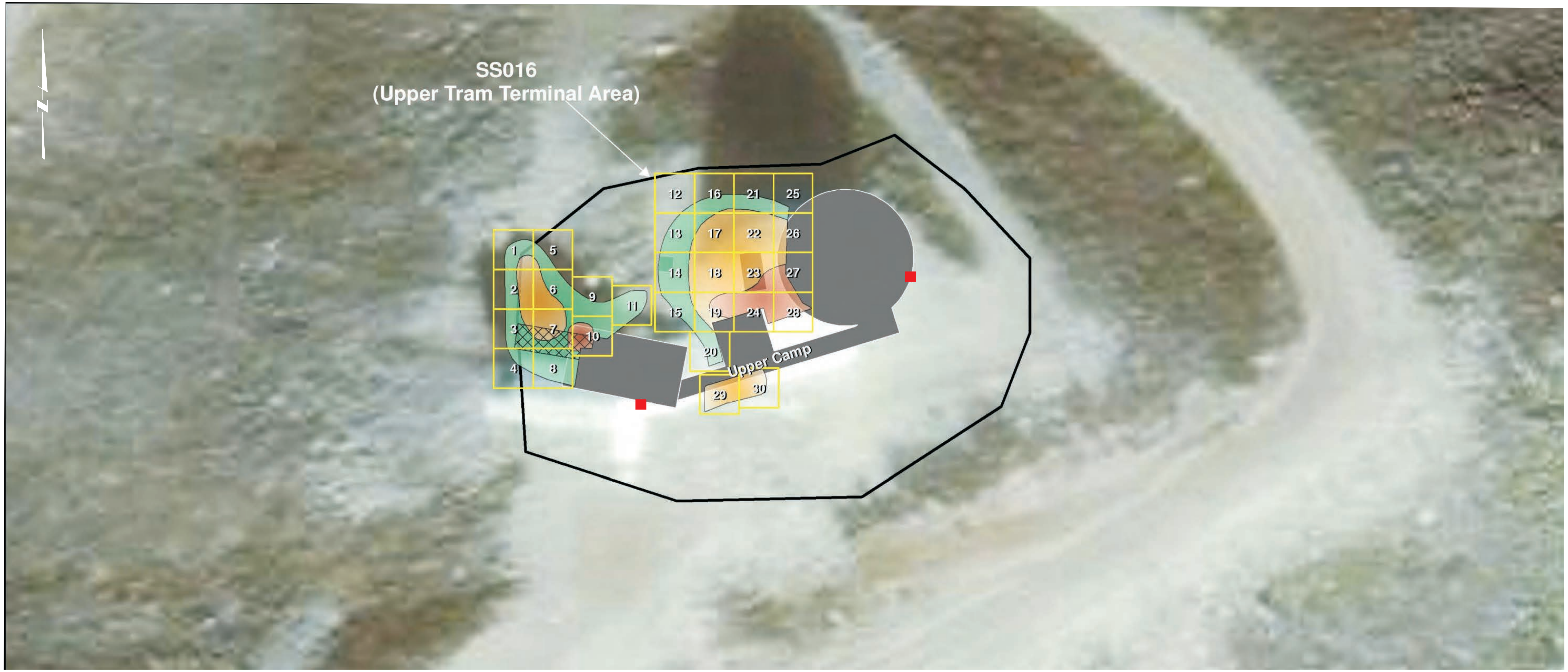
Source:
Cape Romanzof Long Range Radar Site.
LTM-Remedial Actions - Operations,
Figure 6. sdate: Dec 2017.

APPROXIMATE SCALE IN FEET
0 75

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA
2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE SS015

FIGURE
7
185750836.
100.69020401

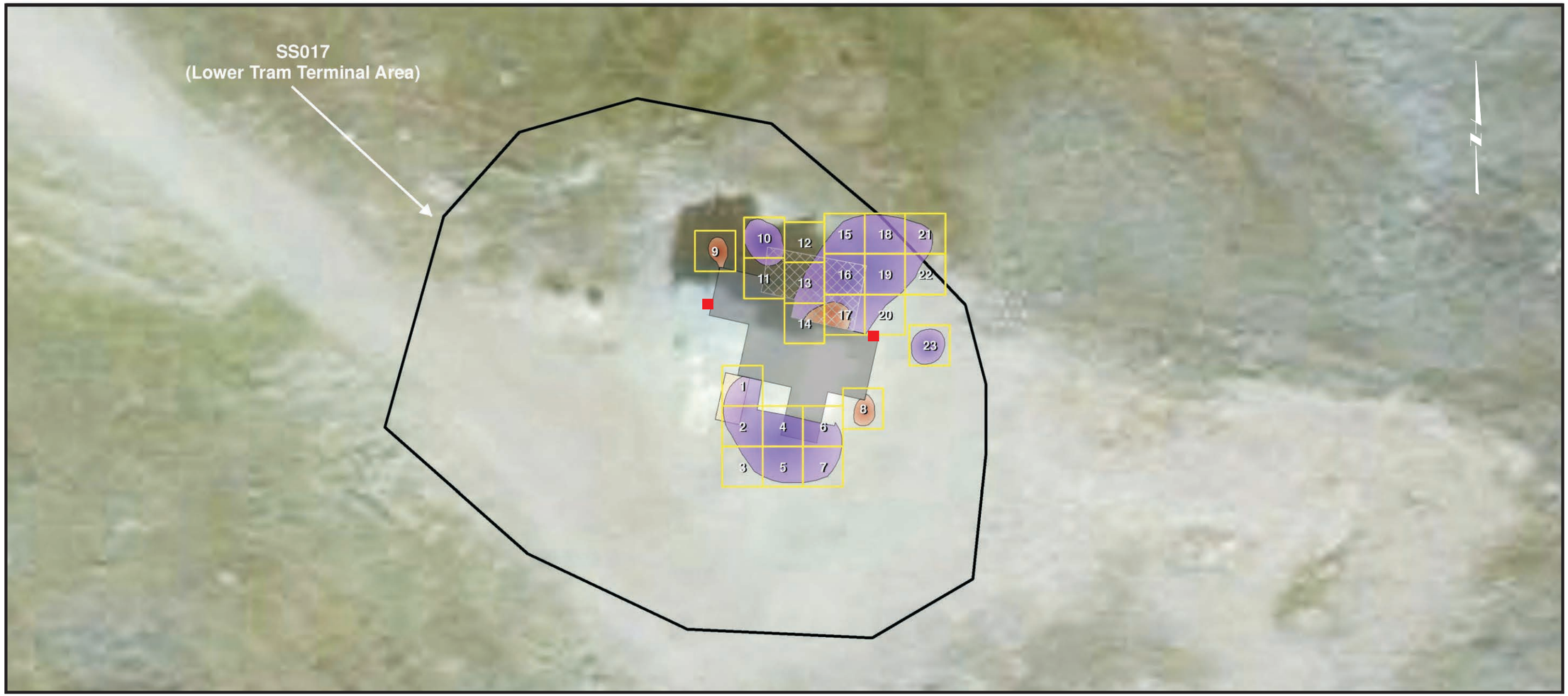


Sampling Cell (with cell identification number)
Building Footprints (approximate)
IRP Site Boundary
Institutional Control Sign Location

Historic Delineated Sample Concentrations
1 - 10 ppm
10 - 50 ppm
>50 ppm
Previously Excavated

FILE: \CAD\Proj\afcec\2018 Cape Romanzof-5year review report_185750836_0032_069\February 2018\Fig08_SS016.cdr

SOURCE: CAPE ROMANZOF LRRS LF003 - LANDFILL NO. 2, SS016 - UPPER TRAM TERMINAL, SS017 - LOWER TRAM TERMINAL REMEDIAL ACTION - CONSTRUCTION, FIGURE 1-3, APRIL 2017.	SCALE IN FEET 0 50'	UNITED STATES AIR FORCE JOINT BASE ELMENDORF-RICHARDSON, ALASKA 2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA	SITE SS016	FIGURE 8 185750836 100.69020401



Legend:

- Institutional Control Sign Location
- Sampling Cell (with cell identification number)
- IRP Site Boundary
- Boulder Staging Area
- Building Footprint (approximate)

Historic PCB Contamination Areas

- 0 - 2 Ft
- 2 - 3.5 Ft
- Previously Excavated Area

SOURCE: CAPE ROMANZOF LRRS LF003 - LANDFILL NO. 2, SS016 - UPPER TRAM TERMINAL, SS017 - LOWER TRAM TERMINAL REMEDIAL ACTION - CONSTRUCTION, FIGURE 1-4, APRIL 2017.

SCALE IN FEET
0 50'

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA

2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE SS017

FIGURE
9
185750836
100.69020401

FILE: \CAD\Proj\afcec\2018 Cape Romanzof-5year review report_185750836_0032_069\February 2018\Fig08_SS016.cdr

LEGEND

⊕	MONITORING WELL LOCATION
GRO	GASOLINE-RANGE ORGANICS
DRO	DIESEL-RANGE ORGANICS
RRO	RESIDUAL-RANGE-ORGANICS
PCBs	POLYCHLORINATED BIPHENYLS
mg/kg	MILLIGRAMS PER KILOGRAM
mg/L	MILLIGRAMS PER LITER
NS	NOT SAMPLED
■	INSTITUTIONAL CONTROL SIGN LOCATION

NOTE:
BOLD/RED TEXT INDICATES THAT THE CONCENTRATION EXCEEDS ADEC TABLE C GCL OR METHOD 2 SCL IN 18 AAC 75 OR PROJECT ACTION LIMIT.

Source:
Cape Romanzof Long Range Radar Site.
LTM - Remedial Actions - Operations,
Figure 3. Date: Feb 2018.

FILE: C:\D\CAD\Proj\AFCEC\2018 Cape Romanzof-5year review report_185750836\May 2018\fig10_ST009.dgn
TIME: 11-MAY-2018 16:13

SCALE IN FEET
0 75

UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON, ALASKA
2018 FIVE-YEAR REVIEW REPORT FOR SITES DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, AND ST009 AT CAPE ROMANZOF LONG RANGE RADAR STATION, ALASKA

SITE ST009

FIGURE
10
185750836.
100.69020401

APPENDICES

APPENDIX A
REFERENCE LIST

REFERENCE LIST

Alaska Department of Environmental Conservation (ADEC), 2017a. Cape Romanzof Site Reports for DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, & ST009, ADEC Division of Spill Prevention and Response, Contaminated Sites Program Database. Available online: http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search.

ADEC, 2017b. 18 AAC 70, Water Quality Standards, amended as of February 5, 2017. February.

ADEC, 2017c. 18 AAC 75, Oil and Hazardous Substances Pollution Control, as amended through November 7, 2017. October.

US Air Force (USAF), 2008. Final Record of Decision, Spill/Leak 1 & 2 (SS007), Spill/Leak 3 (ST009), Drum Storage Area (SS014), and Dump Area (DP011), Cape Romanzof Long-Range Radar Site (Cape Romanzof LRRS). February.

USAF, 2011. Record of Decision, Diesel Seep Area (SS013) and UST Spill Area (SS015), Cape Romanzof LRRS, Alaska. January.

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USAF, 2013b. Final Record of Decision, Landfill No. 2 (LF003), Spill/Leak No. 4 at the Weather Station Building (SS010), Upper Tram Terminal Area (SS016), and Lower Tram Terminal Area (SS017), Cape Romanzof Long-Range Radar Site, Alaska. February.

USAF, 2015. 2014 Long Term Management Report for Sites LF003, ST009, SS015, and SS010 at Cape Romanzof Long Range Radar Station, Alaska. January.

USAF, 2016a. Final 2015 Long Term Management Report for Sites LF003, ST009, SS015, and SS010 at Cape Romanzof Long Range Radar Station, Alaska. January.

USAF, 2016b. Supplemental Work Plan, 2016 Environmental Long Term Monitoring Activities at Sites LF003, ST009, SS010, and SS015, Cape Romanzof Long Range Radar Station. September.

USAF, 2017a. Final Report, LF002 – Landfill No. 2, SS016 – Upper Tram Terminal, and SS017 – Lower Tram Terminal Remedial Action – Construction, Cape Romanzof Long Range Radar Station, Cape Romanzof, Alaska. June.

USAF, 2017b. Land Use Control Management Plan, Pacific Air Forces Regional Support Center Installations. December.

USAF, 2017c. Remedial Action – Operations / Long Term Management, Cape Romanzof Long Range Radar Site – Supplemental Work Plan Addendum. October.

USAF, 2017d. 2016 Technical Project Report, Environmental Long Term Monitoring Activities, Cape Romanzof Long Range Radar Station, Alaska. May.

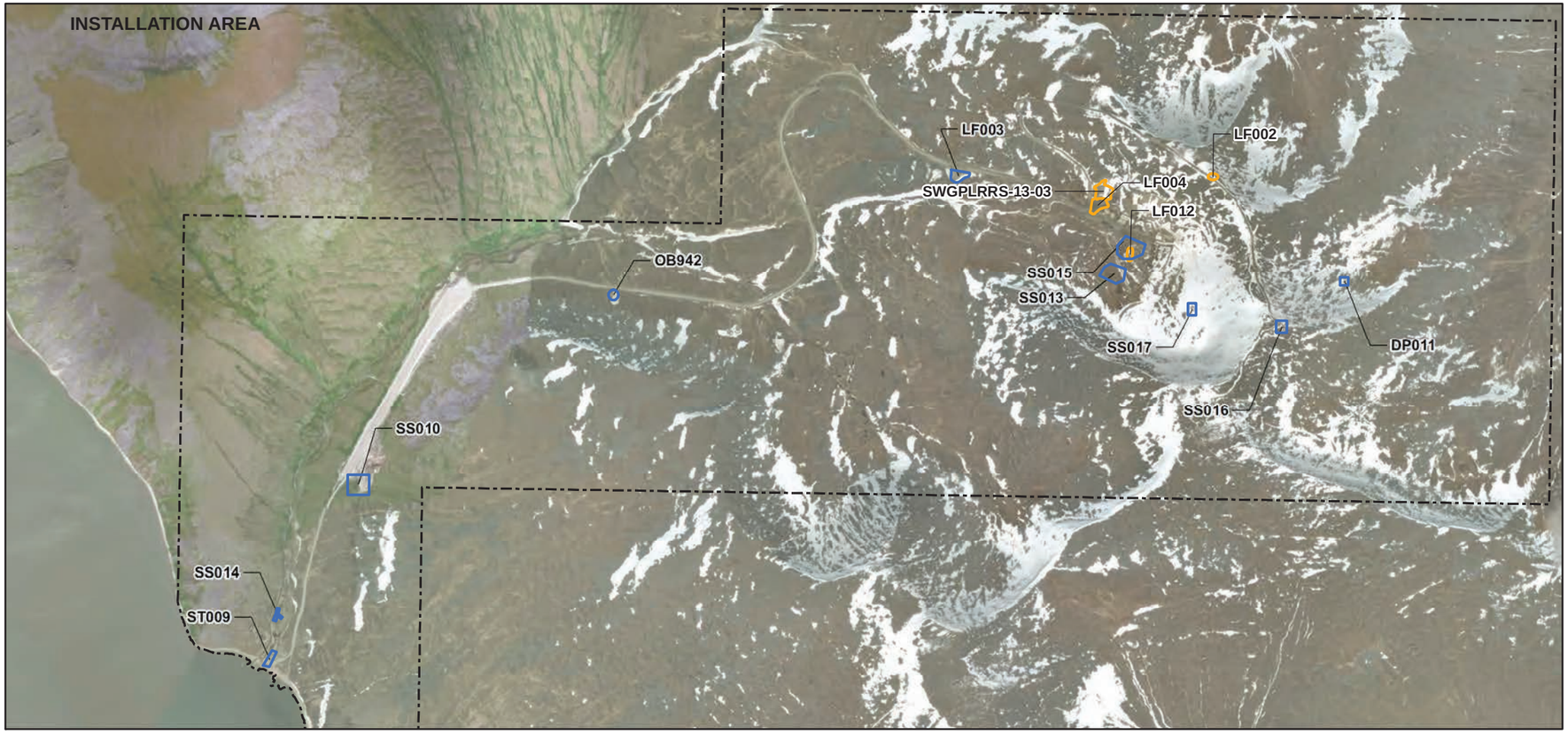
USAF, 2018a. Final Explanation of Significant Differences, Site SS016 (Upper Tram Terminal) & Site SS017 (Lower Tram Terminal), Cape Romanzof Long Range Radar Station, Alaska. August.

