Proposed Plan for Remedial Action

NIKE SITE SUMMIT (SS047)

Joint Base Elmendorf-Richardson (JBER), Alaska

July 2013

PUBLIC COMMENT PERIOD
July 17 through August 16, 2013

OPEN HOUSE AND PUBLIC MEETING
5:30 pm Thursday, August 1, 2013
Fairview Community Recreation Center
1121 East 10th Avenue
Anchorage, Alaska 99501

INTRODUCTION

The U.S. Air Force (Air Force) is requesting public comments on this Proposed Plan. This Proposed Plan describes cleanup of contaminated soil and groundwater at Nike Site Summit (SS047), located on Joint Base Elmendorf-Richardson (JBER), Alaska.

The public comment period begins on July 17, 2013, and ends on August 16, 2013. A public meeting will be held August 1, 2013, at the Fairview Community Recreation Center in Anchorage, Alaska, to discuss the Proposed Plan, answer questions, and receive public comment.

This Proposed Plan has the following purposes:

- Provide basic background information;
- Identify and explain the reasons for the preferred alternative for remedial action;
- Describe the remedial options that were evaluated;
- Solicit public review of and comment on all of the alternatives described; and
- Provide information on how the public can be involved in the remedy selection process.

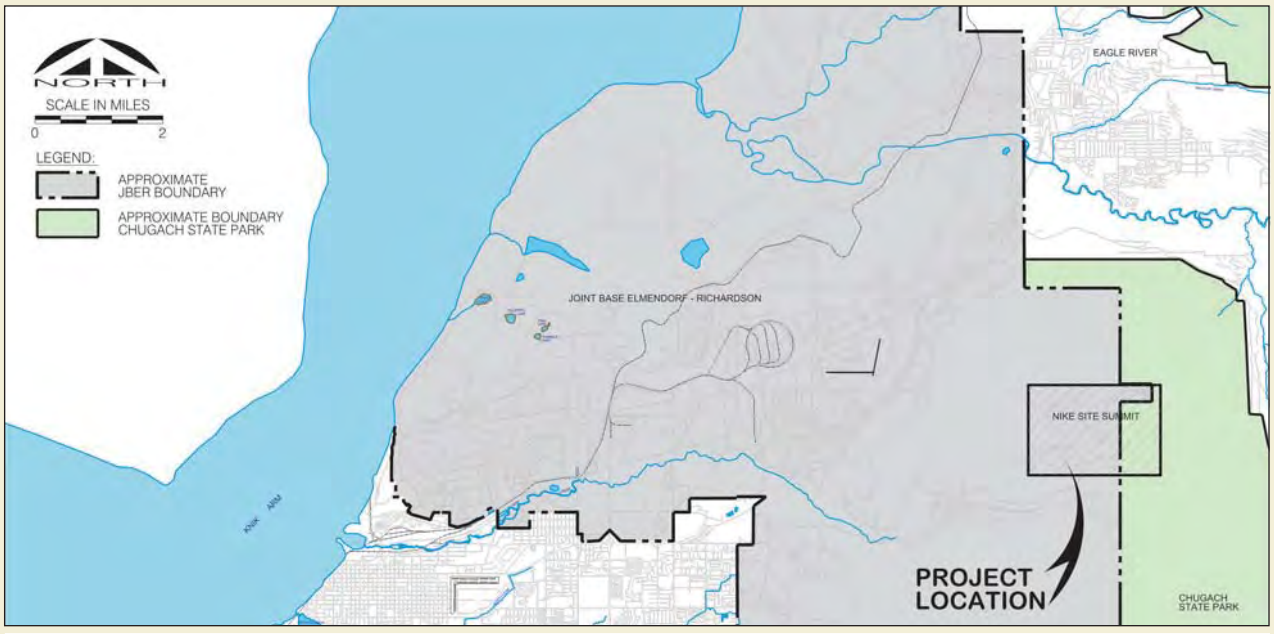


Figure 1 Nike Site Summit (SS047) Location Map

This Proposed Plan is based upon the remedial investigation (RI) and feasibility study (FS) conducted at Nike Site Summit (SS047) and highlights key information from the remedial investigation conducted in 2010 and 2011, and the final *Nike Site Summit Remedial Investigation Report*, May 2012 and the final *Nike Site Summit Feasibility Study*, February 2013. The RI and FS reports for Nike Site Summit (SS047), as well as other information are contained in the Administrative Record file. A copy of the Administrative record file is available for public review at the location listed under the 'Where Do I Get More Information' section located on the final page of this proposed plan. Definitions of environmental terms in ***bold*** *and* ***italics*** are included in the glossary on the final page of this Proposed Plan.

Public input on all alternatives and the rationale for the ***Preferred Alternative*** is very important to the remedy selection. New information the Air Force learns during the public comment period could result in the selection of a final remedial action that differs from the Preferred Alternative. Therefore, the public is encouraged to review and comment on all alternatives in this Proposed Plan. Following public comment, a Record of Decision (ROD) will be issued that selects the final cleanup remedy. Public comments on the Proposed Plan and responses to those comments will be included in the ROD.

This Proposed Plan has been prepared by the Air Force and fulfills public participation requirements under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

SITE BACKGROUND

SS047 is located approximately 12.5 miles east of Anchorage near the eastern boundary of JBER with Chugach State Park (Figure 1). This site is on a ridgeline in the Chugach Mountains at 2,500- to 3,900-foot elevation and covers approximately 244 acres. Nike Site Summit was used as a Nike Hercules missile site and was in operation from 1959 to 1979. This ground-based defensive system provided protection to Fort Richardson, Elmendorf Air Force Base, and the City of Anchorage against aerial attack during the Cold War. In the event of an aerial attack, guided missiles would be fired to destroy incoming aircraft. "Live" missiles were fired at Nike Site Summit between 1960 and 1964, when it was determined to no longer be safe due to growth of the population in the surrounding area. In 1979, the U.S. Army deactivated this site and removed all sensitive equipment. There are six areas at SS047 addressed within this Proposed Plan (Figure 2):

- Upper Site Summit (USS) – former battery control area, located at an elevation of 3,900 feet above mean sea level, currently housing several commercial antenna installations.
- Lower Site Summit (LSS) – former missile launch area, located at an elevation of about 3,100 feet above mean sea level.
- Area A – Former Opportunity Strikes Radio Relay Station (RRS), a Former Borrow Area, and a Suspected Disposal Area are located at a slightly lower elevation (2,950 feet above mean sea level) than LSS.
- Area B – High Explosive and Guided Missile Magazines, located about midway between LSS and USS, along the east side of the gravel road at an elevation of 3,200 feet above mean sea level.
- Area C – Pump House, is the lowest elevation area of SS047 at 2,500 feet above mean sea level, off of Arctic Valley Road.
- Area D – Former Borrow Area, at 3,200 feet above mean sea level, adjacent to LSS.

The U.S. Army, EPA Region 10, and ADEC signed a Federal Facilities Agreement (FFA) for Fort Richardson in December 1994. The FFA ensures that environmental impacts associated with past practices at each installation are investigated and appropriate actions are completed to protect human health and the environment. This agreement sets deadlines, objectives, responsibilities, and procedural framework for cleanup. SS047 was added to the FFA in 2011. Fort Richardson and Elmendorf AFB became a joint base in October 2010 and the Air Force assumed the responsibility of the Fort Richardson FFA.

SITE CHARACTERISTICS

SS047 lies atop the western edge of the Front Range of the Chugach Mountains. Surface materials are dense, with outcroppings of bedrock, hornfels, talus, and rocky gravely soil. Many areas at SS047 contain gravel building pads that were apparently constructed by leveling and spreading local terrain, as well as utilizing materials obtained from borrow sources at Areas A and D.