USAF, 2018b. 2017 Report Draft, Remedial Action – Operations / Long Term Management, Cape Romanzof Long Range Radar Site, Alaska. February.

US Environmental Protection Agency (EPA), 1994. Revisions to the PCB Q and A Manual. June.

APPENDIX B

LAND USE CONTROL BOUNDARY FIGURE AND DESCRIPTIONS FROM THE LAND USE CONTROL MANAGEMENT PLAN, DECEMBER 2017

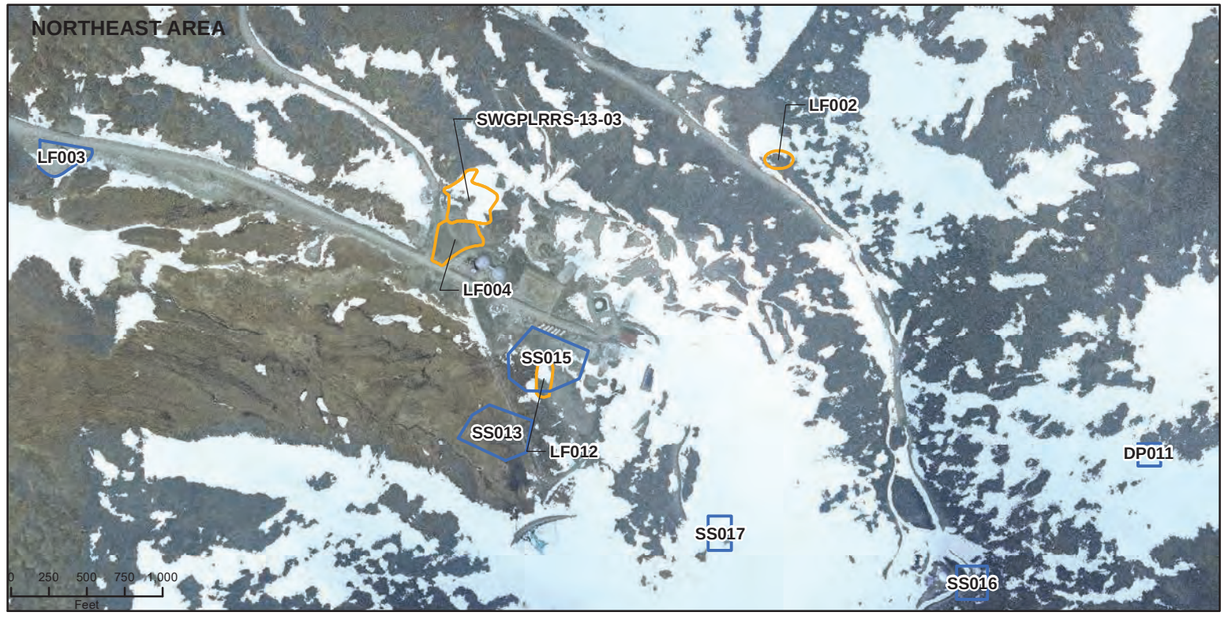


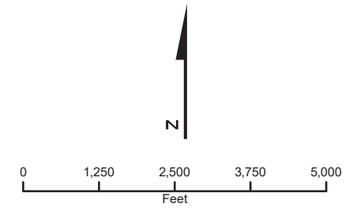
Land Use Control Restriction (See Table 2-1)

Landfill (See Table 1-3)

Installation Boundary

Notes (Not all notes apply to all pages):
1. LRRS = Long Range Radar Site.
2. RRS = Radio Relay Station.
3. LUC = Land Use Control. LUC boundaries depicted on this figure are preliminary pending final analysis of survey information. LUC boundaries will be updated once this information is available.
4. Data are from 611th GeoBase. Data could be incomplete and are of unknown accuracy.
5. For more detailed land use restriction information, see individual site summaries.





GCS WGS 1984 UTM Zone 03V (Calculated), Meters

Figure 10
Installation Map - **Cape Romanzof LRRS**
Land Use Control Management Plan 2017
Pacific Air Forces Regional Support Center Installations
Joint Base Elmendorf-Richardson, Alaska

P:\TitleII\MXD\TitleII_LUC_ManagementPlan.mxd 12/18/2017 beatycj

TABLE 2-1
Description of Land Use Control Types Currently in Effect at Pacific Regional Support Center Environmental Restoration Program Sites
Land Use Control Management Plan 2017, Pacific USAFs Regional Support Center Installations, Joint Base Elmendorf-Richardson, Alaska

Installation: IRP Site(s) with LUCs in Effect	Purpose and Objectives	Prohibitions/Restrictions	Engineering Controls	Expected Durations	Monitoring/ Inspections/ Reporting/ Maintenance	Administrative Elements
Cape Romanzof LRRS: **LF003** **(Landfill No. 2)**	ICs that prohibit the development and use of property for residential housing, prohibit excavation or disturbance of the landfill cap/cover, and require maintenance of the cap/cover will be established.	Prohibit the development and use of property for residential housing, and prevent the use of contaminated soil for restricted uses in the event of an excavation by requiring a dig permit, implement soils management plan, and maintain the landfill cap at LF003 in order to prevent direct exposure and water infiltration.	Landfill Cap Signage	Until it is determined that sediments no longer pose an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure.	Annual cap inspections and maintenance will be conducted at which time both sediment and surface water will be analyzed to check PCB contamination levels and collected and disposed if it exceeds clean up levels. Over time, PCB concentrations in collected sediment will decrease as source concentrations decrease. Signs warning that PCB buried solid waste and potentially hazardous materials are present and site access is restricted will be constructed and maintained at the site to alert personnel that PCB-contaminated sediments may be present within the drainage channel and sediment control barriers. Eroded soil barriers, collected sediment, and signs will be managed and maintained by the USAF until it is determined that sediments no longer pose an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure. Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and Alaska Department of Natural Resources (ADNR) land records. Annually, inspections (with photos and field observations) of the landfill cap, signs, and control barriers, maintenance, and performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.	Locations of the eroded soil control barriers and signs will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and Alaska Department of Natural Resources (ADNR) land records. Annually, inspections (with photos and field observations) of the landfill cap, signs, and control barriers, maintenance, and performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.
Cape Romanzof LRRS: **SS010** **(Weather Station Well Spill Site)**	Institute land use control boundaries to encompass all areas where subsurface soil and groundwater contaminant levels pose an unacceptable risk to human health and the environment	Contaminated subsurface soil and groundwater will remain in place to naturally attenuate. ICs that prevent access to soil and groundwater until cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system, prohibit the development and use of property for residential housing and prevent the use of contaminated soil for restricted uses in the event of excavation by requiring site dig permit, implement soils management plan, and conduct LTM at SS010.	• (None specified)	Until soil and groundwater cleanup levels have been met.	• Annual inspections (with photos and field observations) of the signs, control barriers and submit the performance reports to ADEC, every year, for the first five years followed by a five-year review. At that time, the frequency of inspections and reports may be reduced. • ICs that prevent access to groundwater until groundwater cleanup levels have been met and maintain the integrity of any current or future remedial or monitoring system (such as monitoring wells) by implementing a well permitting system. • Periodic sampling and analysis of contaminated groundwater in the monitoring wells (LTM) will be performed at the site to assess changes in groundwater contaminant concentrations over time. • Annual inspections will be conducted and performance reports will be submitted every year to ADEC for the first five years and then followed by a five-year review.	• Land Use Controls will be recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records. ECs such as land use control boundaries will encompass all areas where groundwater contaminant levels pose an unacceptable risk to human health and the environment. These will be surveyed and a map designating their locations will accompany notations placed on land records. • Incorporate ICs into the LUC Plan for SS010. • Implement soils management plan, and conduct LTM at SS010. • In the event that all contaminated subsurface soil is not able to be removed due to safety or logistical issues, then ICs annual inspections and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. At that time the frequency of inspections and reports may be reduced.
Cape Romanzof LRRS: **SS013**	• To protect human health and the environment for recreational land use	• Future land use within the IC area shown in 2011 ROD, Figure 3, restricted to commercial/industrial use. • Soil or groundwater being removed from the IC area must be properly evaluated and managed. • No unauthorized digging/excavation	• (None specified)	• (None specified)	• Interim reports (Five-Year Reviews) will be prepared no less often than once every 5 years to ensure remedies are still protective of human health and the environment. Interim reports include: *Site inspection checklists *Statement regarding whether all ICs are being adhered to *Description of any deficiencies and resulting corrective actions. • Five-Year Reviews	• Presence of petroleum in soil impacted above levels allowing unrestricted use will be documented in USAF Real Property Records. • USAF dig permit and construction review system or similar system developed by the Base Operation Support contractor will be used to restrict incompatible activities. • Institutional controls will be documented in USAF Real Property records, including a map of IC locations. Appropriate notice will be filed with the USFWS. • ADEC approval will be required for any major changes to ICs. • ADEC approval will berequired at least six months prior to land transfer or sale of SS013.

TABLE 2-1
Description of Land Use Control Types Currently in Effect at Pacific Regional Support Center Environmental Restoration Program Sites
Land Use Control Management Plan 2017, Pacific USAFs Regional Support Center Installations, Joint Base Elmendorf-Richardson, Alaska

Installation: IRP Site(s) with LUCs in Effect	Purpose and Objectives	Prohibitions/Restrictions	Engineering Controls	Expected Durations	Monitoring/ Inspections/ Reporting/ Maintenance	Administrative Elements
Cape Romanzof LRRS: **SS015**	• To protect human health and the environment for recreational land use	• Installation of water supply wells within the IC area shown in 2011 ROD, Figure 4, is prohibited as long as the aquifer contaminant concentrations exceed ADEC Table C cleanup levels protective of drinking water. • Soil or groundwater being removed from the IC area must be properly evaluated and managed. • No unauthorized digging/excavation	• (None specified)	• Monitoring will continue until 18 AAC 75.350 Table C groundwater cleanup levels are reached and cumulative risk is below Alaska threshold levels, or until the groundwater plume is at a steady state or shrinking, contaminant concentrations are decreasing, and concentrations meet applicable cleanup levels at an approved alternative point of compliance.	• Groundwater monitoring in source area well WW-01 and downgradient wells WW-05 and WW-06 will occur at least once every 5 years for DRO, GRO, and BTEX. • Interim reports (Five-Year Reviews) will be prepared no less often than once every 5 years to ensure remedies are still protective of human health and the environment. Interim reports include: *Site inspection checklists *Statement regarding whether all ICs are being adhered to *Description of any deficiencies and resulting corrective actions • Five-Year Reviews	• Presence of petroleum in soil impacted above levels allowing unrestricted use will be documented in USAF Real Property Records. • USAF dig permit and construction review system or similar system developed by the Base Operation Support contractor will be used to restrict incompatible activities. • Institutional controls will be documented in USAF Real Property records, including a map of IC locations. Appropriate notice will be filed with the USFWS. • ADEC approval will be required for any major changes to ICs. • ADEC approval will be required at least six months prior to land transfer or sale of SS015.
Cape Romanzof LRRS: **SS016** **(Upper Tram Terminal Area)**	Prohibit development and use of property for residential housing, prevent use of contaminated soil for restricted uses.and maintain cap (if necessary) at SS016 in order to prevent direct exposure and water infiltration.	Prohibit development and use of property for residential housing, prevent use of contaminated soil for restricted uses, require dig permit in the event of excavation, implement soil management plan, and maintain cap (if necessary) at SS016 in order to prevent direct exposure and water infiltration. ICs will be incorporated into the LUC Plan.	Soil cap Signage	The cap and signs will be maintained by USAF until it is determined that PCB contaminated soil no longer poses an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure at the site.	• Periodic site inspections will be performed to check the condition of the cap and signs; maintenance will be completed as needed. • Cap and signs will be maintained by USAF until it is determined that PCB-contaminated soil no longer poses an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure at the site. • If contamination remains on site, ICs and a Five-Year Review will be required. Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review.	• ICs and a Five-Year Review will be required. • Performance reports will be provided to ADEC, annually, for the first five years after remedial activities and will be followed by a Five-Year Review. • Implement soil management plan • Implement LUC Plan incorporating ICs
Cape Romanzof LRRS: **SS017** **(Lower Tram Terminal Area)**	To prevent unacceptable ecological risks to the recreational and subsistence population at Cape Romanzof LRRS.	If excavation to promulgated soil cleanup levels (1 mg/kg PCBs and 400 mg/kg Lead) is infeasible due to safety or logistical issues associated with remedial action, then capping and ICs with long-term monitoring and maintenance on the cap will be required.	• (None specified)	• (None specified)		• If contamination greater than cleanup levels remains on site after excavation, capping and ICs with long-term monitoring and maintenance on the cap will be required.
Cape Romanzof LRRS: **ST009**	• Ensure that groundwater contamination is not migrating downgradient into Kokechik Bay at levels that could be detrimental to surface water quality. • Restrict use of the groundwater as long as the groundwater DRO concentrations exceed the ADEC Table C cleanup levels, which are protective of drinking water. • Restrict access to contaminated soils above 18 AAC Method 2 levels protective of unrestricted use.	• No unauthorized digging/excavation	• (None specified)	• Annual monitoring will be discontinued if downgradient wells MW-7 and MW-9 do not show increasing levels or DRO, GRO, or BTEX, and surface water results are consistently below water quality criteria and not increasing. Otherwise, the monitoring program will be reviewed for protectiveness and representativeness, revised if appropriate, and extended until three consecutive years of monitoring data establish that the criteria listed above have been met.	• Annual monitoring of three wells, MW-4, MW-7, and MW-9 (for DRO, GRO, and BTEX), and one surface water location SW-5 (for TAqH) will be performed a minimum of 3 years • Visual inspections and reporting at least once every 5 years to asses IC status and how any inconsistencies or inconsistent uses have been addressed.	• Boundaries of soil with DRO above 18 AAC 75.341 Method Two cleanup levels will be delineated • Institutional controls will be documented in USAF Real Property records, including a map of IC locations. Appropriate notice will be filed with the USFWS. • USAF dig permit and construction review system or similar system developed by the Base Operation Support contractor will be used to restrict incompatible activities • ADEC approval required for any major changes to ICs or excavation activities within contaminated areas • In the event that the property is transferred, the property transfer document will describe the ICs. USAF will provide notice to ADEC prior to any transfer, sale, or lease of the property so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain the ICs.
Cape Romanzof LRRS: **OB942**	• Minimize or eliminate the potential for human exposure to MEC, which could prevent a physical hazard	• Restrict invasive and residential activities • Protect human health from exposure to munition consituents associated with small arms debris • No unauthorized digging/excavation	• Signage	• The Air Force shall maintain the LUCs indefinitely, as buried anomalies would remain in place and OB942 would not be restored for UU/UE	• Five-Year reviews • Utilize the installations construction review process • Utilize the installations dig permit system • Inconsistent activities shall be addressed by USAF as soon as possible, no later than 10 days after becoming aware of the breach	• CERCLA five-year reviews required, but not yet implemented (10/6/2016)
Cape Romanzof LRRS: **DP011**	• Restrict access to contaminated subsurface soil and document (for waste management purposes in the event of subsurface activities) that soil impact exceeds ADEC Method Two cleanup levels protective of unrestricted use. • Document that petroleum hydrocarbons in surface soil exceed levels protective of unrestrictive use.	• No unauthorized excavation, construction, or transportation of contaminated soil • Future land use to remain non• residential	• (None specified)	• (None specified)	• Visual inspections will be conducted and reported no less often than once every 5 years to evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. • Inconsistent activities shall be addressed by USAF as soon as possible, no later than 10 days after becoming aware of the breach. • Five-Year Reviews	• Boundaries of soil with DRO above Method 2 cleanup levels will be delineated. • Institutional controls will be documented in the USAF Real Property records, including a map of IC locations. Appropriate notice will be filed with the USFWS • ADEC will be notified prior to any excavation activities within the contaminated area; before making any major changes to the institutional controls; if activities inconsistent with IC requirements, objectives, or controls are discovered; or in the event the property is transferred, sold, or leased. • Property transfer documents would describe the ICs.