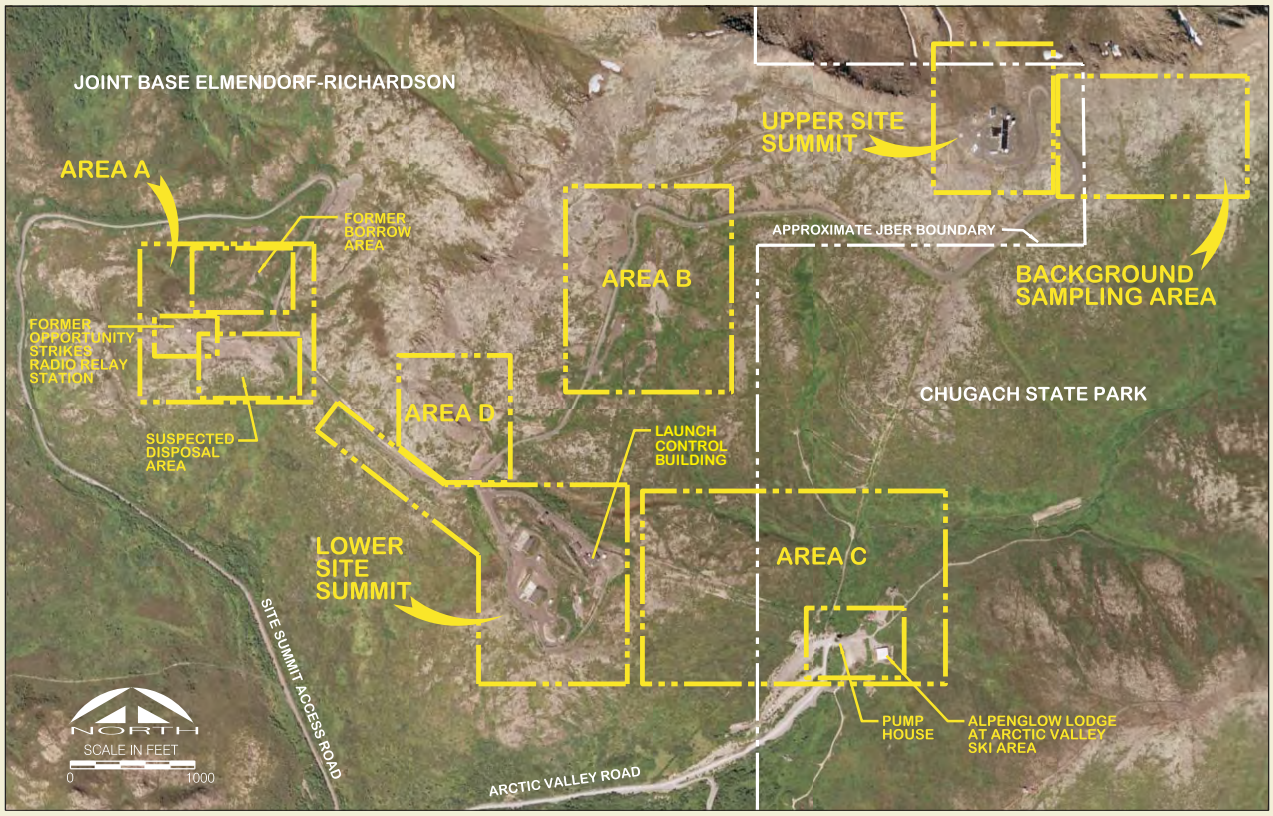


Figure 2 Nike Site Summit (SS047) Site Map

Previous Investigations

A limited Preliminary Assessment/Site Investigation (PA/SI) was conducted at SS047 in 1995 and 1996. The results from the PA/SI were used as a preliminary framework during the RI, as well as to identify areas that require no action (Area B and Area D). Additionally, some remedial actions occurred prior to the 2010/2011 RI, specifically underground storage tank (UST) removals at USS and LSS.

Contaminants of Concern

Petroleum hydrocarbons (PHCs) are the most prevalent organic ***Contaminants of Concern (COCs)*** at SS047, primarily diesel range organics (DRO) and residual range organics (RRO). PHC products are complex mixtures of hundreds of compounds, many of which are susceptible to chemical, physical, and biological breakdown processes in the surface and subsurface soils. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals are also COCs at SS047. Once released, VOCs begin to degrade through a variety of means. The COCs at each site along with cleanup levels are outlined in Tables 1 through 4. Site characteristics and remedial action areas for USS, LSS, Area A, and Area C are presented in the following subsections and Figures 3 through 6. Conceptual site models are also provided for USS and LSS where groundwater exists to demonstrate the surface and subsurface dynamics.

Lower Site Summit - Missile Launch and Control Pad 1 (2010)

Missile Launch (circa 1960's)

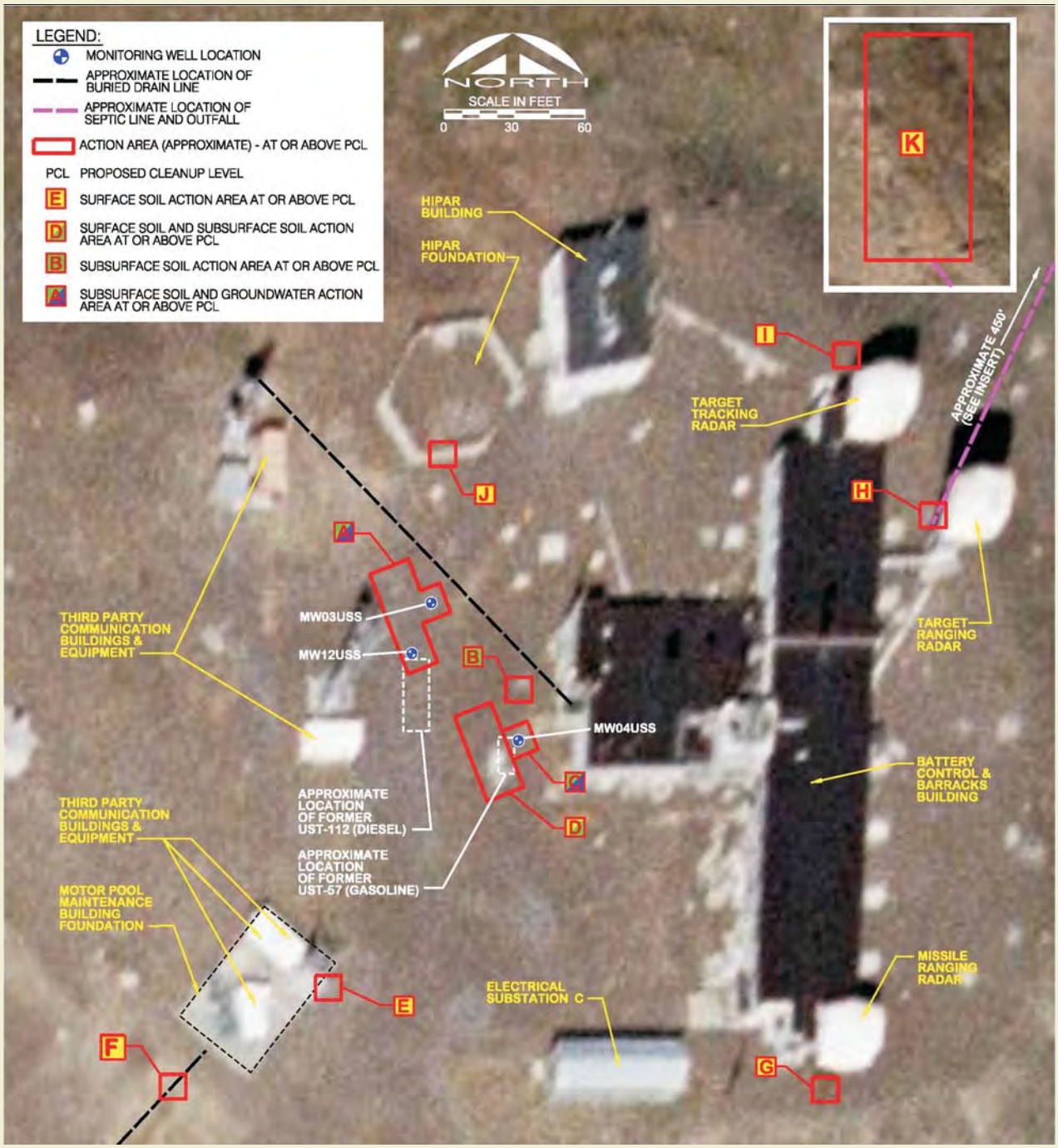


Figure 3 Upper Site Summit Site Map and Conceptual Site Model

Table 1 USS – Contaminants of Concern by Media and Proposed Cleanup Levels

Contaminant of Concern by Media	Maximum Detection	Detection Frequency	PCL	PCL Basis
Surface Soil (0 to 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	2,270	19 of 23	250	ADEC gw
Residual Range Organics (RRO)	3,330	23 of 23	120	ERBCL
Metals				
Arsenic	19.1	15 of 15	12.5	Site-Specific Background [1]
Barium	1,240	15 of 15	1,100	ADEC gw
Cadmium	23.9	15 of 15	1.49	ERBCL
Chromium, Total	63.2	15 of 15	38.0	Site-Specific Background [1]
Lead	950	15 of 15	204	ERBCL
Silver	38.2	15 of 15	11.2	ADEC gw
Semi-Volatile Organic Compounds				
4-Chloroaniline	7.8	2 of 23	0.25	LOQ
Benzo(a)anthracene	8.61	10 of 23	3.6	ADEC gw
Benzo(a)pyrene	5.75	8 of 23	0.49	ADEC dc
Benzo(b)fluoranthene	10.6	8 of 23	1.89	ERBCL
Pyrene	16.6	11 of 23	2.8	ERBCL
Subsurface Soil (greater than 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	3,690	21 of 37	250	ADEC gw
Metals				
Chromium, Total	46.8	24 of 24	38.0	Site-Specific Background [1]
Volatile Organic Compounds				
Benzene	0.0291	5 of 37	0.025	ADEC gw
Trichloroethylene (TCE)	0.079	19 of 37	0.020	ADEC gw
Semi-Volatile Organic Compounds				
Benzo(a)pyrene	3.71	4 of 37	0.49	ADEC dc
Dibenz(a,h)anthracene	0.846	3 of 37	0.744	RBCL

Key:
1 – Site-specific background values calculated during the Remedial Investigation.
ADEC – Alaska Department of Environmental Conservation
bgs – below ground surface
dc – direct contact, under 40 inch zone
ERBCL – Ecological risk-based concentration level (calculated in the HHERA)
gw – migration-to-groundwater
HHERA – Human Health and Ecological Risk Assessment
LOQ – limit of quantitation
mg/Kg – milligrams per kilogram
PCL – proposed cleanup level
RBCL – Risk-based cleanup level (calculated in the HHERA)
USS – Upper Site Summit
note: groundwater is of a minimal volume that it does not present a pathway for exposure

Upper Site Summit -

Groundwater at USS was present in minimal amounts and only in those areas where former USTs had previously been located and the bedrock excavated to accommodate their installation. Surface and subsurface soils consist primarily of angular and rounded gravel fill material atop of bedrock as shown in the conceptual site model provided in Figure 3.