TABLE 2-1
Description of Land Use Control Types Currently in Effect at Pacific Regional Support Center Environmental Restoration Program Sites
Land Use Control Management Plan 2017, Pacific USAFs Regional Support Center Installations, Joint Base Elmendorf-Richardson, Alaska

Installation: IRP Site(s) with LUCs in Effect	Purpose and Objectives	Prohibitions/Restrictions	Engineering Controls	Expected Durations	Monitoring/ Inspections/ Reporting/ Maintenance	Administrative Elements
Cape Romanzof LRRS: **SS014**	• Restrict access to contaminated subsurface soil and document (for waste management purposes in the event of subsurface activities) that soil is impacted above levels allowing unrestricted use.	• Restrict direct contact with petroleum contaminated subsurface soil and document that petroleum hydrocarbons in surface and subsurface soil exceed levels protective of unrestrictive use. • Restrict excavation and transportation of contaminated soil to prevent migration of contaminants. • No unauthorized excavation, construction, or transportation of contaminated soil. • future land use to remain non• residential.	• (None specified)	• (None specified)	• Visual inspections will be conducted and reported no less often than once every 5 years to evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. • Inconsistent activities shall be addressed by USAF as soon as possible, no later than 10 days after becoming aware of the breach. • Five-Year Reviews	• Boundaries of soil with DRO or GRO above Method 2 cleanup levels will be delineated. • Institutional controls will be documented in the USAF Real Property records, including a map of IC locations. Appropriate notice will be filed with the USFWS • ADEC will be notified prior to any excavation activities within the contaminated area; before making any major changes to the institutional controls; if activities inconsistent with IC requirements, objectives, or controls are discovered; or in the event the property is transferred, sold, or leased. • USAF dig permit and construction review system will be used to restrict incompatible activities from the site. • Property transfer documents would describe the ICs.
Cold Bay RRS: **LF002**	• (None specified)	• (None specified)	• (None specified)	• Annual landfill inspection for 5 years	• The landfill will be surveyed annually for five years for development of sinkholes and for the presence of adequate cover. The landfill cap will be maintained as necessary.	• The landfill will be surveyed and the information will be recorded in the Aleutian Islands Recording District in Anchorage, Alaska.
Cold Bay RRS: **ST005**	• To meet 18 AAC 75.341, Method 2 migration to groundwater cleanup level for the under 40-inch precipitation zone for soils to a depth of 10 feet • To ensure that the inhalation and ingestion standards are met and to reduce the amount of time it will take for natural attenuation to meet the cleanup levels for soils between 10 and 15 feet bgs • (For fuel contaminated groundwater) To achieve no greater than 1.5 mg/L DRO throughout the aquifer (18 AAC 75.345 Table C), and to achieve surface water quality standards (10 ug/l TAH, 15 ug/1 TAqH) at the point where groundwater discharges to surface water	• Groundwater not to be used as drinking water until it meets applicable cleanup levels • If contaminated soil is excavated or exposed in the future, it will be managed in accordance with the laws and regulations applicable at that time.	• (None specified)	• Monitored natural attenuation will occur until groundwater DRO concentrations are less than 1.5 mg/L throughout the aquifer (18 AAC 75.345 Table C) and surface water is less than 10 ug/L TAH, 15 ug/L TAqH at the point where groundwater discharges to surface water.	• Monitored natural attenuation will occur until groundwater DRO concentrations are less than 1.5 mg/L throughout the aquifer (18 AAC 75.345 Table C) and surface water is less than 10 ug/L TAH, 15 ug/L TAqH at the point where groundwater discharges to surface water.	• ICs in the form of notice in land records will be developed by USAF, with ADEC concurrence, to document that groundwater should not be used as a drinking water source until it meets the applicable cleanup levels. The ICs will also document that if contaminated soil is excavated or exposed in the future it must be managed in accordance with the laws and regulation applicable at that time.
Cold Bay RRS: **OT001**	• Protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment • Protect human health by reducing the risk from potential exposure	• (None specified)	• (None specified)	As no contaminants remain on site above ADEC cleanup levels, site closure is anticipated	• (None specified)	• (None Specified)
Driftwood Bay RSS: **SS002** **SS007** **SS010**	• Meet 18 AAC 60 maintenace and inspection requirements • Be protective of human health, safety, welfare, and the environment	• Notification prior to digging/excavation is required by ADEC • Groundwater not to be used as drinking water until it meets applicable cleanup levels	• Signage	• IICs and LTM will remain in place until contaminants are below cleanup levels	• Groundwater monitoring • Inspection of all site areas subject to LUCs • Five-Year reviews	• (None Specified)
Driftwood Bay RSS: **LF006 "Lima Bean" and Electronic Debris Area**	Prevent the ingestion, inhalation, and offsite migration of soil exceeding risk-based cleanup levels	• (None specified)	• Containerize and stage contaminated soil above ADEC cleanup levels for offsite shipment; • Perform analytical sampling for waste stream characterization; • Offsite disposal; • Collect and analyze confirmation samples to ensure that cleanup levels have been met; and • Backfill the excavations with locally available material after contaminated soil in excess of ADEC cleanup levels has been removed from the site.	• (None specified)	• (None specified)	• (None specified)

APPENDIX C
COMMUNITY INVOLVEMENT MATERIALS

THE DELTA DISCOVERY NEWSPAPER
P.O. BOX 1028
BETHEL, AK 99559

AO/PO#_____
CASE NO. _____

MWH (Stantec)
c/o Michael Zidek, PMP
NAME OF PETITIONER
725 East Fireweed Lane, Suite 200
Anchorage, AK 99503
ADDRESS OF PETITIONER

For: Cape Romanzof Ad

AFFIDAVIT OF PUBLICATION

UNITED STATES OF AMERICA, STATE OF ALASKA, 4th DIVISION, BEFORE ME, THE UNDERSIGNED, A NOTARY PUBLIC THIS DAY PERSONALLY APPEARED, Kelly J. Lincoln, WHO, BEING FIRST DULY SWORN, ACCORDING TO LAW, SAYS THAT SHE IS THE Office Manager OF THE DELTA DISCOVERY NEWSPAPER, PUBLISHED IN BETHEL IN SAID DIVISION 4th AND STATE OF ALASKA AND THAT THE ADVERTISEMENT, OF WHICH THE ANNEXED IS A TRUE COPY, WAS PUBLISHED IN SAID PUBLICATION ON 10/4/17 AND THEREFORE FOR A TOTAL OF 1 CONSECUTIVE ISSUE(S). THE LAST PUBLICATION APPEARING ON 10/4/17 AND THAT THE RATE CHARGED THEREON IS NOT IN EXCESS OF THE RATE CHARGED TO PRIVATE INDIVIDUALS.

Kelly J. Lincoln
KELLY JEAN LINCOLN
OFFICE MANAGER,
THE DELTA DISCOVERY NEWSPAPER

SWORN TO ME BEFORE ON 10-17-17

Notary Public
SARAH TIPTON
State of Alaska
My Commission Expires Oct. 24, 2020

SIGNATURE OF NOTARY

Sarah Tipton
PRINTED NAME OF NOTARY

MY COMMISSION EXPIRES ON 10-24-20

Alcohol sales tax increase

by Peter Twitchell

I am in favor of a sales tax increase when we purchase alcohol because of all the risks to our health, and increasing distress calls for medical attention and help, besides all the garbage in and around our property.

People discarding their empty bottles increases our clean up costs.

As an example, I see signs in and around Anchorage that there is a thousand dollar ($1,000.00) fine for littering. We do not have a fine to help meet our rising litter and trash on our land.

If we're going to drink and abuse alcohol we better be prepared to pay for the rising costs to our City of Bethel ambulance runs and costs to take care of our inebriants.

It's important that negative effects of public drunkenness be paid for by an equitable alcohol sales tax.

I waited for 13 hours one time at our ER, because the doctors and nurses were attending persons in distress. It is only fair that costs to our community are paid for and met, by an equitable alcohol sales tax. An emergency was created, and can become a burden to our community and its citizens affecting all aspects of our well-being.

Our businesses like around the BNC Complex need cleaning up, and picking up empty alcohol bottles. It doesn't look good to have this litter piling up and making our town less beautiful.

We are all responsible for keeping law and order in our town and increasing the alcohol sales tax is one way to accomplish this goal.

Letters *from page 6*

ronments in Rural Alaska that have many resource rich land and waters that people have depended on for generations.

THANK YOU from SCAMMON BAY!!!!!

Ekam Sundown, IGAP Coordinator
Nile Aguchak, IGAP Assistant
Scammon Bay, AK

Alaskans say yes to ANWR drilling

Voice of the Arctic Iñupiat passes resolution in support

The Arctic National Wildlife Refuge (ANWR) is the largest wildlife refuge in America. Spanning more than 19 million acres, it's an area larger than 10 U.S. states. This vast expanse is home to caribou, fox, bears, and dozens of other species. Much of that land is also home to the Native Iñupiat, and our people have utilized the resources it has blessed us with for more than 10,000 years. One type of those natural resources lies beneath this great land– oil and gas – and lots of it.

The debate over opening ANWR to drilling gained headway nationally in 1980, when President Jimmy Carter set aside less than eight percent of the refuge for potential oil and gas development. This section of ANWR became known as the 1002 area, after a section of the Alaska National Interest Lands Conservation Act.

Since then, Alaskans and the oil and gas industry have fought unsuccessfully to open the 1002 area to drilling, which literally requires an act of Congress. At the same time, lower 48 lawmakers, special interest groups across the country, folks and organizations around the world have waged war on the idea – citing the disruption of wildlife and the pristine Arctic environment.

As ANWR debates occur, the views of the Iñupiat who call the area home are often times left out. The wishes of the people who live in and around the Refuges' Coastal Plain are frequently drowned out by people who live hundreds and even thousands of miles away. Many of whom have never bothered to set foot anywhere near the Arctic. Well, today is a new day.

Voice of the Arctic Iñupiat, an organization with 21 members from across the Arctic Slope region – including members from Kaktovik located inside ANWR – have voted unanimously to pass a resolution supporting oil and gas development in the 1002 area. This is an unprecedented show of unity from the community leaders of the North Slope, those who live in and around the coastal plain of the Refuge, and should send a very clear message to America – we support the development of a portion of the Coastal Plain of ANWR.

My fellow Iñupiat and I firmly believe in a social license to operate, and perhaps no other potential project in the history of America has called for such a blessing from local indigenous peoples more than this one.

When oil was first discovered on our land in 1969, the Iñupiat were worried of industry activities and fought hard for self-determination in order to protect our subsistence resources. So, we fully understand the trepidation from outsiders; the fear that the presence of industry on the coastal plains of ANWR could disrupt wildlife and affect America's manufactured perspective of our land and culture.

However, we also have the benefit of

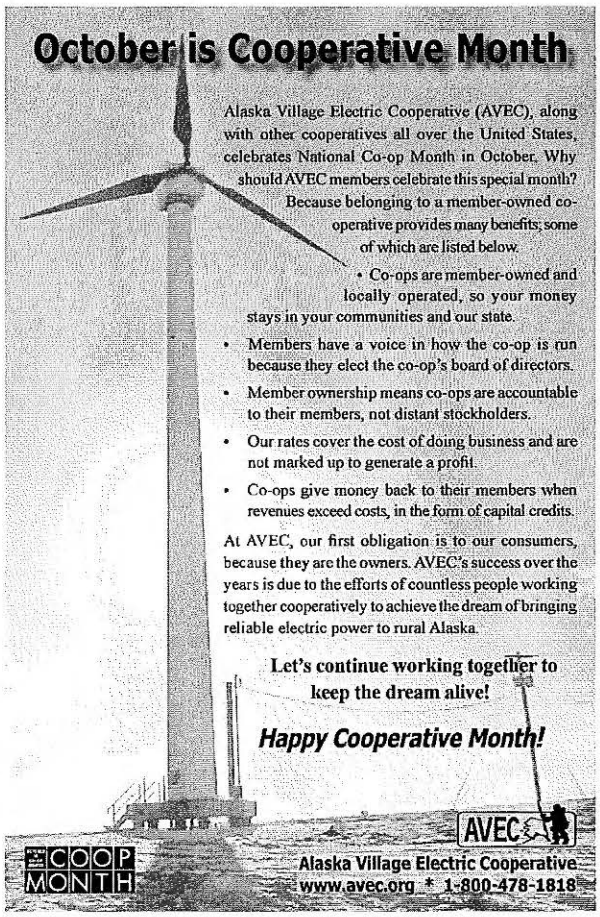
continued on page 18

Buying a home?

Ask me about the HUD 184 home loan for Alaska Natives and American Indians

Lisa Makoni
NMLS #203684
Sr. Mortgage Loan Originator
907-261-3455 direct
907-952-3141 mobile
800-737-3033 ext. 3455
l.makoni@alaskausamortgage.com
www.lisamakoni.com

AlaskaUSA Mortgage Company
People you know. A name you trust.®
License #AK157293



US Air Force Announces Start of Five-Year Review

The Air Force Civil Engineer Center announces the beginning of the Five-Year Review of cleanup remedies implemented at Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites and the Periodic Review of non-CERCLA sites at Cape Romanzof Long Range Radar Station (LRRS), Alaska.

The purpose of the Five-Year Review and Periodic Review is to evaluate whether the remedies selected in the Records of Decision (for CERCLA sites) and Decision Documents (for non-CERCLA sites) to clean up the contaminated site are operating as designed and continue to remain protective of human health and the environment. The U.S. Environmental Protection Agency and Alaska Department of Environmental Conservation also are participating in this review.

Reviews are conducted at least once every five years until contaminant levels allow unlimited use of the site and unrestricted exposure to the air, soil and water. Detailed information concerning Cape Romanzof LRRS cleanup efforts are available electronically on the Air Force Administrative Record at: http://afcec.publicadmin-record.us.af.mil/. Findings from the Five-Year Review will be placed on the administrative record webpage upon completion of the report.

Interested persons can participate in the Five-Year Review and Periodic Review process through October 31, 2017 by responding to a questionnaire available from:

Michael Zidek, Stantec, Inc.
725 East Fireweed Lane Suite 200
Anchorage, AK 99503
michael.zidek@stantec.com
(907) 266-1126

APPENDIX D
INTERVIEW RECORDS

Cape Romanzof LRRS
Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009

Interview Questions for the AFCEC Project Manager, Mr. Richard Mauser

1. Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, and ST009 include ICs as part of the remedy. Have any breaches of the ICs occurred or complaints been filed? If so, how were they addressed?

   Response: No breaches or complaints have been filed about ICs.

2. How are ICs being enforced? What is the enforcement plan in the event of an IC breach?

   Response: Signage, periodic site inspections, environmental self-audits, land use control briefings and review/approval of Dig Permits for the station. Once a LUC/IC violation is verified by AFCEC/CZOP, the following actions occur:

   - The ADEC regulator will be notified by the AFCEC RPM.

   - Following initial notification, written notice of violations will be issued to ADEC within 10 days of violation verification.

3. Do you have any general comments, suggestions, or recommendations regarding remedy implementation or ongoing work at the sites?

   Response: The site is fairly remote and it is unusual that persons not associated with the station would violate the ICs. Therefore, training of station personnel and site signage with maps of the site is important tools.

4. Do we have your permission to use your name in the Five Year Review report and document the results of your interview in the report?

   Response: Yes

Cape Romanzof Long Range Radar Site (LRRS) Five-Year Review Questionnaire by Louis Howard ADEC SPAR-Contaminated Sites Program, 555 Cordova St 2nd fl. Anchorage, AK 99501 (907) 269-7552.

1) Are the ICs at Sites DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017, and ST009 functioning as expected?
   Yes. However, consistent with other active air force sites which AFCEC has RODs with ADEC, ADEC is requesting AFCEC place a notice of environmental contamination (NEC) in the Alaska Department of Natural Resources' land records for ST009, DP011, SS014. ADEC is requesting confirmation of placement of NECs at LF003, SS016, SS010, SS015 and if applicable, SS017.
2) Has the USAF submitted annual performance reports on the ICs at these sites as required?
   Yes.
3) Do you know of any problems or difficulties that have been encountered which have impacted remedy implementation or progress at these sites?
   No.
4) Have any problems been encountered which required, or will require, changes to the RODs or DDs for these sites?
   Not necessarily problems, changes in 18 AAC 75 (as amended through November 7, 2017) cleanup levels for soil and groundwater have occurred which will need to be addressed during the Five-Year Review remedy evaluation and contaminants of potential concern. Especially in cases where there are changes in standards, newly promulgated standards (i.e. 18 AAC 75 November 7, 2017), and TBCs, and changes in toxicity and other contaminant characteristics since the Record of Decisions were signed and the remedies were selected.
5) Are you aware of any community concerns regarding these sites? If so, please give details.
   No.
6) Are you aware of any events, incidents, or activities at these sites such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
   No.
7) Do you have any general comments, suggestions, or recommendations regarding the management of these sites, remedy implementation, or ongoing work at the sites?
   Yes. Investigate the effect of changes in risk parameters that were used to support the remedy selection at each of the sites, such as reference doses, cancer potency factors (see EPA Integrated Risk Information System-IRIS), and exposure pathways of concern.
8) Do we have your permission to use your name in the Five Year Review report and document the results of your interview in the report?
   Yes.

Print Form

cc paul.cooley@arctecalaska.com

Interview Record

Name:	Lita Page	Date:	08/09/17
Organization:	Arctec	Phone Number:	(907) 552-2372
Title:	Station Chief	Email:	Lita.Page@arctecalaska.com
Interview Type:	☐ Mail/Email	☒ Phone/In Person	

The following questions are from the U. S. Environmental Protection Agency (EPA) Comprehensive Five-Year Review Guidance. Please answer the questions when they are applicable to your experience with the cleanup activities at Cape Romanzof LRRS, Alaska. Questions can be left unanswered if they do not apply to you.

Interview Questions

1. What is your overall impression of the restoration effort at Cape Romanzof LRRS, Alaska?(general sentiment)

They are doing good. Restoration projects or monitoring is carried out regularily.

2. What effects do you think site operations have had on the surrounding community? Are you aware of any community concerns or complaints regarding any site or its operations? If so, please provide details.

Not applicable, no site visitors. At a minimum distance 15 miles away.

3. Are you aware of any events, incidents, or activities at any site such as vandalism, trespassing, or emergency responses from local authorities? If so, please provide details of the events and results of the responses.

No.

4. Do you feel well informed about site activities and cleanup progress?

Yes.

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding a site? If so, please give purpose and results.

Yes. Consultants were here last year and return regularly for monitoring and restoration efforts.

6. Is there a continuous on-site operations and maintenance (O&M) presence at the site? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Maintenance staff onsite does not conduct regular maintenance on the Sites included in the 5-year review. That work is generally completed by outside staff.

7. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Consultants conduct monitoring on onsite regularly, with exception of SS010 being added no changes to maintenance schedules or sampling routines have occured.

8. Have any problems been encountered at the site which required, or will require, changes to the cleanup activity?

No.

9. Are you aware of any changes in land use, access, or other site conditions that have occurred since the last Five-Year Review (2013) that you feel may impact the protectiveness or effectiveness of the remedy?

No. Oolgonik did a waste loadout of contaminated soil. New monitoring wells were installed at SS010.

10. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details or reference reports.

No.

11. Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency, or reference remedial process optimization or another report.

No and/or not applicable.

12. Do you have any comments, suggestions, or recommendations regarding cleanup activities at Cape Romanzof LRRS?

No.

APPENDIX E

SITE INSPECTION CHECKLISTS AND PHOTOGRAPHIC DOCUMENTATION, AUGUST 2017

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: DP011	**Date of inspection:** 8-9-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ■ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency 5-years
Responsible party/agency AFCEC
Contact Richard Mauser (Name) Restoration PM (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches ☐ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

C. Letdown Channels □ Applicable ■ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ □ No obstructions
□ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
□ No evidence of excessive growth
□ Vegetation in channels does not obstruct flow
□ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ■ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. No evidence of land disturbance is present at the site. Minor debris was visible (consisting of 55-gallon drums) between large boulders at the site.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M has not been required at the site since the last inspection in 2013.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.
None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: LF003	**Date of inspection:** 8-8-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ■ Landfill cover/containment
- □ Access controls
- ■ Institutional controls
- □ Groundwater pump and treatment
- □ Surface water collection and treatment
- □ Other_____
- ■ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: □ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _____
   Problems, suggestions; □ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ■ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ■ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ■ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ■ Readily available ■ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks___Signs are located at LF003 located along site access road._____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Visual Inspections
Frequency Annual
Responsible party/agency AFCEC
Contact Richard Mauser (Name) Restoration PM (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ■ Applicable □ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map ■ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** □ Location shown on site map ■ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ■ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks Debris appears to have weathered out of the southwest toe of the landfill. No runnels or other erosion features are visibly present.

4. **Holes** □ Location shown on site map □ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** □ Grass □ Cover properly established □ No signs of stress
   □ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks Vegetation is sparse.

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____

7. **Bulges** □ Location shown on site map ■ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** □ Wet areas/water damage not evident
   □ Wet areas □ Location shown on site map Areal extent_____
   □ Ponding □ Location shown on site map Areal extent_____
   □ Seeps □ Location shown on site map Areal extent_____
   □ Soft subgrade □ Location shown on site map Areal extent_____
   Remarks_____

9. **Slope Instability** □ Slides □ Location shown on site map ■ No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
Remarks_____
_____

C. Letdown Channels □ Applicable ■ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____
_____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____
_____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____
_____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ □ No obstructions
□ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
□ No evidence of excessive growth
□ Vegetation in channels does not obstruct flow
□ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   □ Performance not monitored
   Frequency_____□ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines □ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   □ Good condition□ All required wells properly operating □ Needs Maintenance □ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ■ Is routinely submitted on time ■ Is of acceptable quality

2. Monitoring data suggests:
   ■ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
■ All required wells located ■ Needs Maintenance ☐ N/A
Remarks CMW3, CMW7, MW1, MW2, and MW3 have frost heaved, unlocked, and are missing expansion plugs. All other wells appear intact and protective casings are in good condition.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. Signage is present and intact along the site access road. Monitoring wells are in variable conditions with several requiring maintenance and potentially replacement.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No erosion or other issues were noted, however debris is visible at the southwestern extent of the landfill. Vegetation is sparse and present. Monitoring Wells CMW3, CMW7, MW1, MW2, and MW3 require maintenance. No other O&M issues were noted.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS010	**Date of inspection:** 8-8-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ■ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Lita Page (Name) Station Chief (Title) 08/8/2017 (Date)
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ■ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ■ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ■ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency Annual
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   □ Performance not monitored
   Frequency_____□ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES □ Applicable ■ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines □ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   □ Good condition□ All required wells properly operating □ Needs Maintenance □ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

C. Treatment System ■ Applicable □ N/A

1. **Treatment Train** (Check components that apply)
□ Metals removal □ Oil/water separation □ Bioremediation
□ Air stripping □ Carbon adsorbers
□ Filters_____
□ Additive (*e.g.*, chelation agent, flocculent)_____
□ Others_____
□ Good condition □ Needs Maintenance
□ Sampling ports properly marked and functional
□ Sampling/maintenance log displayed and up to date
□ Equipment properly identified
□ Quantity of groundwater treated annually_____
□ Quantity of surface water treated annually_____
Remarks_____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
□ N/A □ Good condition□ Needs Maintenance
Remarks_____
_____

3. **Tanks, Vaults, Storage Vessels**
□ N/A □ Good condition□ Proper secondary containment □ Needs Maintenance
Remarks_____
_____

4. **Discharge Structure and Appurtenances**
□ N/A □ Good condition□ Needs Maintenance
Remarks_____
_____

5. **Treatment Building(s)**
□ N/A □ Good condition (esp. roof and doorways) □ Needs repair
□ Chemicals and equipment properly stored
Remarks_____
_____

6. **Monitoring Wells** (pump and treatment remedy)
□ Properly secured/locked □ Functioning □ Routinely sampled □ Good condition
□ All required wells located □ Needs Maintenance □ N/A
Remarks_____
_____

D. Monitoring Data

1. Monitoring Data
■ Is routinely submitted on time ■ Is of acceptable quality

2. Monitoring data suggests:
■ Groundwater plume is effectively contained ■ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ■ Properly secured/locked □ Functioning ■ Routinely sampled ■ Good condition
   ■ All required wells located □ Needs Maintenance □ N/A
   Remarks _____.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. No evidence of land disturbance is present at the site. All monitoring wells were easily located and protective casings were locked and in good condition.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M has not been conducted at the site since the initial monitoring well and signage intallation.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS013	**Date of inspection:** 8-9-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_ _____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ■ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ■ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ■ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks___Signs were present at site boundary._____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency 5-years
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site. Signage present on site boundaries

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ■ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. Signage is present and intact. No evidence of land disturbance is present at the site. One monitoring well was present in approximately the location of MW-3. Site maps from 2010 show a well decommissioned in generally the same area. A concrete foundation and rebar remains at the site as well.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M has not been required at the site since the last inspection of 2013. Vegetation is in good condition and no erosion or other issues were noted.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS014	**Date of inspection:** 8-8-17
Location and Region: Cape Romanzof, LRRS	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_ _____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser (Name) Restoration PM (Title) _____ (Date) (907)552-0788 (Phone no.)
Problems; suggestions; ☐ Report attached _____

Agency ADEC
Contact Louis Howard (Name) Environmental Program Specialist (Title) _____ (Date) (907)269-7552 (Phone no.)
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ■ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ■ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ■ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ■ Readily available ■ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ■ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Visual Inspections
Frequency 5-years
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   □ Performance not monitored
   Frequency_____□ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines □ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   □ Good condition□ All required wells properly operating □ Needs Maintenance □ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters_____
☐ Additive (*e.g.*, chelation agent, flocculent)_____
☐ Others_____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually_____
☐ Quantity of surface water treated annually_____
Remarks_____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition☐ Needs Maintenance
Remarks_____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
Remarks_____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition☐ Needs Maintenance
Remarks_____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks_____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
■ All required wells located ■ Needs Maintenance ☐ N/A
Remarks MW-1, MW-2, and MW-3 were located. MW-1 and MW-3 were not plumb. All casings were locked.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. Monitoring wells are in generally good condition.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No erosion or other issues were noted. Vegetation is sparse and present. Monitoring Wells MW-1 and MW-3 require maintenance. No other O&M issues were noted.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS015	**Date of inspection:** 8-9-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ■ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Lita Page (Name) Station Chief (Title) 08/8/2017 (Date)
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks___Signs were present at site boundary._____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency 5-years
Responsible party/agency AFCEC
Contact Richard Mauser (Name) Restoration PM (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site. Signage present on site boundaries

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   □ Performance not monitored
   Frequency_____□ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines □ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   □ Good condition□ All required wells properly operating □ Needs Maintenance □ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ■ Needs Maintenance ☐ N/A
Remarks WW-1 – protective casing and monitoring well casing broken. No lock present and expansion plug could not be fit into casing. WW-3 is frost heaved and the protective casing is damaged as a result. The protective casing cannot be locked until well height is adjusted. WW-5 – protective casing is damaged and could not be locked in current condition. Expansion plug is intact. WW-6- protective casing is intact but without lock.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. Signage is present and intact. No evidence of land disturbance is present at the site. Four monitoring wells were present at the site. Three wells require maintenance.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M is needed to address monitoring well issues. No land disturbance or other issues were noted.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.
None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS016	**Date of inspection:** 8-9-17
Location and Region: Cape Romanzof, LRRS	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency Annual
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

II. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ■ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks _____.
   _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. No evidence of land disturbance is present at the site. Signage is in good condition and mounted to the Upper Tram Terminal.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M has not been required at the site. No evidence of erosion or ground disturbance were observed.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: SS017	**Date of inspection:** 8-9-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_ _____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks_____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Regular inspections
Frequency 5-year
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ■ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____☐ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ■ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks _____.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. No evidence of land disturbance is present at the site. Signage is in good condition and located on the Lower Tram Terminal Building at the end of the Site Access Road.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M has not been required at the site. No signs of erosion were observed during the site visit.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None applicable.