USS Battery Control and Barracks Building (demolished in 2012) Looking Eastward

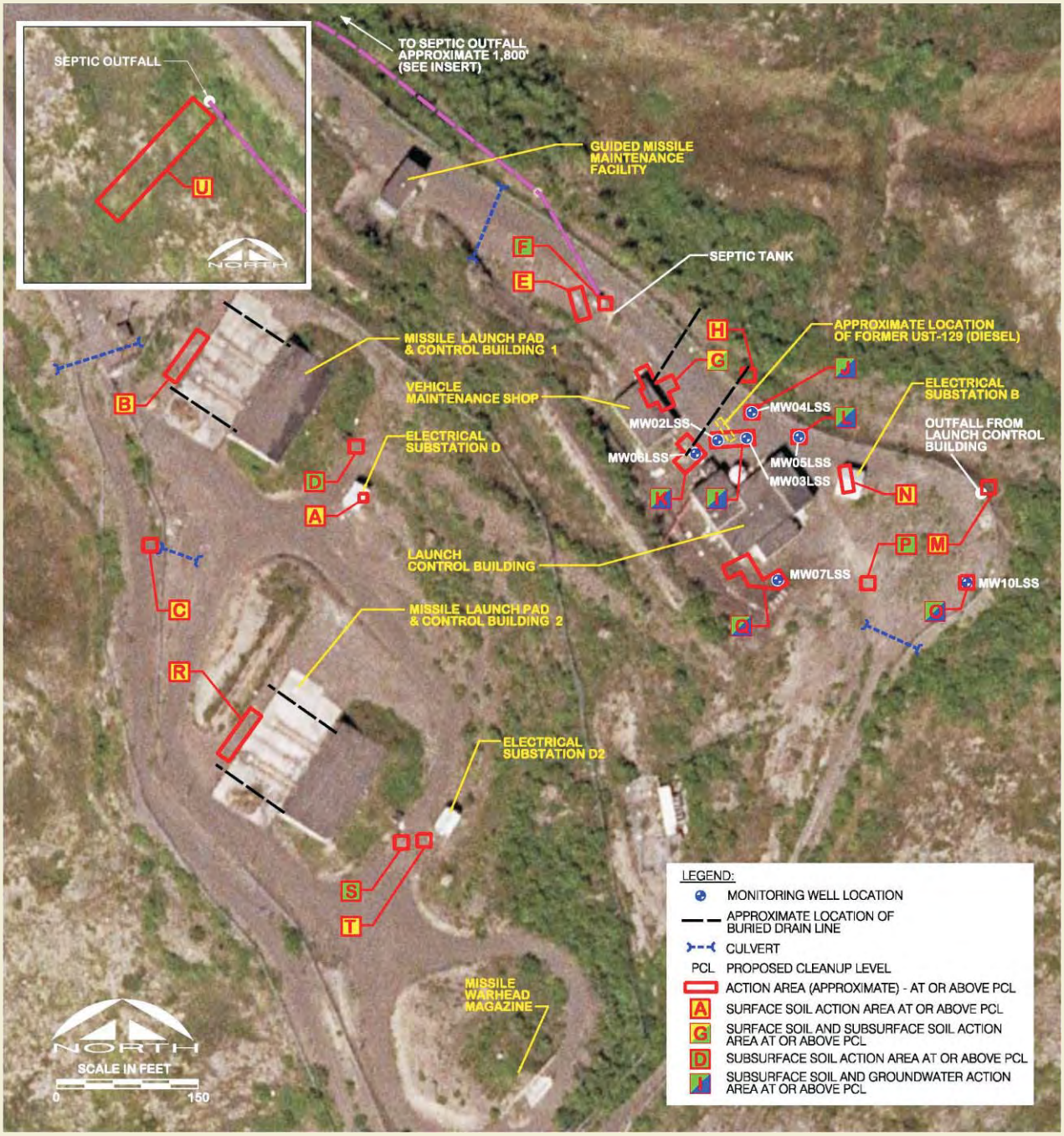


Figure 4 Lower Site Summit Site Map and Conceptual Site Model

Table 2 LSS Contaminants of Concern by Media and Proposed Cleanup Levels

Contaminant of Concern by Media	Maximum Detection	Detection Frequency	PCL	PCL Basis
Surface Soil (0 to 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	7,360	29 of 37	250	ADEC gw
Residual Range Organics (RRO)	24,400	37 of 37	120	ERBCL
Metals				
Arsenic	19	34 of 34	12.5	Site-Specific Background [1]
Cadmium	15.6	34 of 34	1.49	ERBCL
Chromium, Total	65	34 of 34	38.0	Site-Specific Background [1]
Mercury	1.92	34 of 34	1.4	ADEC gw
Volatile Organic Compounds				
Trichloroethene (TCE)	0.290	13 of 37	0.020	ADEC gw
Semi-Volatile Organic Compounds				
Benzo(a)pyrene	2.83	12 of 37	0.744	RBCL
Benzo(b)fluoranthene	6.15	11 of 37	1.89	ERBCL
bis(2-ethylhexyl) Phthalate	5.44	3 of 37	0.549	ERBCL
Chrysene	3.28	11 of 37	2.14	ERBCL
Pentachlorophenol	46.5	1 of 37	2	LOQ
Pyrene	7.27	19 of 37	2.8	ERBCL
Subsurface Soil (greater than 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	4,170	13 of 36	250	ADEC gw
Metals				
Chromium, Total	171	21 of 21	38.0	Site-Specific Background [1]
Nickel	143	21 of 21	86	ADEC gw
Volatile Organic Compounds				
1,1,2,2-Tetrachloroethane	1.210	1 of 36	0.017	ADEC gw
1,1,2-Trichloroethane	1.650	1 of 36	0.018	ADEC gw
1,2,3-Trichlorobenzene	0.131	1 of 36	0.015	EPA
1,2,3-Trichloropropane	0.491	1 of 36	0.001	LOQ
1,2-Dibromo-3-chloropropane	3.040	1 of 36	0.002	LOQ
2-Hexanone	0.942	1 of 36	0.0079	EPA
Benzene	0.0497	3 of 36	0.025	ADEC gw
Trichloroethylene (TCE)	0.613	21 of 36	0.020	ADEC gw
Semi-Volatile Organic Compounds				
Benzo(a)anthracene	37	6 of 36	3.6	ADEC gw
Benzo(a)pyrene	35.7	5 of 36	0.49	ADEC dc
Benzo(b)fluoranthene	40.1	5 of 36	12	ADEC gw
Dibenz(a,h)anthracene	6.12	2 of 36	4	ADEC gw
Groundwater (mg/L)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	29.4	6 of 8	0.308	RBCL
Metals				
Arsenic	0.0322	8 of 8	0.000327	RBCL
Lead	0.0333	6 of 8	0.015	ADEC gw
Vanadium	0.137	7 of 8	0.0307	RBCL
Volatile Organic Compounds				
Benzene	0.00539	1 of 8	0.005	ADEC gw
Naphthalene	0.168	3 of 8	0.0163	RBCL
Trichloroethylene (TCE)	0.0175	2 of 8	0.00256	RBCL
Semi-Volatile Organic Compounds				
2-Methylnaphthalene	0.0735	3 of 8	0.0257	RBCL

Key:
1 – Site-specific background values calculated during the Remedial Investigation
ADEC – Alaska Department of Environmental Conservation
bgs – below ground surface
dc – direct contact, under 40 inch zone
ERBCL – Ecological risk-based concentration level (calculated in the HHERA)
EPA - U.S. Environmental Protection Agency Risk-Based Soil Screening Levels, Nov 2012
gw – migration-to-groundwater
HHERA – Human Health and Ecological Risk Assessment
LOQ – limit of quantitation
LSS – Lower Site Summit
mg/Kg – milligrams per kilogram
mg/L – milligrams per liter
PCL – proposed cleanup level
RBCL – Risk-based cleanup level (calculated in the HHERA)

Lower Site Summit - (continued from previous page)

Groundwater at LSS appears to follow the contours of the bedrock and, similar to USS, is most plentiful in the area where a former UST was located. Groundwater is shallowest nearest the excavated bedrock behind the Launch Control Building and steadily drops as it heads downslope toward the northeast edge of the LSS gravel building pad as shown in the conceptual site model provided in Figure 4.

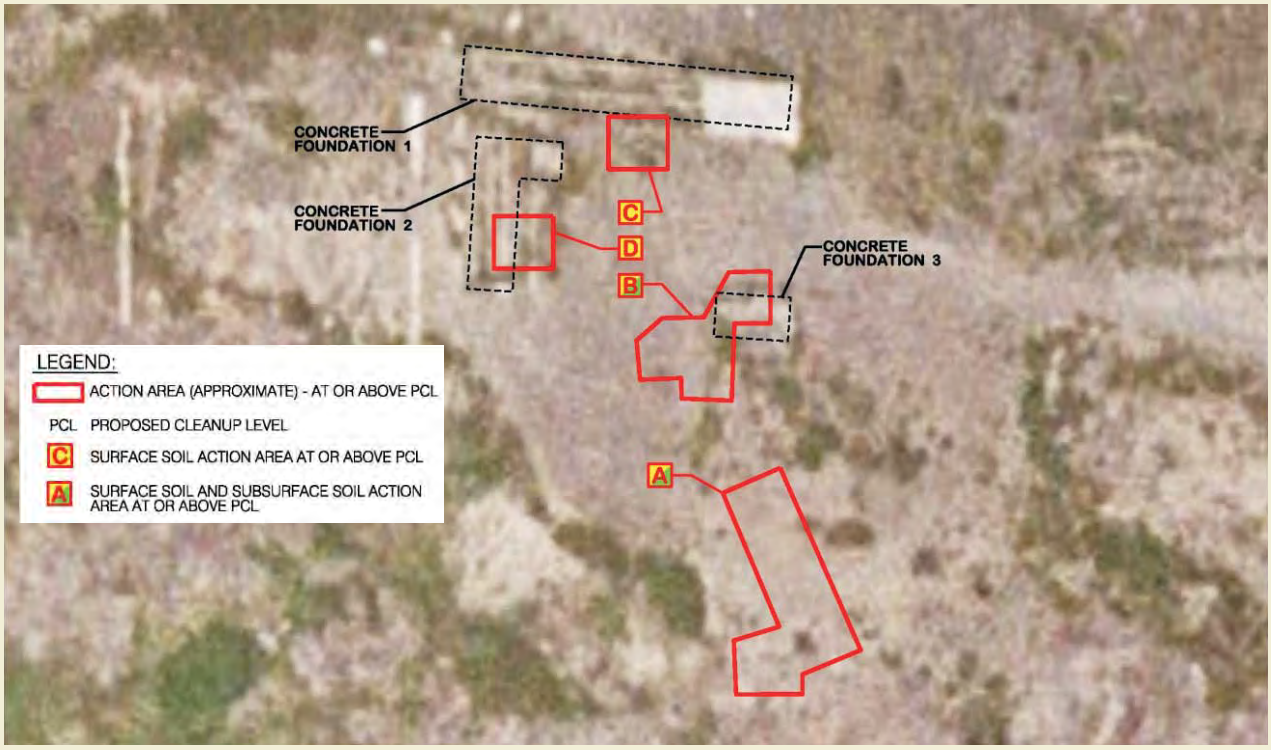


Figure 5 Area A Site Map

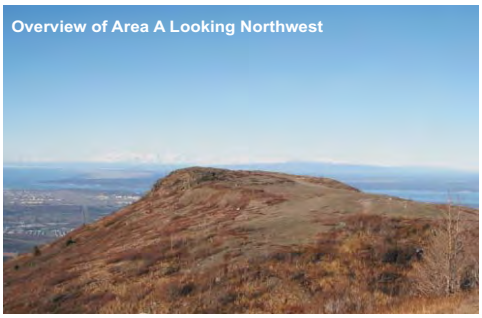
Table 3 Area A Contaminants of Concern by Media and Proposed Cleanup Levels

Contaminant of Concern by Media	Maximum Detection	Detection Frequency	PCL	PCL Basis
Surface Soil (0 to 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	19,200	14 of 15	2,998	RBCL
Residual Range Organics (RRO)	161,000	15 of 15	496	ERBCL
Subsurface Soil (greater than 2 feet bgs) (mg/Kg)				
Petroleum Hydrocarbons				
Diesel Range Organics (DRO)	28,400	11 of 19	2,998	RBCL

Key:
bgs – below ground surface
ERBCL – Ecological risk-based concentration level (calculated in HHERA)
HHERA – Human Health and Ecological Risk Assessment
mg/Kg – milligrams per kilogram
PCL – proposed cleanup level
RBCL – risk-based cleanup level (calculated in the HHERA)

Area A - (continued from previous page)

Groundwater was not encountered in the eleven test pits excavated to bedrock at Area A. Area A sits atop a bedrock outcrop.


Overview of Area A Looking Northwest


View of Area A Looking East

Area C -

Area C includes the surface water weir and ponded area located within the unnamed creek that marks the topographical divide between SS047 and the Alpenglow Ski area. No test pits or monitoring wells were installed at Area C, as contaminants were observed to be limited to one isolated area of soil surface staining.


Area C Pump House Looking Northeast

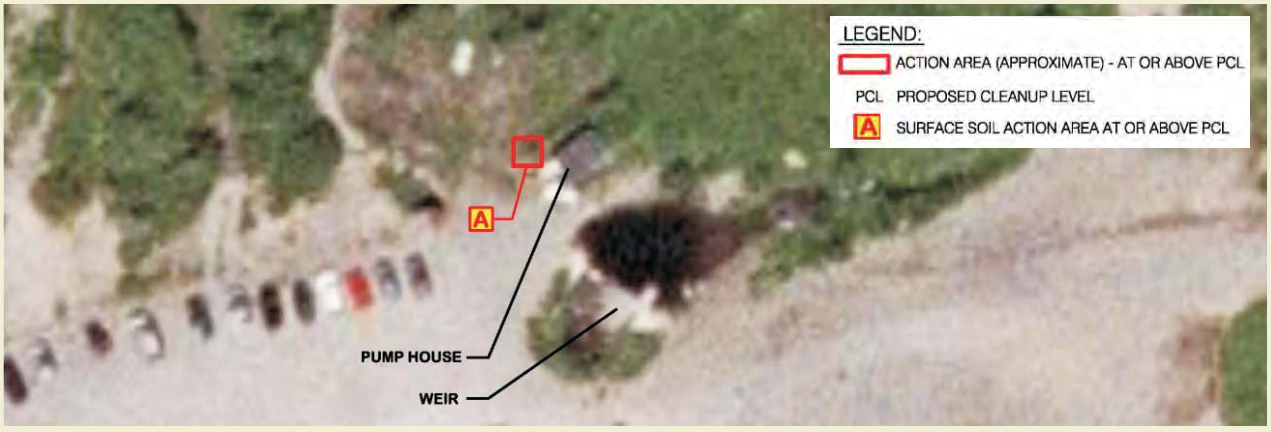


Figure 6 Area C Site Map

Table 4 Area C Contaminants of Concern by Media and Proposed Cleanup Levels

Contaminant of Concern by Media	Maximum Detection	Detection Frequency	PCL	PCL Basis
Surface Soil (0 to 2 feet bgs) (mg/Kg)				
Semi-Volatile Organic Compounds				
Benzo(a)pyrene	1.62	2 of 6	0.744	RBCL

Key:
bgs – below ground surface
COC – contaminant of concern
HHERA – Human Health and Ecological Risk Assessment
mg/Kg – milligrams per kilogram
PCL – proposed cleanup level
RBCL – risk-based cleanup level (calculated in the HHERA)

SCOPE AND ROLE OF THE REMEDIAL ACTION

The remedial action, or method, used to clean up the contamination at SS047 is part of a basewide effort to clean up contaminated areas. This Proposed Plan addresses all six areas at SS047. The RI and FS for SS047 identified various combinations of PHC, metal, VOC, and SVOC contamination in soil and groundwater at several areas within SS047. The remedial action strategy places a priority on protecting human health and the environment.

SUMMARY OF SITE RISKS

As part of the RI and FS, the Air Force conducted a baseline risk assessment to determine the current and future effects of COCs on human health and the environment. The baseline risk assessment estimates the risks a site poses if no action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. Table 5 presents a summary of site risks at SS047.

It is the Air Force's current judgment that the Preferred Alternatives identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, are necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from areas at SS047 that might present an imminent and substantial endangerment to public health or welfare. Table 5 presents a Summary of Site Risks at SS047.

Human Health Risks

Two important outcomes of a human health risk assessment (HHRA) are estimates of the ***incremental lifetime cancer risk (ILCR)*** and non-cancer ***hazard quotient (HQ)*** that may result from human exposures to contaminants at a site. The ILCR is an estimate of additional risk of developing cancer from exposure to contamination, over the national average of developing cancer. For example, a $1x10^{-6}$ cancer risk means that the likelihood of cancer is one in a million (1,000,000). The ADEC acceptable ILCR criterion is 1×10^{-5} (one in 100,000). The national average risk of developing cancer is about 1 in 3. The HQ expresses the likelihood that exposure to contaminants will cause some adverse, non-cancer health effect. An HQ above 1 indicates a potential for non-cancer health effects to result from exposure to contaminants. Additionally, the ***hazard index (HI)*** is the sum of HQs of non-cancer risks for all contaminants within a certain exposure pathway. The ADEC acceptable HI criterion is 1.

Ecological Risks

An ecological risk assessment was conducted to determine if plants or animals might be exposed to contaminants and if the exposure could have adverse effects. Plants can be exposed to contaminants in air, soil, water, or sediment. Animals may be exposed to contaminants in air, soil, water, sediment and (if they burrow) vapors from soil or groundwater. Animals may also be exposed to contaminants by eating contaminated plants or other animals. A contaminant is considered to be potentially harmful to the environment if it has a HQ greater than 1.