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: ST009	**Date of inspection:** 8-8-17
Location and Region: Cape Romanzof LRRS, Alaska	**EPA ID:** AK9572728633
Agency, office, or company leading the five-year review: Stantec Consulting Services, Inc.	**Weather/temperature:** Overcast, Temperature: 45°F, Precip 0.04 inches, Wind: 8-16 mph West

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ■ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other_____
- ■ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Lita Page_____ __Station Chief_____ _08/8/2017
   Name Title Date
   Interviewed ■ at site ☐ at office ☐ by phone Phone no. 907-552-2372____
   Problems, suggestions; ■ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency AFCEC

Contact Richard Mauser Restoration PM _____ (907)552-0788
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency ADEC
Contact Louis Howard Environmental Program Specialist _____ (907)269-7552
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ■ Readily available ☐ Up to date ☐ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☐ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** ■ Readily available ☐ Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks_____

3. **O&M and OSHA Training Records** ■ Readily available ☐ Up to date ☐ N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

7. **Groundwater Monitoring Records** ■ Readily available ■ Up to date ☐ N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ■ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ■ N/A

   Remarks_____

10. **Daily Access/Security Logs** ■ Readily available ☐ Up to date ☐ N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ■ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other_____
_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ■ N/A

Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map ☐ N/A

Remarks___Signs were present at site boundary._____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ■ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ■ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Annual inspections
Frequency Yearly
Responsible party/agency AFCEC
Contact Richard Mauser Restoration PM _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ■ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ■ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ■ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ■ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Maps showing locations of LUCs are posted within the personnel housing and work area. Land access is highly monitored and limited due to remoteness of the site. Signage present on site boundaries

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ■ No vandalism evident

Remarks

2. **Land use changes on site** ■ N/A

Remarks

3. **Land use changes off site** ■ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ■ Roads adequate ☐ N/A

Remarks

B. Other Site Conditions

Remarks

VII. LANDFILL COVERS ☐ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
   Areal extent_____
   Remarks_____
   _____

B. Benches □ Applicable ■ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

2. **Bench Breached** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

3. **Bench Overtopped** □ Location shown on site map ■ N/A or okay
   Remarks_____
   _____

C. Letdown Channels □ Applicable ■ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** □ Location shown on site map □ No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Material Degradation** □ Location shown on site map □ No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Undercutting** □ Location shown on site map □ No evidence of undercutting
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Obstructions** Type_____ □ No obstructions
   □ Location shown on site map Areal extent_____
   Size_____
   Remarks_____
   _____

6. **Excessive Vegetative Growth** Type_____
   □ No evidence of excessive growth
   □ Vegetation in channels does not obstruct flow
   □ Location shown on site map Areal extent_____
   Remarks_____
   _____

D. Cover Penetrations ☐ Applicable ■ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance
   ☐ N/A
   Remarks_____
   _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

4. **Leachate Extraction Wells**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
   Remarks_____
   _____

E. Gas Collection and Treatment ☐ Applicable ■ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

F. Cover Drainage Layer ☐ Applicable ■ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____
   _____

G. Detention/Sedimentation Ponds □ Applicable ■ N/A

1. **Siltation** Areal extent_____ Depth_____ □ N/A
   □ Siltation not evident
   Remarks_____
   _____

2. **Erosion** Areal extent_____ Depth_____
   □ Erosion not evident
   Remarks_____
   _____

3. **Outlet Works** □ Functioning □ N/A
   Remarks_____
   _____

4. **Dam** □ Functioning □ N/A
   Remarks_____
   _____

H. Retaining Walls □ Applicable ■ N/A

1. **Deformations** □ Location shown on site map □ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____
   _____

2. **Degradation** □ Location shown on site map □ Degradation not evident
   Remarks_____
   _____

I. Perimeter Ditches/Off-Site Discharge □ Applicable ■ N/A

1. **Siltation** □ Location shown on site map □ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Vegetative Growth** □ Location shown on site map □ N/A
   □ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____
   _____

3. **Erosion** □ Location shown on site map □ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Discharge Structure** □ Functioning □ N/A
   Remarks_____
   _____

VIII. VERTICAL BARRIER WALLS □ Applicable ■ N/A

1. **Settlement** □ Location shown on site map □ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Performance Monitoring** Type of monitoring_____
   □ Performance not monitored
   Frequency_____□ Evidence of breaching
   Head differential_____
   Remarks_____
   _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ■ Applicable □ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines □ Applicable ■ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   □ Good condition□ All required wells properly operating □ Needs Maintenance □ N/A
   Remarks_____
   _____
   _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

B. Surface Water Collection Structures, Pumps, and Pipelines □ Applicable ■ N/A

1. **Collection Structures, Pumps, and Electrical**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   □ Good condition□ Needs Maintenance
   Remarks_____
   _____

3. **Spare Parts and Equipment**
   □ Readily available □ Good condition□ Requires upgrade □ Needs to be provided
   Remarks_____
   _____

C. Treatment System ☐ Applicable ■ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____

D. Monitoring Data

1. Monitoring Data
   ■ Is routinely submitted on time ■ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ■ Functioning ■ Routinely sampled ■ Good condition
■ All required wells located ■ Needs Maintenance ☐ N/A
Remarks MW-5 requires a lock and casing height adjustment in response to natural frost heave. MW-4, MW-7, MW-9 require locks. All wells properly outfitted with expansion plugs and are in good condition.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
Access to the site is limited due to the remote location and land use is limited to site personnel. Land use control areas are posted in employee housing and work areas. Staff are informed of limited access and restricted land use. Signage is present and intact. Monitoring wells are in generally good conditions.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
Monitoring well MW-5 requires a casing adjustment and lock. MW-4, MW7, and MW-9 require replacement locks. No other O&M issues were noted.

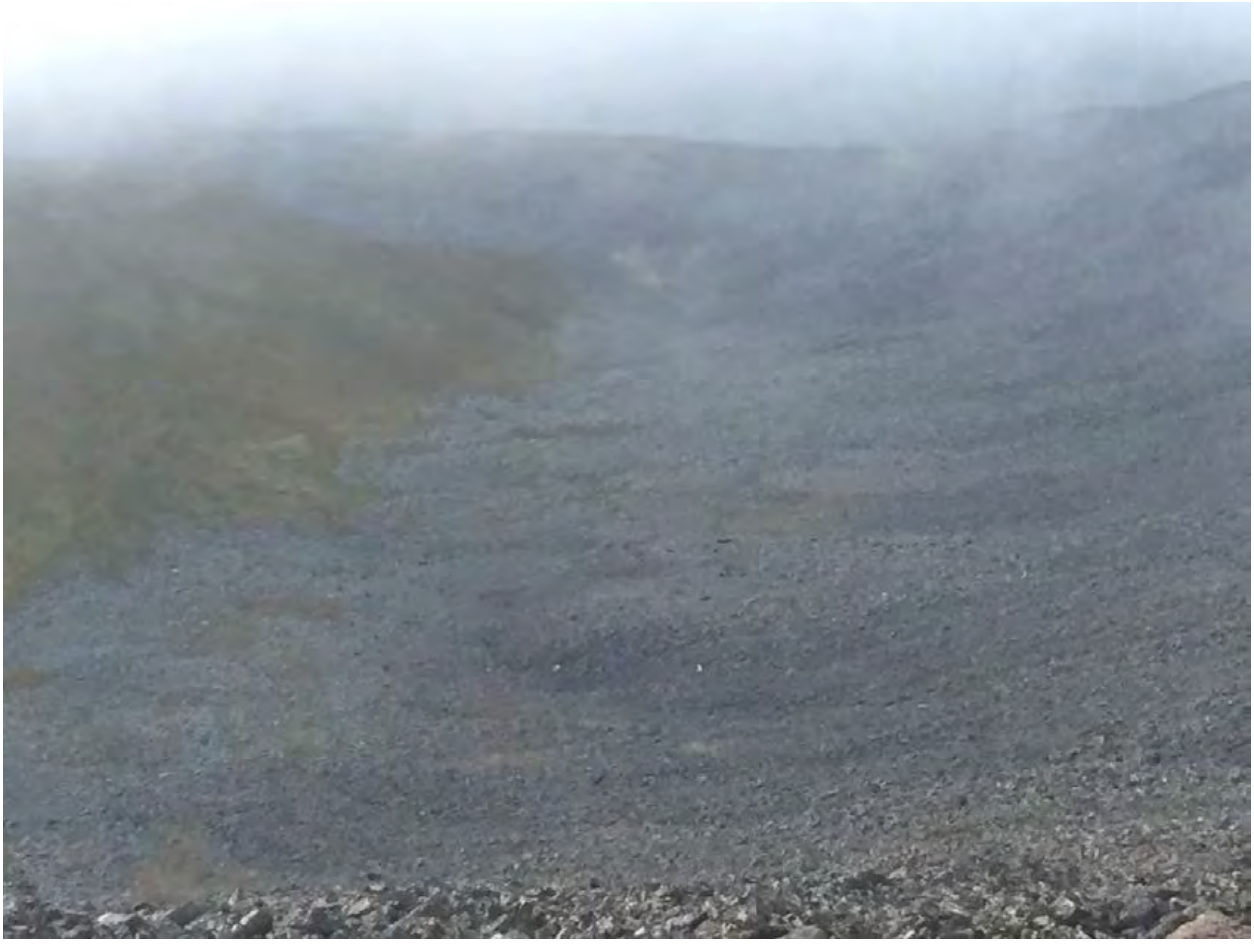
C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.
None applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
None applicable.

DP011 view east. Photograph shows site in its entirety and general topography.



DP011 view east. Photograph shows base of the cirque with minimal debris scattered in colluvium boulders.

DP011 view south. Photograph shows cirque sloping with minimal debris scattered in colluvium boulders.

DP011 view east. Photograph shows cirque down slope from site access road with minimal debris scattered among boulders.

LF003 view south. CMW3 in foreground with MW-2 and LUC signage in background over landfill cap.

LF003 view west. MW2 shown at left foreground and CMW3 in background.

LF003 view west. MW1 shown in foreground along site access road.

LF003. Close-up of MW1.

LF003 view south. Western LUC signage and landfill cap shown.

LF003 view south. Eastern LUC signage and landfill cap shown.

LF003 view north. CMW5 shown at toe of landfill.

LF003 view west. CMW5 shown in foreground.

LF003 view north. CMW4 shown in foreground at toe of the landfill.

LF003 view east. CMW4 shown in foreground along southern toe of the landfill.

LF003 view west. Close-up of CMW6.

LF003 view west. CMW3 shown in foreground along toe of the landfill at photographs right.

LF003 view south. CMW2 shown along stream.

LF003 view west. CMW2 shown along eastern toe of the landfill.

LF003 view northeast. CMW7 shown in foreground.

LF003 view east. Debris daylighting along western toe of the landfill.

SS010 view south. LUC signage shown in foreground along site access road and Building 4104 shown in background.

SS010 view northeast. MW1 shown below pad of Building 4101.

SS010 view south. MW1 shown in foreground.

SS010 view north and east. MW2 shown in foreground.

SS010 view south. MW2 shown in foreground.

SS010 view west. MW3 shown at photographs left. Former tank pad shown on the right.

SS010 view south west. MW3 shown in foreground.

SS010 view south west. Drainage area bisecting monitoring wells in foreground.

SS013 view east along water transmission line. LUC signage shown.

SS013 view north east shown well protective casing roughly located near former MW3 shown in foreground with water pump house and cold storage shown in background.

SS013 view south and east. Site overview.

SS013 view north east. Site overview.

Site SS013 view south west. Concrete foundation in foreground and monitoring well protective casing in background.

Site SS014 view south. Concrete and wood platform shown in foreground. MW3 shown in background along Fowler Creek.

Site SS014 view west. MW3 shown in foreground.

Site SS014 view east. MW2 shown in foreground.

Site SS014. MW2 close-up.

Site SS014 view south. MW1 shown in foreground with main LUC area shown in background.

Site SS015 view north from water transmission line pad. Cold storage facility shown in backdrop.

Site SS015 view west. WW01 shown in foreground.

Site SS015. WW01 close-up.

Site SS015. WW03 close-up.

Site SS015 view south. WW5 shown in foreground.

Site SS015. WW5 close-up.

Site SS015 view north. WW6 shown in foreground.

Site SS015 view south west. WW6 shown in foreground. Water transmission line pad and pump building shown in background.

Site SS015 view east. LUC signage in foreground with SS015 in background.

SS016 view north east below radome.

SS016 view north. LUC signage (orange) shown mounted to the upper tram building.

SS017 view west. Lower tram building shown.

SS017 view south. LUC signage shown mounted to the lower tram building.

SS017 view east. Lower tram building and LUC signage shown.

ST009 view east. LUC signage shown along beach access to the site.

ST009 view north along Fowler Creek. LUC signage in foreground.

ST009 view south. MW4 shown in foreground and Fowler Creek outlet in background.

ST009 view north. MW5 shown in foreground. Also shown are the former borrow pit and biocell foundation.

ST009 view east. MW6 shown in foreground.

ST009 view west. Fowler Creek in background. MW6 shown in foreground.

ST009 view east. MW7 shown in foreground and former borrow pit in background.

ST009 view north. MW8 shown in foreground. MW6 shown in background.

ST009 view southeast. MW9 shown in foreground, Kokechik Bay in background.

ST009 site overview from south to north.

APPENDIX F
COMPARISON OF COPCS TO REVISED ADEC CLEANUP LEVELS

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
DP011				
Soil	**DRO**	**502 mg/kg**	1,200 mg/kg*	250 mg/kg
	GRO	10.8 mg/kg	300 mg/kg	300 mg/kg
	RRO	716 mg/kg	11,000 mg/kg	11,000 mg/kg
	Acetone	1,110 F mg/kg	88,000 mg/kg	81,000 mg/kg
	2-Butanone	637 F mg/kg	60,800 mg/kg	23,000 mg/kg
	4-Isopropyltoluene	11.5 F mg/kg	NE	NE
	Methylene Chloride	48 F mg/kg	1,100 mg/kg	460 mg/kg
	n-Butylbenzene	16.2 F mg/kg	1,000 mg/kg	20 mg/kg
	1,2,4-Trimethylbenzene	19.9 F mg/kg	5,100 mg/kg	37 mg/kg
	Anthracene	6.3 F mg/kg	20,600 mg/kg	23,000 mg/kg
	Benzo(a)anthracene	**14.4 mg/kg**	4.9 mg/kg	2 mg/kg
	Benzo(a)pyrene	**19 mg/kg**	0.49 mg/kg	0.2 mg/kg
	Benzo(b)fluoranthene	**20.4 mg/kg**	4.9 mg/kg	2 mg/kg
	Benzo(g,h,i)perylene	13.4 mg/kg	1,400 mg/kg	2,300 mg/kg
	Benzo(k)fluoranthene	13.6 mg/kg	49 mg/kg	20 mg/kg
	Chrysene	18.2 mg/kg	490 mg/kg	200 mg/kg
	Dibenz(a,h)anthracene	**6.15 mg/kg**	0.49 mg/kg	0.2 mg/kg
	Fluoranthene	39.8 mg/kg	1,900 mg/kg	3,100 mg/kg
	Fluorene	3.03 mg/kg	2,300 mg/kg	3,100 mg/kg
	Indeno(1,2,3-cd)pyrene	**12.7 g/kg**	4.9 mg/kg	2 mg/kg
	Naphthalene	3.03 mg/kg	1,400 mg/kg	29 mg/kg
	Phenanthrene	25.6 mg/kg	20,600 mg/kg	2,300 mg/kg
	Pyrene	34.6 mg/kg	1,400 mg/kg	2,300 mg/kg
	PCBs	**1.16 mg/kg**	1 mg/kg	1 mg/kg
	Arsenic	**15.4 mg/kg**	2 mg/kg	8.8 mg/kg
	Barium	358 mg/kg	20,300 mg/kg	20,000 mg/kg
	Beryllium	1.05 mg/kg	200 mg/kg	200 mg/kg
	Cadmium	0.696 mg/kg	79 mg/kg	92 mg/kg
	Chromium	33.7 mg/kg	26 mg/kg	NE
	Cobalt	13.6 mg/kg	NE	NE
	Copper	20.2 mg/kg	4,100 mg/kg	4,100 mg/kg
	Iron	43,500 mg/kg	NE	NE

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
	Lead	30.9 mg/kg	400 mg/kg	400 mg/kg
	Mercury	**38 F mg/kg**	30 mg/kg	3.1 mg/kg
	Nickel	25.1 mg/kg	2,000 mg/kg	2,000 mg/kg
	Selenium	1.7 mg/kg	510 mg/kg	510 mg/kg
	Vanadium	49.3 mg/kg	710 mg/kg	510 mg/kg
	Zinc	269 mg/kg	30,400 mg/kg	30,000 mg/kg
LF003				
Soil	**PCBs**	**195 mg/kg**	1 mg/kg	1 mg/kg
Groundwater	**DRO**	**2.13 mg/L**	1.5 mg/L	1.5 mg/L
	GRO	0.113 mg/L	1.3 mg/L	2.2 mg/L
	Benzene	**0.017 mg/L**	0.005 mg/L	0.0046 mg/L
	Ethylbenzene	0.0013 mg/L	0.7 mg/L	0.015 mg/L
	1,4-Dichlorobenzene	**0.0052 mg/L**	0.075 mg/L	0.0048 mg/L
	1,1-Dichloroethane	0.00045 mg/L	7.3 mg/L	0.028 mg/L
	1,1,1-Trichloroethane	0.006 mg/L	0.2 mg/L	8 mg/L
	Total Xylenes	0.0067 mg/L	10 mg/L	0.19 mg/L
	TPH	0.26 mg/L	NE	NE
	Cadmium	0.006 mg/L	0.005 mg/L	0.0092 mg/L
SS010				
Soil	**DRO**	**11,000 mg/kg**	10,250 mg/kg	10,250 mg/kg
	GRO	**1,180 mg/kg**	300 mg/kg	300 mg/kg
	RRO	390 mg/kg	11,000 mg/kg	11,000 mg/kg
	Acetone	0.074 mg/kg	88,000 mg/kg	38 mg/kg
	Benzene	**0.099 mg/kg**	11 mg/kg	0.022 mg/kg
	Chloroform	**0.011 mg/kg**	0.46 mg/kg	0.0071 mg/kg
	Ethylbenzene	**3.2 mg/kg**	6.9 mg/kg	0.13 mg/kg
	Isopropylbenzene	3.2 mg/kg	51 mg/kg	5.6 mg/kg
	1,2,4-Trimethylbenzene	**27 mg/kg**	49 mg/kg	0.16 mg/kg
	1,3,5-Trimethylbenzene	**5.4 mg/kg**	23 mg/kg	1.3 mg/kg
	Methylene chloride	0.14 mg/kg	0.0160 mg/kg	0.33 mg/kg
	m,p-Xylene	4.4 mg/kg	NE	NE
	n-Butylbenzene	8.3 mg/kg	15 mg/kg	23 mg/kg
	o-Xylene	4 mg/kg	NE	NE

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
	p-Isopropyltoluene	5.5 mg/kg	NE	NE
	sec-Butylbenzene	4.9 mg/kg	41 mg/kg	28 mg/kg
	t-Butylbenzene	0.32 mg/kg	12 mg/kg	11 mg/kg
	1-Methylnaphthalene	**25 mg/kg**	760 mg/kg	0.41 mg/kg
	2-Methylnaphthalene	**37 mg/kg**	6.1 mg/kg	1.3 mg/kg
	Acenaphthene	5.2 mg/kg	180 mg/kg	37 mg/kg
	Acenaphthylene	1.4 mg/kg	180 mg/kg	18 mg/kg
	Anthracene	0.15 mg/kg	20,600 mg/kg	23,000 mg/kg
	Benzo(a)anthracene	0.0066 mg/kg	4.9 mg/kg	2 mg/kg
	Benzo(b)fluoranthene	0.043 mg/kg	4.9 mg/kg	2 mg/kg
	Benzo(g,h,i)perylene	0.025 mg/kg	1,400 mg/kg	2,300 mg/kg
	Chrysene	0.013 mg/kg	490 mg/kg	200 mg/kg
	Dibenz(a,h)anthracene	0.017 mg/kg	0.49 mg/kg	0.2 mg/kg
	Fluoranthene	0.018 mg/kg	1,900 mg/kg	3,100 mg/kg
	Fluorene	1.5 mg/kg	2,300 mg/kg	3,100 mg/kg
	Indeno(1,2,3-cd)pyrene	0.025 mg/kg	4.9 mg/kg	2 mg/kg
	Naphthalene	9 mg/kg	1,400 mg/kg	29 mg/kg
	Phenanthrene	1.4 mg/kg	20,600 mg/kg	2,300 mg/kg
	Pyrene	0.053 mg/kg	1,400 mg/kg	2,300 mg/kg
	Arsenic	**176 M mg/kg**	3.9 mg/kg	8.8 mg/kg
	Barium	188 mg/kg	1,100 mg/kg	2,100 mg/kg
	Cadmium	0.355 mg/kg	5 mg/kg	9.1 mg/kg
	Chromium	24.9 mg/kg	25 mg/kg	NE
	Lead	11.2 mg/kg	400 mg/kg	400 mg/kg
	Mercury	0.0726 mg/kg	1.4 mg/kg	0.36 mg/kg
	Selenium	0.773 mg/kg	3.4 mg/kg	6.9 mg/kg
	Silver	0.0638 mg/kg	11.2 mg/kg	11 mg/kg
Groundwater	DRO	No quantitative data available	1.5 mg/L	1.5 mg/L
	GRO		2.2 mg/L	2.2 mg/L
	RRO		1.1 mg/L	1.1 mg/L
SS013				
Soil	**DRO**	**110,000 mg/kg**	205,000 mg/kg*	10,250 mg/kg
	GRO	**900 mg/kg**	1,400 mg/kg	300 mg/kg

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
	RRO	**51,600 mg/kg**	204,000 mg/kg*	11,000 mg/kg
	TPH	17,000 mg/kg	NE	NE
	Ethylbenzene	**0.46 mg/kg**	5.5 mg/kg	0.13 mg/kg
	1,2,4-Trimethylbenzene	**16.6 mg/kg**	49 mg/kg	0.16 mg/kg
	1,3,5-Trimethylbenzene	**33.5 mg/kg**	42 mg/kg	1.3 mg/kg
	Total Xylenes	**17 mg/kg**	63 mg/kg	1.5 mg/kg
	Acenaphthene	2 J mg/kg	210 mg/kg	37 mg/kg
	Benzo(a)anthracene	0.149 F mg/kg	6 mg/kg	2 mg/kg
	Benzo(a)pyrene	0.2 J mg/kg	3 mg/kg	0.2 mg/kg
	Benzo(b)fluoranthene	0.4 J mg/kg	20 mg/kg	2 mg/kg
	Benzo(g,h,i)perylene	0.4 J mg/kg	1,500 mg/kg	2,300 mg/kg
	Benzo(k)fluoranthene	0.2 J mg/kg	200 mg/kg	20 mg/kg
	Chrysene	0.4 J mg/kg	620 mg/kg	82 mg/kg
	Dibenz(a,h)anthracene	0.3 mg/kg	0.49 mg/kg	0.87 mg/kg
	Fluoranthene	0.457 mg/kg	2,100 mg/kg	590 mg/kg
	Indeno(1,2,3-cd)pyrene	0.5 J mg/kg	4.9 mg/kg	8.8 mg/kg
	Pyrene	0.584 mg/kg	1,500 mg/kg	87 mg/kg
	2-Methylnaphthalene	**13 mg/kg**	280 mg/kg	1.3 mg/kg
Groundwater	**DRO**	**2.22 mg/L**	1.5 mg/L	1.5 mg/L
	GRO	0.142 mg/L	1.3 mg/L	2.2 mg/L
	RRO	0.628 mg/L	1.1 mg/L	1.1 mg/L
	Benzene	0.0003 J mg/L	0.005 mg/L	0.0046 mg/L
	Total BTEX	0.0078 mg/L	NE	NE
	Acenaphthene	0.0001 mg/L	2.2 mg/L	0.53 mg/L
	Fluorene	0.0002 mg/L	1.5 mg/L	0.29 mg/L
	Phenanthrene	0.0001 mg/L	11 mg/L	0.17 mg/L
	2-Methylnaphthalene	0.0087 mg/L	0.15 mg/L	0.036 mg/L
SS014				
Soil	**DRO**	**5,780 mg/kg**	12,500 mg/kg*	250 mg/kg
	GRO	**616 mg/kg**	1,400 mg/kg*	300 mg/kg
	RRO	1,300 mg/kg	11,000 mg/kg	11,000 mg/kg
	1-Chlorohexane	0.00972 F mg/kg	NE	NE
	4-Isopropyltoluene	0.00783 F mg/kg	NE	NE

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
	2-Butanone	0.203 F mg/kg	59 mg/kg	15 mg/kg
	Hexachlorobutadiene	0.0135 F mg/kg	NE	NE
	Methylene chloride	0.0766 F mg/kg	0.0160 mg/kg	0.33 mg/kg
	Acenaphthylene	0.00186 mg/kg	180 mg/kg	18 mg/kg
	Benzo(a)anthracene	0.00191 F mg/kg	3.6 mg/kg	0.28 mg/kg
	Benzo(b)fluoranthene	0.00172 F mg/kg	12 mg/kg	2.7 mg/kg
	Benzo(g,h,i)perylene	0.00163 F mg/kg	1,400 mg/kg	2,300 mg/kg
	Chrysene	0.0112 mg/kg	360 mg/kg	82 mg/kg
	Phenanthrene	0.00198 F mg/kg	3,000 mg/kg	39 mg/kg
	Pyrene	0.0172 F mg/kg	1,000 mg/kg	87 mg/kg
	n-Butylbenzene	0.011 F mg/kg	42 mg/kg	20 mg/kg
	sec-Butylbenzene	0.00759 F mg/kg	41 mg/kg	28 mg/kg
	Arsenic	**19.8 mg/kg**	2 mg/kg	0.20 mg/kg
	Barium	126 mg/kg	1,100 mg/kg	2,100 mg/kg
	Cadmium	0.169 F mg/kg	5 mg/kg	9.1 mg/kg
	Chromium	43.3 mg/kg	26 mg/kg	NE
	Cobalt	5.62 mg/kg	NE	NE
	Copper	16.8 mg/kg	460 mg/kg	370 mg/kg
	Iron	15,200 mg/kg	NE	NE
	Lead	9.08 mg/kg	400 mg/kg	400 mg/kg
	Naphthalene	0.00226 F mg/kg	20 mg/kg	0.038 mg/kg
	Nickel	13.3 mg/kg	86 mg/kg	340 mg/kg
	Selenium	0.172 F mg/kg	3.4 mg/kg	6.9 mg/kg
	Silver	0.0432 F mg/kg	11.2 mg/kg	11 mg/kg
	Vanadium	38.7 mg/kg	710 mg/kg	510 mg/kg
	Zinc	35.7 mg/kg	4,100 mg/kg	4,900 mg/kg
Groundwater	DRO	0.12 mg/L	1.5 mg/L	1.5 mg/L
	RRO	0.6 mg/L	1.1 mg/L	1.1 mg/L
	Benzene	0.00022 F mg/L	0.005 mg/L	0.0046 mg/L
	Naphthalene	0.0000176 F mg/L	0.730 mg/L	0.0017 mg/L
	Toluene	0.00051 F mg/L	1 mg/L	1.1 mg/L
	Barium	0.0169 mg/L	2 mg/L	3.8 mg/L
	Cobalt	0.0105 mg/L	NE	NE

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
	Nickel	0.000818 F mg/L	0.1 mg/L	0.39 mg/L
	Selenium	0.00425 F mg/L	0.05 mg/L	0.1 mg/L
SS015				
Soil	**DRO**	**8,000 mg/kg**	250 mg/kg	250 mg/kg
	GRO	**440 mg/kg**	300 mg/kg	300 mg/kg
	RRO	4,5000 mg/kg	11,000 mg/kg	11,000 mg/kg
	TPH	26,000 mg/kg	NE	NE
Groundwater	**DRO**	**400 mg/L**	1.5 mg/L	1.5 mg/L
	GRO	**8.38 mg/L**	2.2 mg/L	2.2 mg/L
	RRO	**1.38 mg/L**	1.1 mg/L	1.1 mg/L
	Benzene	**1.3 mg/L**	0.005 mg/L	0.0046 mg/L
	Ethylbenzene	**0.31 mg/L**	0.7 mg/L	0.015 mg/L
	Toluene	0.18 mg/L	1 mg/L	1.1 mg/L
	Acenaphthene	0.0246 mg/L	2.2 mg/L	0.53 mg/L
	Anthracene	0.00117 mg/L	11 mg/L	0.043 mg/L
	Benzo(a)pyrene	**0.000434 mg/L**	0.0002 mg/L	0.000034 mg/L
	Benzo(a)anthracene	**0.000631 mg/L**	0.0012 mg/L	0.00012 mg/L
	Benzo(b)fluoranthene	**0.000438 mg/L**	0.0012 mg/L	0.00034 mg/L
	Benzo(g,h,i)perylene	**0.000278 mg/L**	1.1 mg/L	0.00026 mg/L
	Benzo(k)fluoranthene	0.000406 mg/L	0.012 mg/L	0.0008 mg/L
	Bis(2-ethylhexyl)phthalate	0.006 mg/L	0.006 mg/L	0.056 mg/L
	Chrysene	**0.000866 mg/L**	0.12 mg/L	0.0002 mg/L
	Dibenz(a,h)anthracene	**0.00008 mg/L**	0.00012 mg/L	0.000034 mg/L
	Fluoranthene	0.00246 mg/L	1.5 mg/L	0.26 mg/L
	Fluorene	0.0496 mg/L	1.5 mg/L	0.29 mg/L
	Indeno(1,2,3-cd)perylene	**0.000213 mg/L**	0.0012 mg/L	0.00019 mg/L
	2-Methylnaphthalene	**0.53 mg/L**	1.5 mg/L	0.26 mg/L
	Naphthalene	**0.967 mg/L**	0.73 mg/L	0.0017 mg/L
	Phenanthrene	0.0002 F mg/L	11 mg/L	0.17 mg/L
	Pyrene	0.00302 mg/L	1.1 mg/L	0.12 mg/L
	1-Methylnaphthalene	**0.013 mg/L**	1.5 mg/L	0.011 mg/L
	2-Methylnaphthalene	**0.11 mg/L**	1.5 mg/L	0.036 mg/L
SS016				

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

Medium	Constituent	DD/ROD Maximum Detected Concentration	DD/ROD Screening Level	2017 ADEC Method Two Cleanup Level
Soil	**DRO**	**5,300 mg/kg**	250 mg/kg	250 mg/kg
	PCBs	**6,600 mg/kg**	1 mg/kg	1 mg/kg
	Lead	**617 mg/kg**	400 mg/kg	400 mg/kg
SS017				
Soil	**DRO**	**12,000 mg/kg**	250 mg/kg	250 mg/kg
	RRO	**26,000 mg/kg**	11,000 mg/kg	11,000 mg/kg
	PCBs	**68 mg/kg**	1 mg/kg	1 mg/kg
	Lead	**1,500 mg/kg**	400 mg/kg	400 mg/kg
ST009				
Soil	**DRO**	**11,100 mg/kg**	12,500 mg/kg*	250 mg/kg
	GRO	259 mg/kg	300 mg/kg	300 mg/kg
	RRO	294 mg/kg	11,000 mg/kg	11,000 mg/kg
	Ethylbenzene	**1.76 mg/kg**	5.5 mg/kg	0.13 mg/kg
	Toluene	0.18 mg/kg	5.4 mg/kg	6.7 mg/kg
	Total Xylenes	**361 mg/kg**	78 mg/kg	1.5 mg/kg
	PCBs	0.105 mg/kg	1 mg/kg	1 mg/kg
	Lead	8.1	400 mg/kg	400 mg/kg
Groundwater	**DRO**	**4.14 mg/L**	1.5 mg/L	1.5 mg/L
	GRO	**75.7 mg/L**	1.3 mg/L	2.2 mg/L
	RRO	0.653 mg/L	1.1 mg/L	1.1 mg/L
	Lead	0.004 mg/L	0.015 mg/L	0.015 mg/L
	Benzene	0.000402 mg/L	0.005 mg/L	0.0046 mg/L
	Ethylbenzene	0.34 mg/L	0.7 mg/L	0.015 mg/L
	Toluene	0.0599 mg/L	1 mg/L	1.1 mg/L
	m,p-Xylene	0.213 mg/L	NE	NE
	o-Xylene	0.0782 mg/L	NE	NE

Key:

Bold – The detected concentration exceeds the 2017 ADEC cleanup level.