No Action Areas

Area B

Area B was investigated during the 1996 SI due to indications of past waste disposal. A visual site inspection was also conducted during the 2010 remedial investigation. Based on the results of these investigations, no site-related contaminants are present and no further investigation is warranted. Metals that were detected during the site investigation are consistent with background levels. There are no COCs at Area B. Based on these findings, No Action is recommended for Area B.

Area D

Area D was investigated during the 1996 SI because old borrow pits at other military installations were sometimes used as disposal sites. A visual site inspection was also conducted during the 2010 RI. Analytical results and observations indicate that there is no evidence of site-related contamination. Based on these findings, No Action is recommended for Area D.

Table 5 — Summary of Site Risks at SS047

Area	Estimated Human Health Risks						Estimated Ecological Risk
	Site Workers		Site Visitors		Residental		Hazard Quotient[a]
	ILCR (1 x 10^{-5})	HI (1)	ILCR (1 x 10^{-5})	HI (1)	ILCR (1 x 10^{-5})	HI (1)	HQ (1)
Upper Site Summit							
Surface Soil	**2 x 10^{-5}**	<1	2 x 10^{-6}	<1	**5 x 10^{-5}**	<1	**>1**
Subsurface Soil	**3 x 10^{-5}**	<1	3 x 10^{-6}	<1	**7 x 10^{-5}**	<1	
Groundwater	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	
Lower Site Summit							
Surface Soil	**1 x 10^{-4}**	< 1	9 x 10^{-6}	< 1	**3 x 10^{-4}**	< 1	**>1**
Subsurface Soil	**2 x 10^{-4}**	1	**2 x 10^{-5}**	< 1	**4 x 10^{-4}**	**>1**	
Groundwater	--[c]	--[c]	--[c]	--[c]	**2 x 10^{-3}**	**>1**	
Indoor Air	8 x 10^{-6}	1	--[d]	--[d]	**2 x 10^{-5}**	1	
Area A							
Surface Soil	4 x 10^{-8}	1	4 x 10^{-9}	< 1	6 x 10^{-8}	**> 1**	**>1**
Subsurface Soil	6 x 10^{-6}	<1	6 x 10^{-7}	<1	**2 x 10^{-5}**	**> 1**	
Area C							
Surface Soil	**1 x 10^{-5}**	--[e]	**1 x 10^{-6}**	--[e]	**3 x 10^{-5}**	--[e]	<1
Subsurface Soil	--[f]	--[f]	--[f]	--[f]	--[f]	--[f]	

Key:
(1) – Values in parenthesis are Alaska Department of Environmental Conservation risk criteria.
Values in **BOLD** are above Alaska Department of Environmental Conservation acceptable risk criterion.
a – An ecological risk assessment was only conducted for surface soils.
b – A human health risk assessment was not necessary due to the limited nature and extent of groundwater.
c – Groundwater risks were only assessed for the future resident scenario using the most conservative assumptions, which assumed unfiltered groundwater and the presence of hexavalent chromium at Lower Site Summit.
d – Indoor air risks were only assessed for site worker and future resident scenarios, for vapor intrusion of naphthalene and trichloroethylene (TCE) from groundwater at Lower Site Summit.
e – Contaminants identified in surface soil at Area C are not known to have non carcinogenic effects; therefore, non-cancer HIs were not evaluated.
f – No contaminants were identified in subsurface soil at Area C; therefore, no risk assessment calculations were performed.
HI - Hazard index
hr - hour
ILCR - Incremental lifetime cancer risk
m - month
wk - week

Aerial Oblique View of Upper Site Summit

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are specific goals for protecting human health and the environment. RAOs are developed by evaluating the results of the RI including the human health and ecological risk assessments and establishing goals that will be achieved by implementation and/or completion of remedial actions. RAOs are media specific, and are presented below by area.

Upper Site Summit RAOs:

- Prevent contact with soil with contaminant concentrations that exceed cleanup levels. The primary contaminants that exceeded these levels and contributed to USS human health risks were:
  - Surface and subsurface soil: benzo(a)pyrene, dibenz(a,h)anthracene, and arsenic.
- Prevent exposure of ecological receptors to USS surface soil contaminants. The primary contaminants that exceeded cleanup levels and contributed to USS ecological receptor health risks were:
  - Surface soil: RRO, cadmium, lead, benzo(b)fluoranthene, and pyrene.
- Prevent soil contaminants that exceed migration-to-groundwater cleanup levels from impacting groundwater through leaching. The primary contaminants that exceed these levels were:
  - DRO, barium, total chromium, silver, 4-chloroaniline, benzo(a)anthracene, benzene, and trichloroethylene (TCE).

Lower Site Summit RAOs:

- Prevent use of surface soil, subsurface soil, and groundwater with contaminant concentrations that exceed cleanup levels. The primary contaminants that exceeded these levels and contributed to LSS human health risks were:
  - Surface soil: arsenic, pentachlorophenol, benzo(a)pyrene, and benzo(b)fluoranthene.
  - Subsurface soil: 1,1,2-Trichloroethane, 1,2,3-trichloropropane, and 1,2-dibromo-3-chloropropane.
  - Groundwater: DRO, arsenic, vanadium, 2-methylnaphthalene, naphthalene, and TCE.
- Prevent exposure of ecological receptors to LSS surface soil contaminants. The primary contaminants that exceeded these levels and contributed to LSS ecological receptor health risks were:
  - Surface soil: RRO, cadmium, bis(2-ethylhexyl)phthalate, pentachlorophenol, benzo(a)pyrene, benzo(b)fluoranthene,chrysene, and pyrene.
- Prevent soil contamination that exceed migration-to-groundwater cleanup levels from impacting groundwater through leaching. The primary contaminants that exceeded these levels were:
  - DRO, chromium, nickel, mercury, TCE, pentachlorophenol, 1,1,2,2-tetrachloroethane, 1,1,2 trichloroethane, 1,2,3-trichlorobenzene, 1,2,3-trichloropropane, 1,2-dibromo-3-chloropropane, 2-hexanone, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenz(a,h)anthracene.

Area A RAOs:

- Prevent contact of soil with contaminant concentrations that exceed cleanup levels. The primary contaminants that exceeded these levels and contributed to Area A human health risks were:
  - Surface and subsurface soil: DRO.
  - Surface soil: RRO.
- Prevent exposure of ecological receptors to Area A surface soil contaminants that exceed cleanup levels. The primary contaminant that exceeded these levels and contributed to Area A ecological receptor health risks was:
  - Surface soil: RRO.

Area C Human Health RAOs:

- Prevent contact of soil with contaminant concentrations that exceed cleanup levels. The primary contaminant that exceeded these levels and contributed to Area C human health risks was:
  - Surface soil: benzo(a)pyrene.

There were no potential ecological receptors at Area C; therefore, ecological RAOs are not necessary.

SUMMARY OF ALTERNATIVES

The remedial alternatives considered in the Nike Site Summit (SS047) FS to address contaminated media at the six areas is provided in Table 6 and discussed below.

No Action. This response action consists of leaving the impacted soil and groundwater in its current condition, with no further investigation or remedial action. Evaluation of this response action is required by the NCP.

Land use Controls (LUCs). This response action consists of restricting access to contaminated soil and groundwater at the site. LUCs are technology/process options that include: engineering controls; physical barriers, such as fences and security guards; and institutional controls, which are non-engineering controls such as zoning restrictions, building or excavation permits, well drilling prohibitions, easements, and covenants.

Table 6 Remedial Alternatives by Area

Process Option	USS[1]	LSS	Area A[1]	Area B[2]	Area C[3]	Area D[2]
No Action	X	X	X	X	X	X
Land Use Controls	X	X	X	--	X	--
In-Situ Treatment – Soil						
– Natural Attenuation	X	X	X	--	X	--
– Chemical Oxidation	X	X	X	--	X	--
In-Situ Treatment – Groundwater						
– Groundwater Monitoring	--	X	--	--	--	--
– Chemical Oxidation	--	X	--	--	--	--
Ex-Situ Treatment – Soil						
– Thermal Desorption	X	X	X	--	X	--
– Excavation	X	X	X	--	X	--

Key:
□ – Preferred Alternative
X – Detailed analysis to be carried out for this option, if the media (soil or groundwater) contains contaminants of concern that require remediation at any of the SS047sites.\
-- – not applicable
1 – No groundwater or groundwater insufficient to complete exposure pathway at this site.
2 – Areas B and D are proposed for No Action.
3 – COCs limited to surface soil only, no subsurface investigation warranted based on site conditions.
LSS – Lower Site Summit
USS – Upper Site Summit

Groundwater Monitoring (GWM). This response action relies on natural physical, chemical, and biological processes to reduce contaminant mass and concentration in soil and groundwater over time. Periodic monitoring is required to assess changes in the nature and extent of contamination. This approach can be appropriate when contaminants are not reasonably anticipated to migrate or pose unacceptable risks to human or ecological receptors.

In-situ Chemical Oxidation. This approach involves introducing a strong oxidizing agent into the media to break the chemical bonds in organic COCs. This approach requires extended contact time to be an effective alternative and may require more than one application.

Excavation and Off-site Treatment. For soils, excavation refers to removing contaminated soil, backfilling with clean material, and treatment of the excavated soil off-site. The type of treatment depends on the type of contaminant(s). For PHCs, Thermal Desorption would be used, which uses heat to remove organic compounds from the soil. The soil is excavated and loaded into a thermal desorption unit where it is heated to approximately 800 degrees Fahrenheit (°F), achieving separation of the contaminants from the soil. Volatilized contaminants are thermally degraded or captured for disposal.

EVALUATION OF ALTERNATIVES

Nine criteria (Table 7) are used to evaluate the different remediation alternatives individually and against each other in order to identify a Preferred Alternative. This section of the Proposed Plan discusses the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are explained in Table 7. A detailed analysis of alternatives can be found in the RI and FS. Tables 8 through 11 compare the cleanup alternatives at SS047 using the nine evaluation criteria – with symbols to reflect scoring. An explanation of the symbols is provided at the bottom of each table.

A detailed analysis for USS, LSS, Area A, and Area C using the nine evaluation criteria is provided on the following pages.

1. Overall Protection of Human Health and the Environment – All of the alternatives, except for No Action, would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through treatment and/or land use controls. Because the No Action alternative is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

2. Compliance with *Applicable or Relevant and Appropriate Requirements (ARARs)* – All alternatives would meet their respective state and federal ARARs.

3. Long-term Effectiveness and Permanence – All alternatives would be effective in the long term by reducing contaminant concentrations in the soil and groundwater, and are rated high for this criterion. For all alternatives at sites USS, LSS, Area A, and Area C, once RAOs have been reached, LUCs and monitoring would not be needed.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment –

- **USS:** Alternatives 2 and 3 would remove and destroy contaminants in the surface soil (and some subsurface soil in Alternative 3). Subsurface soil and groundwater would not be directly treated, but would naturally attenuate over time. These alternatives are rated Medium for this criterion (Table 8). Alternative 4 would destroy contaminants in both soil and groundwater and is, therefore, rated High for this criterion.
- **LSS:** Alternative 2 would remove and destroy contaminants in the surface soil, but subsurface soil and groundwater would not be directly treated. Alternative 3 would remove and destroy contaminants in the surface and subsurface soil, but groundwater would not be directly treated. These alternatives are rated Medium for this criterion (Table 9). Alternative 4 would destroy contaminants in both soil and groundwater and is, therefore, rated High for this criterion.
- **Area A:** Alternative 2 would remove and destroy contaminants in the surface soil, but subsurface soil would not be directly treated. This alternative is rated Medium for this criterion (Table 10). Alternative 3 would destroy contaminants throughout the soil column and is, therefore, rated High for this criterion (Table 11).
- **Area C:** Alternative 2 would remove and destroy contaminants in the surface soil. This soil israted High for this criterion.

5. Short Term Effectiveness – All alternatives can be readily implemented and completed over a relatively short time frame. These alternatives would utilize methodology that prevents risk to human health and the environment during remedial activities. The alternatives could be implemented to have minimal or no impact on the surrounding community and environment. All alternatives rate High for this criterion.

6. Implementability –

- **USS:** All alternatives can be implemented at USS. Excavation equipment and treatment facilities are available; therefore, Alternatives 2 and 3 are rated High for this criterion (Table 8). The use of chemical oxidants can be unpredictable, given different soil conditions. Occasionally, additional or multiple applications may be required to fully treat the contaminants; therefore, Alternative 4 rates Medium for this criterion.
- **LSS:** All alternatives can be implemented at LSS. Excavation equipment and treatment facilities are available; therefore, Alternative 2 is rated High for this criterion (Table 9). Alternative 3 is rated Medium because excavations would be required near facilities listed on the National Register of Historic Places. Alternative 4 is also rated Medium because the use of chemical oxidants can be unpredictable and may require multiple applications to full treat the contaminants.

- **Area A:** All components of Alternatives 2 and 3 can be readily implemented at Area A, and is rated High for this criterion (Table 10).
- **Area C:** Alternative 2 can be readily implemented immediately at Area C, and rated High for this criterion (Table 11).

7. Cost – Costs are broken down to analyze the capital costs, annual operations and maintenance, and the ***net present value*** **(NPV)** of all expected costs.

- **USS:** Costs for all alternatives at USS are presented in Table 8 Alternative 2 has the lowest estimated NPV, while Alternative 3 has the highest estimated NPV.
- **LSS:** Costs for all alternatives at LSS are presented in Table 9. Alternative 4 has the lowest estimated NPV, while Alternative 3 has the highest estimated NPV.
- **Area A:** Costs for all alternatives at Area A are presented in Table 10. Alternative 3 is expected to cost slightly less than Alternative 2.
- **Area C:** Capital costs for Area C are estimated to be $38,600 and are presented in Table 11. The cost estimate assumes that all cleanup goals would be met and the site would be closed in 2 years; therefore, there are no recurring costs.

8. State Acceptance – ADEC has participated in the development of this Proposed Plan. Final acceptance will be evaluated following the public comment period.

9. Community Acceptance – Community acceptance of the preferred alternatives will be evaluated after the public comment period ends. It is anticipated that the Friends of Nike Site Summit and the Alaska Association for Historic Preservation, a statewide 201(c)3 nonprofit organization, will both offer comments. Community comments and responses will be included in the ROD for SS047.

Table 7 Nine Criteria for Evaluating Cleanup Alternatives

THRESHOLD CRITERIA
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment.
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
PRIMARY BALANCING CRITERIA
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing an alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as net present value. Net present value is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
MODIFYING CRITERIA
State Agency Acceptance considers whether the State agrees with the preferred alternative identified in the Proposed Plan.
Community Acceptance considers whether the local community agrees with the preferred alternative identified in the Proposed Plan. Comments received on the Proposed Plan are an important indicator of community acceptance.

PREFERRED ALTERNATIVES

The Preferred Alternatives are expected to achieve substantial and long-term risk reduction through treatment and natural attenuation, at a reasonable cost. The alternatives provide active treatment to the area that has the highest risk and is relatively simple to implement. Until RAOs are achieved, LUCs will be required at LSS. The Preferred Alternatives and a brief synopsis of why they are proposed are presented below:

- **USS – Alternative USS-3, Excavation and off-site treatment/disposal of surface soil and subsurface soil.** Surface soil contamination is limited primarily to specific points of release and are relatively small in area; while contaminated subsurface soil is limited to the former UST area which is also relatively small in extent and is bounded vertically by shallow bedrock in which the voids to accommodate the former USTs were excavated. Based on the extremely limited volume of groundwater sitting atop the bedrock, it is anticipated that during the soil excavation nearly all of the groundwater will be removed with the soil, thus removing all sources of contamination. Therefore, excavation and off-site treatment and disposal of both surface and subsurface soil is the preferred alternative.

Table 8 USS Remedial Alternative Comparison

Evaluation Criteria	Alternative USS-1	Alternative USS-2	Alternative USS-3	Alternative USS-4
	No Action	Excavation and off-site treatment/disposal of surface soil; GWM; LUCs	Excavation and off-site treatment / disposal of surface and subsurface soil	Selective soil excavation and off-site treatment/disposal; treatment of deep soil by ISCO
Estimate Volume (cubic yards)	NA	101.5	1062.3	308.9
Evaluation Criteria				
Protection of Human Health and the Environment	Fail	Pass	Pass	Pass
Compliance with ARARs	Fail	Pass	Pass	Pass
Long-Term Effectiveness and Permanence	Low	High	High	High
Reduction of TMV through Treatment	Low	Medium	Medium	High
Short-Term Effectiveness	Medium	High	High	High
Implementability	High	High	High	Medium
Estimated Costs				
Capital Costs	$0	$176,000	$652,000	$615,000
NPV at 2%	$0	$780,000	$949,000	$719,000
NPV at 5%	$0	$590,000	$908,000	$711,000
Estimated Construction Timeframe	0 years	1 year	1 year	1 year
Estimated Time to Achieve Remedial Action Objectives	NA	30 years	2 years	3 years[1]

Key:
% – percent
[1]– Assumes one application of chemical oxidant and three years of groundwater sampling.
ARAR – applicable or relevant and appropriate requirement
GWM – groundwater monitoring
ISCO – in-situ chemical oxidation
LUC – land use control
NA – not applicable
NPV – net present value
TMV – toxicity, mobility, and volume
USS – Upper Site Summit

Scoring:
Pass – meets threshold criterion
Fail – does not meet threshold criterion
High, Medium, and Low indicate the degree to which the Alternative satisfies the criterion.

- **LSS – Alternative LSS-2, Excavation and off-site treatment/disposal of surface soil, GWM along with LUCs.** Surface soil contamination at LSS is associated primarily with localized releases. Subsurface contamination is present over a broader area in the vicinity of the vehicle maintenance shop and the launch control building. Removal of surface contamination and off-site treatment and disposal along with groundwater monitoring (GWM) and LUCs was selected as the preferred alternative.