*A site-specific Method Three cleanup level was selected.

BTEX – benzene, toluene, ethylbenzene, and xylenes

DD – Decision Document

DRO – diesel-range organics

GRO – gasoline-range organics

F – The analyte was positively identified but the associated numerical value is below the project quantitation limit; therefore, the result is estimated.

Appendix F

Comparison of COPC Concentrations to Revised ADEC Cleanup Levels

J – The result is detected below the reporting limit and/or is an estimated concentration.
M – A matrix effect was present.
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
NE – A screening criterion was not established.
PCBs – polychlorinated biphenyls
ROD – Record of Decision
RRO – residual-range organics
TPH – total petroleum hydrocarbons

APPENDIX G

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION RESPONSE TO COMMENTS

THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Environmental Conservation
DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501
Main: 907-269-7552
Fax: 907-269-7687
www.dec.alaska.gov

File No.: 2621.38.004

November 16, 2018

Robert Johnston
AFCEC/CZOP
10471 20th Street, Suite 347
JBER, AK 99506-2201

RE: **Approval of Redline version of the 3rd Five-Year and Periodic Review for Cape Romanzof LRRS, Alaska dated November 2018**

Dear Mr. Johnston:

On behalf of the Alaska Department of Environmental Conservation (ADEC), I have reviewed the above document. ADEC will approve the changes in the redline version of the Third CERCLA Five-Year Review and Third Non-CERCLA Periodic Review Report for sites-DP011, LF003, SS010, SS013, SS014, SS015, SS016, SS017 and ST009 At Cape Romanzof Long Range Radar Station (LRRS). ADEC approves the redline version and all the comments which were incorporated into the document.

If you have any questions on this letter or wish to set up a comment review meeting, please contact me at 907-269-7552 or louis-howard@alaska.gov.

Sincerely,

Louis Howard
Environmental Program Specialist

Alaska Department of Environmental Conservation
Comments on the Draft 3rd 5YR & Periodic Review for sites at Cape Romanzof LRRS, Alaska dated July 2018
Commenter: Louis Howard (ADEC), Comments Developed: August 27, 2018

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1		**Introduction** The text states: "There are eight additional Environmental Restoration Program sites at Cape Romanzof that are not included in this FYR and Periodic Review. These sites and their status with ADEC are as follows: LF002, LF012, OT005, OT006, SS001, SS007, and SS008 – Cleanup Complete; and LF004 – Cleanup Complete with ICs. The seven sites identified as Cleanup Complete are not subject to FYRs or Periodic Reviews." Please elaborate in the text on why the site referred to as LF004 aka Landfill No. 3 (cleanup complete with institutional controls) was not included in this five-year review/periodic review document	The paragraph was revised to read as follows: "There are seven additional Environmental Restoration Program (ERP) sites at Cape Romanzof that are not included in this FYR and Periodic Review. Sites LF002, LF012, OT005, OT006, SS001, SS007, and SS008 are identified by ADEC as "Cleanup Complete" status (ADEC, 2017a). Sites identified as Cleanup Complete are not subject to FYRs or Periodic Reviews. The ADEC Contaminated Sites Database also lists LF004 as an ERP site with "Cleanup Complete with ICs" status. However, LF004, a permitted landfill (Permit Nos. 9021-BA012 and 9740-BA007-CR1), is not an ERP site and is managed by 611 CES Compliance (Richard Mauser, personal communication, 7 November 2018). Compliance sites are not evaluated in FYRs or Periodic Reviews."

Alaska Department of Environmental Conservation
Comments on the Draft 3rd 5YR & Periodic Review for sites at Cape Romanzof LRRS, Alaska dated July 2018
Commenter: Louis Howard (ADEC), Comments Developed: August 27, 2018

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
2.	13		**Site SS014** The text states: "Shallow groundwater at SS014 is affected by saltwater intrusion and is not considered drinking water by application of the requirements specified in 18 Alaska Administrative Code (AAC) 75.350 (USAF, 2008 and 2013a)." ADEC requests additional text be added from the SS007, ST009, SS014 and DP011 Record of Decision (ROD) which states: "However, the groundwater at Cape Romanzof Sites ST009 and SS014 is not considered drinking water, by application of the criteria stipulated in 18 AAC 75.350. A groundwater use determination was prepared in accordance with the criteria specified in 18 AAC 75.350 and presented in the Proposed Plan to meet the public notice requirement of 18 AAC 75.350. No comments were received from the public regarding the groundwater use determination. ADEC and USAF agree that the groundwater at Sites ST009 and SS014 meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source."	Concur. Additional text from the ROD was added to describe the groundwater classification.

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3.	21		**Site ST009** The text states: "Shallow groundwater at ST009 is affected by saltwater intrusion and is not considered drinking water by application of the requirements specified in 18 AAC 75.350 (USAF, 2008 and 2013a)." ADEC requests text be added from the SS007, ST009, SS014 and DP011 Record of Decision (ROD) which states: "However, the groundwater at Cape Romanzof Sites ST009 and SS014 is not considered drinking water, by application of the criteria stipulated in 18 AAC 75.350. A groundwater use determination was prepared in accordance with the criteria specified in 18 AAC 75.350 and presented in the Proposed Plan to meet the public notice requirement of 18 AAC 75.350. No comments were received from the public regarding the groundwater use determination. ADEC and USAF agree that the groundwater at Sites ST009 and SS014 meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source." ADEC requests the Air Force consider recommending in this review to cease groundwater monitoring for all wells: MW-4, MW-7 and MW-9 at ST009. Add text: "ADEC agreed in the 2008 ROD[1] that the groundwater meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source. Therefore, Table C groundwater cleanup levels do not apply at ST009 and monitoring will cease upon approval of this Five Year-Review. The shallow groundwater is not suitable as drinking water since it is brackish and unfit for human consumption. The shallow groundwater is not within a recharge area for a private/public drinking water well, a well protection area, or a sole source aquifer. Surface water monitoring did not have any exceedances of total aromatic hydrocarbons (10 µg/L) or total aqueous hydrocarbons (15 µg/L) in any surface water samples collected during 2004, 2006, 2007-2009, 2012 - 2015."	Concur. Additional text from the ROD was added to describe the groundwater classification. Concur. The text provided was added to Section V in the response to Question A. In addition, Section IV, Data Review, was revised to remove the comparison to ADEC groundwater cleanup levels. Finally, a recommendation was added to Section VI to cease groundwater LTM at ST009.

[1] Spill/Leak 3 (ST009) 2.7.4.1 Cleanup Levels Final Record of Decision 4 Sites at Cape Romanzof LRRS, Alaska. February 2008

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4.		II.	**Response Action Summary**	
5.	32		**Response Actions** **SS016** ADEC requests that additional text be added as follows: "The Implementation of the remedy for Sites SS016 and SS017 occurred between June and September 2016. As part of the SS016 contingency remedy, outlined in the 2013 ROD, the USAF was to excavate to the extent feasible and dispose of approximately 339-cubic yards (cy) of PCB and lead contaminated soil and install a gravel cap over any remaining soil with PCB > 1 mg/kg and lead > 400 mg/kg. As part of Site SS017 remedy, the USAF was to excavate and dispose offsite approximately 190 CY of PCB > 1 mg/kg and lead > 400 mg/kg contaminated soil. During the 2016 remedial response action, not all remaining PCB and lead contaminated soil at Site SS016 was capped; and at Site SS017 significantly more PCB and lead contaminated soil was identified. At Site SS016 the instability of the slope around the Upper Tram Terminal, and the required safety zone around a surface laid high voltage power cable prevented access, removal or capping of the PCB contaminated soils at Cells 1 through 6[2]. Because Cells 1 through 6 remain uncapped they do not meet 2013 ROD contingency remedy for being protective to human health and the environment." **SS017** ADEC requests that additional text be added as follows: "The Implementation of the remedy for Sites SS016 and SS017 occurred between June and September 2016. At Site SS017, an estimated additional 240-cy of PCB and lead contaminated soil remains to be excavated. This includes an estimated 90-cy of PCB and lead contaminated soil discovered under the Lower Tram Terminal, an additional 8.3-cy found around the disposal pit, and 67-cy of contaminated soil that could not be accessed due to the buffer zone around the high voltage power cable. Relocation of the live high voltage power cable is required to access the contaminated soils at Cells #15, #18, #21, and #22). The extent of contamination at the eastern portion of the	Partially concur. Per the EPA FYR template, the Response Action section focuses solely on response actions completed prior to the ROD. Actions taken to implement the remedy are described in Section II, Status of Implementation. Additional details on the 2016 remedial action were incorporated into the Status of Implementation sections for SS016 and SS017.

[2] Final Report LF003, SS016, and SS017 Remedial Action – Construction Cape Romanzof LRRS, Alaska. June 2017.

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			site (Cells #19, #20, and #23) needs further characterization before remedial activity can resume. Powering down the high voltage cable and moving the cable at SS016 and SS017 is not an option due to operational requirements of both the USAF and the Federal Aviation Administration. Upon completion of excavation and sampling activities, the floor and sidewalls of those areas containing PCB > 1 mg/kg and Lead > 400 mg/kg were covered with a geotextile to delineate the contaminated area for future removal actions. Clean fill from the installation borrow source was placed on top of the liner as backfill to match the surrounding grade, effectively acting as a cap to the contamination.[3]"	
6.			**Remedy Components**	
7.			**LF003** The text states: "All soil or sediment that contains PCBs in excess of 50 mg/kg will be considered a Resource Conservation & Recovery Act (RCRA) Subtitle C hazardous waste." While the language regarding polychlorinated biphenyls (PCBs) and being regulated by Resource Conservation & Recovery Act (RCRA) is in the final 2013 Record of Decision for LF003, ADEC slightly disagrees with this statement. Bulk remediation waste such as soil or sediment contaminated with PCBs in excess of 50 mg/kg is regulated under the Toxic Substance Control Act (TSCA) of 1976 and must be managed and disposed of "based on the concentration at which the PCBs are found". You may not dilute the as-found concentration of the contaminated soil by mixing it with clean soil during excavation or other management activities. Be aware that the soil or sediment is regulated for disposal if the PCB concentration is greater than or equal to 1 ppm. The disposal options for soil <50 ppm, set out in §761.61(a)(5)(v)(A), include a state-approved municipal or non-municipal non-hazardous waste landfill[4]. PCBs are exempt from federal Resource Conservation and Recovery Act (RCRA) regulations (40 CFR 261.8)[5]. PCBs are not listed RCRA hazardous wastes[6]. See "PCB wastes as hazardous wastes" in the EPA Monthly Report 1996	Concur. Text clarifying PCB regulations was added following the bulleted list of remedy components.

[3] Final Report LF003, SS016, and SS017 Remedial Action – Construction Cape Romanzof LRRS, Alaska. June 2017

[4] EPA June 2014 Revisions to the PCB Q and A Manual (1994)

[5] https://www.epa.gov/enforcement/toxic-substances-control-act-tsca-and-federal-facilities Toxic Substances Control Act (TSCA) and Federal Facilities

[6] PCBs are not listed RCRA hazardous wastes. It is possible that PCBs will be present as incidental contaminants in a listed hazardous waste (e.g., solvent used to remove PCBs from transformers). Typically PCBs do not exhibit a characteristic. Wastes that are hazardous for TC waste codes D018-43 and contain PCBs are

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			September at: https://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/08d5c1fe0a361be9852568e300468042!OpenDocument or https://yosemite.epa.gov/osw/rcra.nsf/0c994248c239947e85256d090071175f/08D5C1FE0A361BE9852568E300468042/$file/14014.pdf and also see: https://waste.zendesk.com/hc/en-us/articles/211677188-Are-polychlorinated-biphenyls-PCBs-regulated-under-RCRA-as-a-hazardous-waste- ADEC is providing the above information as a courtesy and wishes to direct any questions on RCRA interpretation or TSCA interpretation to the appropriate Region 10 program contacts. RCRA: David Bartus TSCA PCB Approvals, Senior RCRA & TSCA Policy Analyst (Bartus.dave@Epamail.epa.gov) 206-553-2804. TSCA: Michelle Mullin (mullin.michelle@epa.gov) TSCA PCB Approvals and PCB Coordinator 206-553-1616.	
8.	41	Table 2	**ROD Cleanup Levels** **SS017** **Subsurface Soil** **Maximum Detection** The table lists PCBs at 13.6 mg/kg and lead at 1,440 mg/kg for maximum detection in subsurface soil. ADEC requests these levels be changed due to the 2016 remedial action activities at SS017 which detected PCBs at a higher concentration of 18.4 mg/kg and lead at a higher concentration of 2,160 mg/kg in a sidewall sample for Cell# 11[7]. These contaminant levels in soil are new maximum detections in soil for SS017.	Partially concur. Table 2 is compiled from the RODs and specifies the maximum concentrations at the time of remedy selection. However, footnotes were added to the SS017 PCB and lead detections detailing the higher detections detected in 2016.
9.			**Status of Implementation**	
10.	42 & 45		**Status of Implementation** **Page 42** **Last Para.** **1st and 2nd Sentences** Delete duplicate second sentence: "The IC specifications include a requirement to file the appropriate notice with the USFWS."	Concur. The duplicated sentences were deleted.

exempt under RCRA if regulated under TSCA. Waste containing PCBs and not qualifying for the Section 261.8 exemption is fully subject to RCRA. Land disposal restrictions has special standards for PCB wastes (California List) per Section 3004(d)(2)(D) and 3004(d)(2)(E) (SUPERSEDED: California list removed, see 62 FR 25997; 5/12/97).