Table 9 LSS Remedial Alternative Comparison

Description	Alternative LSS-1	Alternative LSS-2	Alternative LSS-3	Alternative LSS-4
	No Action	Surface soil excavation and off-site treatment/disposal; GWM; LUCs	Surface and subsurface soil excavation and off-site treatment/disposal; GWM; LUCs	Soil excavation and off-site treatment/disposal; ISCO for deep soil and groundwater
Estimate Volume (cubic yards)	NA	419.9	994.9	640.9
Evaluation Criteria				
Protection of Human Health and the Environment	Fail	Pass	Pass	Pass
Compliance with ARARs	Fail	Pass	Pass	Pass
Long-Term Effectiveness and Permanence	Low	High	High	High
Reduction of TMV through Treatment	Low	Medium	Medium	High
Short-Term Effectiveness	Medium	High	High	High
Implementability	High	High	Medium	Medium
Estimated Costs				
Capital Costs	$0	$480,000	$868,000	$812,000
NPV at 2%	$0	$1,211,000	$1,286,000	$916,000
NPV at 5%	$0	$976,000	$1,203,000	$908,000
Estimated Construction Timeframe	0 years	1 year	1 year	1 year
Estimated Time to Achieve Remedial Action Objectives	NA	30 years	15 years	3 years[1]

Key:
% – percent
[1] – Assumes one application of chemical oxidant and three years of groundwater sampling.
ARAR – applicable or relevant and appropriate requirement
GWM – groundwater monitoring
ISCO – in-situ chemical oxidation
LUC – land use control
LSS – Lower Site Summit
NA – not applicable
NPV – net present value
TMV – toxicity, mobility, and volume

Scoring:
Pass – meets threshold criterion
Fail – does not meet threshold criterion
High, Medium, and Low indicate the degree to which the Alternative satisfies the criterion.

- **Area A – Alternative ARA-3, Excavation and off-site treatment/disposal of surface and subsurface soil.** Surface and subsurface soil contamination at Area A is associated with the buried pipeline, presumed former aboveground storage tank location, and points of entry along the foundations. Bedrock is relatively shallow, and no groundwater was documented at the site, thus removal of contaminated soil and off-site treatment/disposal is the preferred alterative.

- **Area B – No Action.**

- **Area C – Alternative ARC-2, Excavation and off-site treatment/disposal of surface soil.** Surface soil contamination is limited to one small localized area, therefore; removal and off-site treatment/disposal is the preferred alternative.

- **Area D – No Action.**

Table 10 Area A Remedial Alternative Comparison

Description	Alternative ARA-1	Alternative ARA-2	Alternative ARA-3
	No Action	Surface soil excavation and off-site treatment/disposal; GWM; LUCs	Surface and subsurface soil excavation to bedrock and off-site treatment/disposal
Estimated Volume (cubic yards)	NA	196	494
Evaluation Criteria			
Protection of Human Health and the Environment	Fail	Pass	Pass
Compliance with ARARs	Fail	Pass	Pass
Long-Term Effectiveness and Permanence	Low	High	High
Reduction of TMV through Treatment	Low	Medium	High
Short-Term Effectiveness	Medium	High	High
Implementability	High	High	High
Estimated Costs			
Capital Costs	$0	$176,000	$345,000
NPV at 2%	$0	$541,000	$407,000
NPV at 5%	$0	$421,000	$402,000
Estimated Construction Timeframe	0 years	1 year	1 year
Estimated Time to Achieve Remedial Action Objectives	NA	30 years	2 years

Key:
% – percent
ARA – Area A
ARAR – applicable or relevant and appropriate requirement
GWM - groundwater monitoring
LUC – land use control
NA – not applicable
NPV – net present value
TMV – toxicity, mobility, and volume

Scoring:
Pass – meets threshold criterion
Fail – does not meet threshold criterion
High, Medium, and Low indicate the degree to which the Alternative satisfies the criterion.

Based on the information currently available, the Air Force, ADEC, and EPA believe the Preferred Alternatives meet the threshold criteria (Criteria 1 and 2) and provide the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Air Force expects the Preferred Alternatives to satisfy the following statutory requirements of CERCLA §121(b):

- Be protective of human health and the environment.
- Comply with ARARs.
- Be cost effective.
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- Satisfy the preference for treatment as a principal element.

The Preferred Alternatives can change in response to public comment or new information. Contamination that remains onsite above cleanup levels for more than 5 years requires a 5-year review to be conducted until cleanup levels have been met.

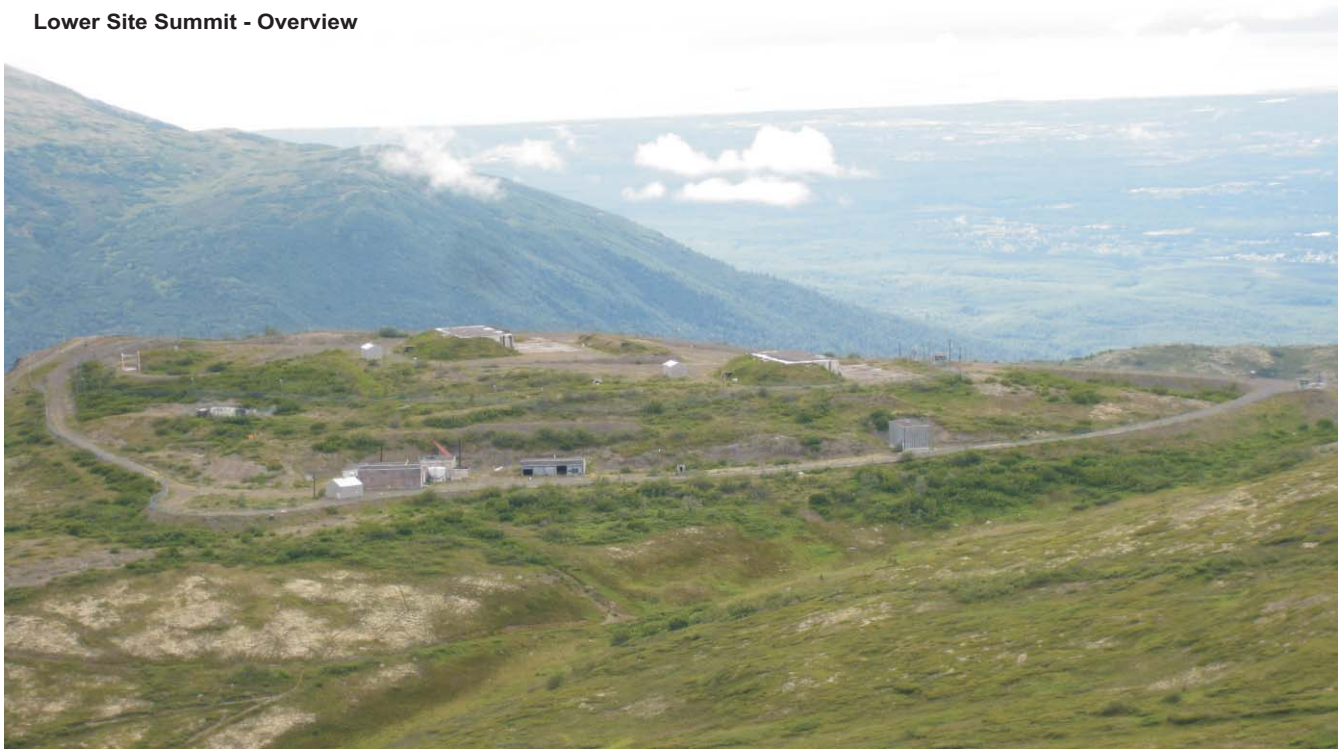
Table 11 Area C Remedial Alternative Comparison

Description	Alternative ARC-1	Alternative ARC-2
	No Action	Surface soil excavation and off-site treatment/disposal
Estimated Volume (cubic yards)	NA	4
Evaluation Criteria		
Protection of Human Health and the Environment	Fail	Pass
Compliance with ARARs	Fail	Pass
Long-Term Effectiveness and Permanence	Low	High
Reduction of TMV through Treatment	Low	Medium
Short-Term Effectiveness	Medium	High
Implementability	High	High
Estimated Costs		
Capital Costs	$0	$38,600
NPV at 2%	$0	NA
NPV at 5%	$0	NA
Estimated Construction Timeframe	0 years	1 year
Estimated Time to Achieve Remedial Action Objectives	NA	2 years

Key:
% – percent
ARC – Area C
ARAR – applicable or relevant and appropriate requirement
GWM – groundwater monitoring
NA – not applicable
NPV – net present value
TMV – toxicity, mobility, and volume

Scoring:
Pass – meets threshold criterion
Fail – does not meet threshold criterion
High, Medium, and Low indicate the degree to which the Alternative satisfies the criterion.

Lower Site Summit - Overview



WHERE DO I GET MORE INFORMATION?

This Proposed Plan for SS047 summarizes information contained in the RI and FS. All site-related documents are provided in the Administrative Record file, which is the official collection of all site-related documents, correspondence, and other information. You may review a copy of the Administrative Record file by visiting the Information Repository that JBER maintains in the Anchorage community:

Alaska Resources Library and Information Services (ARLIS)
University of Alaska Anchorage (UAA) / Alaska Pacific University (APU)
Consortium Library

3211 Providence Drive
Anchorage, Alaska 99508

(907) 27-ARLIS or 272-7547
reference@arlis.org

Hours: Mon - Fri, 8am - 5pm

Another source of information on the environmental cleanup process is the JBER ***Community Environmental Board (CEB)***. The CEB is a group of community volunteers who act as a focal point for exchange of information about environmental cleanup issues. The CEB has been meeting since April 2003 to discuss subjects such as the investigations and the cleanup strategies for sites on JBER. The public is welcome to attend these meetings. Please contact the Environmental Community Relations Coordinator at the number shown below for information on the CEB.

Additional information about cleanups at JBER can be found on the base's public web site. The address for the Environmental Restoration page is: **http://www.jber.af.mil/environmental/restoration.asp.**

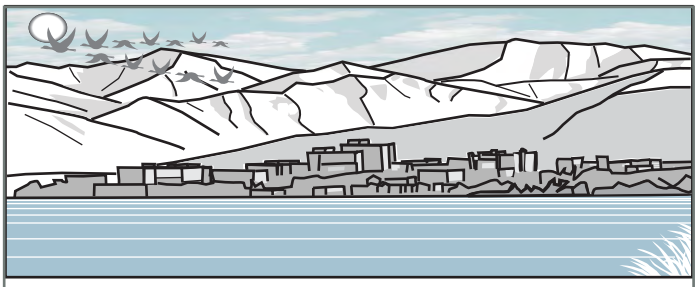
A comment form is provided, but you do not have to use the form to submit comments. Please send written comments to the Environmental Community Relations Coordinator.

Environmental Community Relations Coordinator, 673d Air Base Wing Public Affairs (673 ABW/PA), 10480 Sijan Avenue Suite 120, Joint Base Elmendorf-Richardson AK 99506, or e-mail to **pateam@elmendorf.af.mil**.

For more information, call Bob Hall, Environmental Community Relations Coordinator at 552-8152.

PUBLIC MEETING:

The public meeting is scheduled from 5:30 pm to 8:30p.m. on August 1, 2013, at the Fairview Community Recreation Center , located at 1121 East 10th Avenue in Anchorage, Alaska. Representatives from the Air Force will be present to discuss the Proposed Plan and answer questions.



COMMUNITY PARTICIPATION

We invite you to comment on this Proposed Plan. Comments from the public will be used to help determine what action to take. You may comment verbally, or in writing, at the public meeting on August 1, 2013. If you prefer, you may submit written comments during the public comment period, July 17 through August 16, 2013, by sending them to:

Environmental Community Relations Coordinator,
673d Air Base Wing Public Affairs (673 ABW/PA),
10480 Sijan Avenue Suite 120,
Joint Base Elmendorf-Richardson AK 99506, or e-mail to **pateam@elmendorf.af.mil**.

After considering public comments, the Air Force, in consultation with ADEC and the EPA, will select the final cleanup remedies. The preferred cleanup remedy may be modified based on public comment or new information. The chosen cleanup remedy will be described in the Record of Decision (ROD). The Air Force will respond to your comment(s) in the ROD, in a section called the Responsiveness Summary. The ROD will be available for your review at the information repository listed above once the ROD has been signed.

GLOSSARY

Applicable or Relevant and Appropriate Requirements (ARARs): The Federal or State standards, requirements, criteria that a selected remedy will meet. These requirements may vary among sites and alternatives.

Contaminants of Concern (COCs): A substance detected at a hazardous waste site that has the potential to affect receptors adversely due to its concentration, distribution, and mode of toxicity.

Community Environmental Board (CEB): A committee of community members who want to be involved in the cleanup activities at Department of Defense sites, such as JBER. This provides a forum for public involvement on environmental restoration, compliance, natural resources, and cultural resources issues on JBER.

Hazard Index (HI): The sum of HQs for all contaminants within a certain exposure pathway, such as contact with soil or domestic use of groundwater.

Hazard Quotient (HQ): Expresses the likelihood that exposure to contaminants will have some negative health effect other than cancer.

Incremental Lifetime Cancer Risk (ILCR): the average daily dose, averaged over a liftime, and multiplied by the cancer slope factor. Measures the likelihood that one additional person above the national average will develop cancer from exposure to contamination.

Net Present Value (NPV): The current value of money estimated to be necessary to complete a remedial action. This includes both capital and operation and maintenance costs estimated from start to finish of the action.

Petroleum Hydrocarbons (PHCs): Fuel contaminants such as diesel, gasoline, or heavy oils.

Preferred Alternative: The selected alternative which best meets the RAOs and is deemed most appropriate taking into consideration the nine criteria for evaluating cleanup alternatives.

Remedial Action Objective (RAOs): Media specific goals for protecting human health and the environment.

COMMENT FORM ON PROPOSED PLAN FOR REMEDIAL ACTION

NIKE SITE SUMMIT (SS047)

Joint Base Elmendorf-Richardson (JBER), Alaska

July 2013

Your comments and suggestions about the remedial alternatives in this Proposed Plan are important to the U.S. Air Force. Comments that the public provides will be valuable in helping the agencies select a final remedy for SS047, Nike Site Summit.

You may use the space provided below to submit your comments. When you are finished, please fold and mail. A return address has been provided on the back of this page for your convenience. Comments must be postmarked by August 16, 2013. If you have any questions, please contact Bob Hall, Community Relations Coordinator at (907) 552-8152.

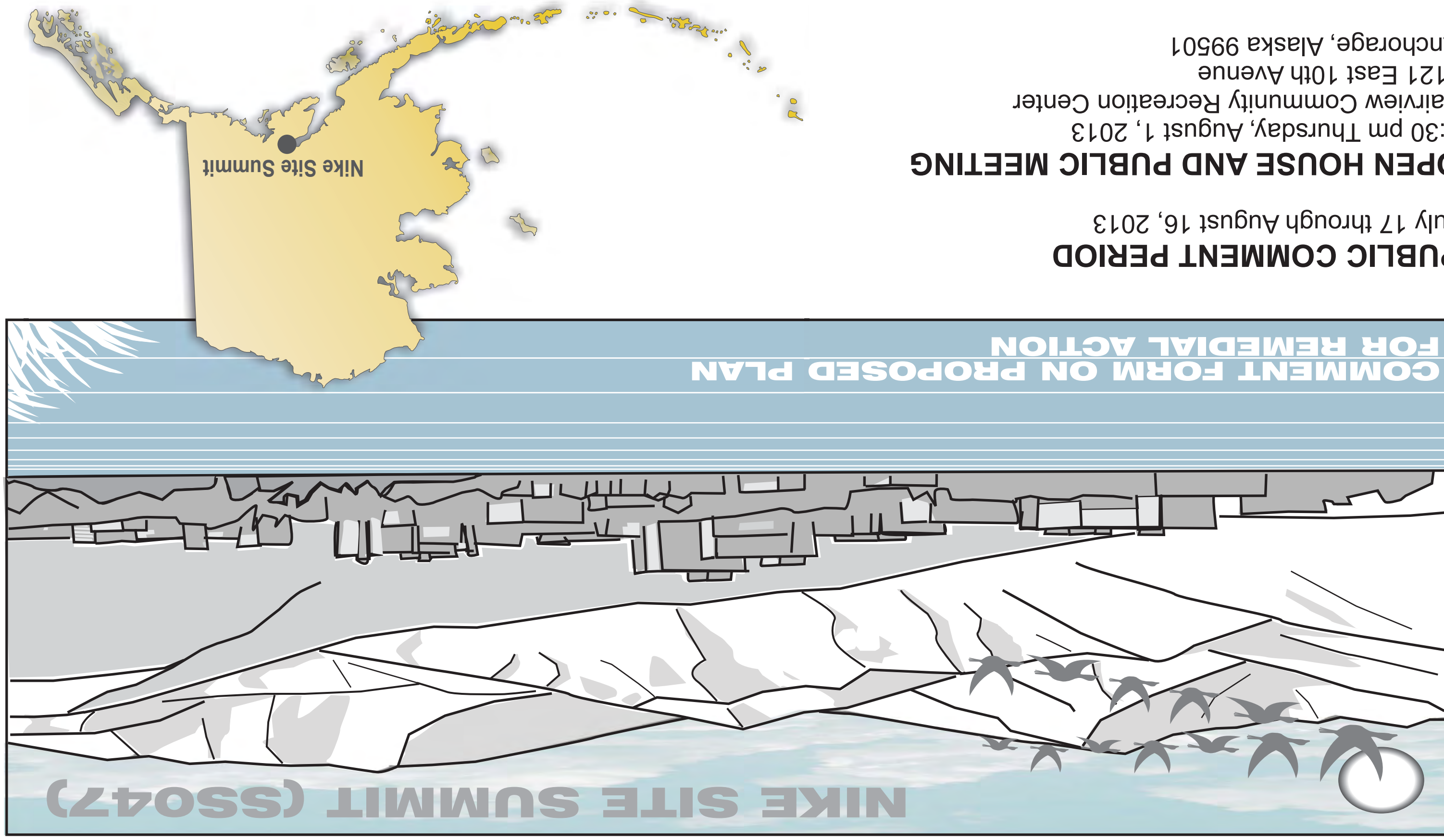
Name: _____

Address: _____

_____

Telephone: _____

e-mail: _____



PUBLIC COMMENT PERIOD

July 17 through August 16, 2013

OPEN HOUSE AND PUBLIC MEETING

5:30 pm Thursday, August 1, 2013
Fairview Community Recreation Center
1121 East 10th Avenue
Anchorage, Alaska 99501

Please Affix
First Class
Postage Here

Environmental Community Relations Coordinator
673rd Air Base Wing Public Affairs (673 ABW/PA)
10480 Sijan Avenue Suite 120
Joint Base Elmendorf-Richardson AK 99506

Tape here