[7] Table 4-10 Final Report LF003, SS016, and SS017 Remedial Action – Construction Cape Romanzof LRRS, Alaska. June 2017

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			Page 45 **SS016** ADEC requests text be added that an explanation of significant differences (2018) is being pursued by the Air Force. Areas that could not be excavated or capped due to safety or logistical concerns will remain uncapped until Upper Tram Terminal and a high voltage power cable are removed and the slope stabilized. - LUCs for uncapped cells will meet the same Record of Decision (ROD) requirements as for capped cells. - Locations of uncapped cells will be surveyed and recorded in the land records, including the Base Master Plan and ADNR land records. Uncapped cells will meet the same requirement for Five-Year Reviews and performance reports as stated in the ROD. An additional 256-cy (396 tons) of PCB and lead contaminated soil remain at the site. It is expected the remaining soil contamination will be removed once the abandoned Upper Tram Terminal and high voltage cable are removed. To remove the remaining contaminated soil the high voltage cable will require relocating and the Upper Tram Terminal will need removing increasing the estimated cost by $8,849,439. This significantly exceeds the $795,743 estimate presented in the 2013 ROD by $8,053,696. **SS017** ADEC requests text be added that an explanation of significant differences is being pursued by the Air Force. The quantity of soil removed in 2016 was 293-cy (454 tons) of PCB and lead contaminated soil. Approximately 103-cy (160-tons) more than the ROD amount. An estimated 240-cy (372-tons) of contaminated soil remain on site. It is expected the remaining contamination will be addressed in 2023 during the removal of the Lower Tram Terminal and relocation of the high voltage cable. The remedy specified in the 2013 ROD is amended to allow the current areas with PCB >1 mg/kg and lead > 400 mg/kg contaminated soil to remain in place with capped cells and those areas unexcavated and inaccessible to remain until such time that the Lower Tram Terminal is removed and the high voltage cables can be relocated.	Partially concur. Text regarding the ESD was added for SS016 and SS017. In addition, information about the ESD was added to Section V under the response to Question A. However, the cost information provided was not incorporated, as the 2016 EPA FYR template eliminated the section regarding costs to implement the remedy.

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			The remedy specified in the 2013 ROD is amended to implement land use controls (LUC) until such time that the Lower Tram Terminal is removed and the power to the high voltage cables can be relocated. After the 2016 remedial action, approximately 454-tons (293-cy) soil was excavated and disposed of offsite at a cost of $1,506,826 ($3,319/ton). An estimated 396-tons (256-cy) remain on site. To remove the remaining contaminated soil the high voltage cable will require relocating and the Lower Tram Terminal will need removing, increasing the estimated cost to $8,849,439. This significantly exceeds the $938,995 estimate presented in the 2013 ROD by $9,417,270.	
11.	46	Table 3	**LUC Summary of Planned and/or Implemented LUCs** **Media, Engineered Controls, and Areas that do not support UU/UE Based on Current Conditions** **LF003** Please add text for gravel caps used for PCB contaminated soil at SS016 [Page 9 Table 3-1 of the 2018 Explanation of Significant Differences (ESD)] and SS017 (Page 11 Table 3-2 of the 2018 ESD). Add text for the eroded soil control barriers for LF003 (Page 26 of this document). **SS017** Add text to discuss proposed changes to the land use controls in the explanation of significant differences the Air Force will implement once finalized: The remedy specified in the 2013 ROD is amended to implement land use controls (LUC) at SS017 until such time that the Lower Tram Terminal is removed and the power to the high voltage cables can be relocated as follows: - Engineering controls (ECs) such as signs warning of contamination will be erected at the location where soil is located at concentrations above cleanup levels protective of human health and the environment. - ICs that prohibit development and use of property for residential housing, prevent use of contaminated soil for restricted uses, require dig permit in the event of excavation, and implement soil management plan at SS017 in order to prevent direct exposure. - ICs will be incorporated into the LUC Plan. - Periodic site inspections will be performed every year to check the condition of the signs; maintenance will be completed as needed. The signs will be maintained by the USAF until such time that it is determined that PCB	Concur. Text regarding the gravel caps at SS016 and SS017 and the eroded soil control barriers at LF003 was added. Partially concur. Detailed information on the LUCs was added under the Remedy Components subsection of Section II. Table 3 already includes a summary of the LUCs in effect at SS017.

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			contaminated soil no longer poses an unacceptable risk to human health and the environment and allow for unlimited use and unrestricted exposure at the site. - Locations of the cap will be surveyed and recorded in the appropriate Cape Romanzof LRRS land records, including the Base Master Plan and ADNR land records.	
12.	49	III	**Progress since the Last Review** The text states: "No issues were identified that affected the protectiveness of the remedies at these five sites, but recommendations that do not affect remedy protectiveness, including inspection and/or repair of monitoring wells, were identified (USAF, 2013a)." ADEC disagrees. Section 3.1 Site SS016 of the draft Explanation of Significant Differences SS016 & SS017 (July 2018) states: "Because Cells 1 through 6 remain uncapped they do not meet 2013 ROD contingency remedy for being protective to human health and the environment."	Disagree. This section focuses on issues identified during the prior FYR. The 2013 FYR did not identify any issues affecting the protectiveness of the remedies at these sites.
13.	59	V.	**Technical Assessment** **Question A:** Is the remedy functioning as intended by the decision documents? **LF003** The text states: "The remedies for Sites LF003, SS010, SS015, and ST009 require LTM. LTM was initiated at LF003 in 2017, and the results indicate that PCBs are present in surface water and sediment at concentrations exceeding cleanup levels." In a comment response to ADEC's comments on a draft December 2017 RA-O/LTM Report, the Air Force acknowledged that further action is needed for the contaminated sediments at LF003[8]. Please add text in this Five-Year Review document incorporating a summary of the following response: "Sample results indicate TSCA level PCBs and remediation waste will need to be addressed in accordance with 40 CFR § 761.3. Additionally, the AF recognizes that this level of sediment contamination will present problems in the future. The AF will program this location for further remedial actions."	Concur for LF003. A summary of the text provided was added to Section V, Question A, in the paragraph regarding LF003.

[8] "Sediment sample locations SED-01, SED-02 and SED-04 had PCB concentrations reported at 129,000 ug/kg, 96,400 ug/kg and 106,000 ug/kg, respectively." Section 3.3.1 Sediment Sample Results. 2017 Remedial Action-Operations/Long Term Management Cape Romanzof LRRS, Alaska. February 2018.

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			If further remedial action does not address the continued release of PCBs into sediment, then additional action will need to be taken by the Air Force to address the continuing source of PCBs within the landfill and/or groundwater diversion barrier to prevent groundwater from traveling through the LF003 landfill and leaching into the sediments. **Last sentence** ADEC requests that additional text be added: "It is expected the remaining contamination will be addressed in 2023 during the removal of the Upper and Lower Tram Terminals and removal and/or relocation of the high voltage cable." The text states: "Exposed drums were observed within the eroding bank at ST009 and at the shoreline below the high tide mark. Potential releases from these drums should be evaluated to determine if remedial action is required." If the abandoned and discarded drums (barrels[9]) are investigated (evaluated) in accordance with 18 AAC 75.335(b)(2)(C), then ADEC concurs with the text.	Concur for SS017. Additional text regarding the tram terminals and high-voltage cable was added as requested. Comment noted for ST009. This text was removed by the USAF and replaced with the following: "At ST009, drums are exposed within the eroding bank and at the shoreline below the high tide mark; however, these drums were used as a bank retaining wall and were not part of a drum dump (Richard Mauser, USAF, personal communication, 30 August 2018)."

[9] NOTE: AS 46.03.826(9) "release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance, but excluding
(A) any release that results in exposure to persons solely within a workplace, with respect to a claim that those persons may assert against the persons' employer; and
(B) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, or vessel;

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14.	60		**Question B:** Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy still valid? SS015 The November 7, 2017 18 AAC 75.345(b)(1) Table C groundwater cleanup levels referenced in Table 2-8[10] of the 2008 ROD have changed: Table C November 7, 2017 (2008 ROD levels) units reported in in µg/L - benzene 4.6 (5) - naphthalene 1.7 (730) - benzo(a)pyrene 0.034 (0.2) - ethylbenzene 5 (700) - benzo(a)anthracene 0.12 (1.2) - benzo(b)fluoranthene 0.34 (1.2) - 2-methylnaphthalene 36 (150) - benzo(a)pyrene 0.034 (0.2) - bis(2-ethylhexyl)phthalate 56 (6 has become less stringent) - toluene 1,100 (1,000 has become less stringent) These changes in cleanup levels need to be addressed in this five year review of the site since the levels as found in Table 2-8 of the 2013 ROD are not reflective of levels protective of unlimited use/unrestricted exposure [with the exception of toluene and bis(2-ethylhexyl)phthalate].	Concur. A table comparing groundwater COPCs to the revised cleanup levels was added as Appendix F and the response under Question B was updated to discuss the results. Because ICs/LUCs are required or are in place at the sites, the changes to the standards do not affect remedy protectiveness.
15.	61 & 62	VI	**Issues/Recommendations** **Sites without Issues/Recommendations Identified in the FYR and Periodic Review:** **SS016 and SS017** ADEC disagrees. Add text from the Explanation of Significant Differences for Sites SS016 and SS017 regarding Remedy Performance for both sites. **SS016** During the remedial action in 2016, six cells where not capped due to safety and logistical issues. 256-cy (396 tons) of PCB and lead contaminated soil remain at the site. It is expected the remaining soil contamination will be removed once the abandon Upper Tram Terminal and the high voltage cable are removed. Affects Current Protectiveness (Yes) and Future Protectiveness (Yes). Milestone Date: XXXX XX, 2023.	Concur for SS016 and SS017. The residual contaminated soil was added for each site as an issue affecting current and future protectiveness. Concur for LF003. The recommended issue was added.

[10] 2.9 Remedial Action Objectives. "At Site SS015, groundwater DRO and benzene concentrations are above groundwater cleanup levels. The RAOs for Site SS015 are to: • Clean up contaminated groundwater to the ADEC Table C cleanup levels (Table 2-8) [SS015 Groundwater Results Above Screening Levels]"

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			SS017 An estimated 240-cy (372-tons) of contaminated soil remain on site. Contaminated soil remains in place with capped cells and those areas unexcavated and currently inaccessible. It is expected the remaining contamination will be addressed in 2023 during the removal of the Lower Tram Terminal and relocation of the high voltage cable. Affects Current Protectiveness (No). Affects Future Protectiveness (Yes). Milestone Date: XXXX, XX, 2023. **Page 61** Add text for Site LF003: Issue Category: Remedy Performance. Issue: Contaminated sediments remain above cleanup level for PCBs (1 mg/kg) at three locations: 129 mg/kg, 96.4 mg/kg and 106 mg/kg which will need to be addressed by the Air Force. Recommendation: Remove contaminated sediments from these locations. Affects Current Protectiveness: Yes. Affects Future Protectiveness: Yes. Milestone Date-?????. **Page 62** The text states: "Wells MW-1 and MW-3 at Site SS014 are not plumb; however, the remedy for Site SS014 does not include groundwater monitoring. The USAF should consider removing/decommissioning these monitoring wells." ADEC concurs. Especially since the 2008 ROD states: "As discussed in Section 2.8.2, groundwater at sites ST009 and SS014 is not considered drinking water, in accordance with 18 AAC 75.350." It also states: "Although USAF and ADEC agree that the groundwater at SS014 meets the criteria spelled out in 18 AAC 75.350 to classify groundwater as a non-drinking water source, groundwater contamination at SS014 does not exceed Table C groundwater cleanup levels…" "A groundwater use determination was prepared in accordance with the criteria specified in 18 AAC 75.350 and presented in the Proposed Plan to meet the public notice requirement of 18 AAC 75.350. No comments were received from the public regarding the groundwater use determination. ADEC and USAF agree that the groundwater at Sites ST009 and SS014 meets the 18 AAC 75.350 criteria to classify groundwater as a non-drinking water source…" Since groundwater is not a source of drinking water and no surface water quality standards were exceeded[11], groundwater need not be monitored at SS014. ADEC concurs with decommissioning the wells associated with SS014.	Comment regarding wells at SS014 noted.

[11] Surface water and sediment samples were collected from three locations on the periphery of Site SS014 (i.e., SW-1/SD-1 and SW-3/SD-3 from Fowler Creek and SW-2/SD-2 from an unnamed creek south-southwest of the site; see Figure 2-5). Samples were analyzed for VOCs, PAHs, PCBs, and metals; results are summarized below. • No VOCs, PAHs, or PCBs were detected in any of the surface water or sediment samples. • No TAH and TAqH were detected. Section 2.7.5.3 Investigation Summary 2008 ROD 4 Sites at Cape Romanzof LRRS, Alaska.

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16.	63 & 65	VII	**Protectiveness Statements** **Page 63** Add text regarding the PCB contaminated sediments remaining at LF003 above 1 mg/kg being "Not Protective" and how the Air Force will address these sediments in the near future. **Page 65** **Site: SS016** The text states: "Remedial activities are in progress and, if all impacted material cannot be removed via excavation, a cap will be installed as specified in the ROD. The 2018 draft Explanation of Significant Differences for SS016 states: "Because Cells 1 through 6 remain uncapped they do not meet 2013 ROD contingency remedy for being protective to human health and the environment." ADEC requests the text be added stating an additional 256-cy (396 tons) of PCB and lead contaminated soil remain at the site. It is expected the remaining soil contamination will be removed once the abandon Upper Tram Terminal and the high voltage cable are removed. These demolition activities are expected to occur at the same time when the Lower Tram Building (SS017) is demolished. Also add this text to Issues and Recommendations Section VI of the document. **Site SS017** The 2018 draft Explanation of Significant Differences for SS017 shows in Table 3-2 Site SS017 – Status After 2016 RA: cells 15, 18, 21 and 22 are not excavated and at 2 feet below ground surface, PCBs are greater than 1 mg/kg and lead is greater than 400 mg/kg. For both of these sites: protectiveness is deferred[12]. Add text for SS017 stating that an estimated 240-cy (372-tons) of contaminated soil remain on site. It is expected the remaining contamination will be addressed in 2023 during the removal of the Lower Tram Terminal and relocation of the high voltage cable[13]. Also add this text to Issues and Recommendations Section VI of the document.	Concur for LF003. Text regarding the PCB-contaminated sediment was added to the LF003 protectiveness statement. Concur for Sites SS016 and SS017. Additional text regarding the residual, inaccessible soil was added. In addition, the protectiveness determinations were revised to indicate that a protectiveness determination was deferred.

[12] Table 4-2 Comparison of 2013 ROD Remedy and Changes in this ESD: It is expected the remaining contamination will be addressed in 2023 during the removal of the Lower Tram Terminal and relocation of the high voltage cable. ADEC believes the Upper Tram Terminal and high voltage power cable removal will be addressed during this same time period.

[13] Table 4-2. Comparison of 2013 ROD Remedy and Changes in this ESD. Site SS017. Quantity Differences. July 2018.