Decision Document
Dock Storage Area (ST003)

Final

Oliktok LRRS, Alaska

Prepared By

United States Air Force
Pacific Air Forces Command
611 CES, Alaska

April 2008

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1.0 Declaration

1.1 Site Name and Location

Facility Name: Dock Storage Area (ST003), Oliktok Long Range Radar Station (LRRS)
Site Location: Oliktok, Alaska
CERCLIS ID Number: Not Applicable
Alaska Department of Environmental Conservation (ADEC) Contaminated Site Record Key (reckey) Number: 198931X102561
Operable Unit/Site: Not Applicable

Oliktok LRRS is located approximately 30 miles northeast of the Village of Nuiqsut on Alaska's Arctic Coastal Plain, 70°30'N latitude and 149°53'W longitude. The Dock Storage Area (ST003) is one of 10 individual sites located at the Oliktok LRRS being addressed under the U.S. Air Force (USAF) Environmental Restoration Program (ERP). The Oliktok LRRS is one of the eight radar installations being addressed. The Oliktok LRRS is not listed on the National Priorities List (NPL).

The Dock Storage Area (ST003) is located on the beach west of the main installation at 70°15'17.98"N latitude and 140°38'55.69"W longitude. This is the location of sample point, LF2SS03-2.5, which is located in the northwest center of the site. ST003 is south of the Beaufort Sea, between ERP sites LF001 (The Old Landfill) to the west and LF002 (The Dump Site) to the east. The area is approximately 4 or 5 feet above sea level and is comprised of an area approximately one-half acre in size. ST003 was used for the storage of drums, including drums of liquid products (likely fuels and lube oil). Drums have not been stored at the site since at least 1980.

1.2 Statement of Basis and Purpose

This Decision Document (DD) presents the USAF's decision of no further action (NFA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and full closure under State of Alaska laws and regulations of the ERP site Dock Storage Area (ST003) in Oliktok, Alaska. This decision was selected in accordance with CERCLA of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

This document is issued by the Department of the Air Force (USAF), as the lead agency. The USAF is managing remediation of contamination at ST003 in accordance with CERCLA as required by the Defense Environmental Restoration Program (DERP). The decision put forth in this document is also in accordance with the requirements of Title 18, Chapter 75, Article 3, of the Alaska Administrative Code (AAC) Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances regulations for the State of Alaska.

As the lead agency, the USAF has selected the remedy. The State of Alaska, through ADEC, concurs with the selected remedy. The United States Environmental Protection Agency (USEPA) has been given the opportunity to review this document and has chosen to defer to the

ADEC for regulatory oversight of the ERP at Oliktok LRRS.

1.3 Description of Selected Remedy

The selected remedy for this site is NFA, and closure under CERCLA and Alaska State laws and regulations. Under the NFA alternative no further investigation, sampling or remedial actions are necessary at ST003. The site does not pose an unacceptable risk to human health or the environment. No petroleum remains at ST003 above ADEC Method One (18 AAC 75.341 Table A2) soil cleanup levels of 500 mg/Kg for diesel range organics (DRO), 0.5 mg/Kg for benzene and 15 mg/Kg for total BTEX (benzene, toluene, ethylbenzene, and xylenes). No contaminants otherwise remain at this site above ADEC Method Two soil cleanup levels for the Arctic Zone (*18 AAC 75.341, Tables B1 and B2*), with the potential exception of a small area where arsenic was detected at one sample location (SPL07) in 2002 at 66.6 mg/Kg. Of four soil samples collected in 2002 and 2003 (Figure 2-3), SPL07 was the only sample with a concentration of arsenic above ADEC Method Two cleanup levels. Concentrations in other samples ranged from 5.26 to 6.58 mg/Kg, which is consistent with background levels for the area. Two of these samples (LF2SS03 and LF2SS04) were collected near to SPL07 during the 2003 RI in order to confirm the 2002 result of 66.6 mg/Kg. Results were 5.26 and 6.58 mg/Kg, confirming that the 2002 arsenic exceedance at SPL07 was localized. Contaminants in the surface water, with the exception of aluminum, iron, and selenium, were below both ADEC 18 AAC 70 Water Quality Standards and the National Oceanic and Atmospheric Association (NOAA) Screening Quick Reference Tables (SQuiRT) for Probable Effect Levels (PELs). No drinking water maximum contaminant levels have been established for these contaminants. All three metals were either equal to or greater than NOAA SQuiRT criteria for freshwater. However, the freshwater habitat at the site is limited. NOAA SQuiRT criteria for the marine environment were considered applicable. There are no NOAA SQuiRT criteria for Aluminum or Iron in marine waters. Selenium detections were below marine criteria. In addition, the aluminum appeared to be largely associated with the particulate phase. Selenium is naturally occurring and commonly found in sedimentary rock which is common at the Oliktok LRRS (HCG 2004).

Cleanup levels applied meet the risk managements standards of 18 AAC 75.325(h), (i.e. the risk from hazardous substances does not exceed a cumulative carcinogenic risk of 1 in 100,000 and a cumulative non-carcinogenic hazard index [HI] of 1.0). Based on the 2003 risk calculations the calculated excess cancer risk under a residential exposure scenario was 3.1×10^{-7} and the non-cancer hazard index under the same scenario was 0.1. The site conditions are protective of human health under all current and projected site uses, including unrestricted residential land use. No contaminants have been identified as Chemicals of Concern (COCs) at ST003.

1.4 Statutory Determinations

No remedial action is necessary at ST003 under CERCLA or under State of Alaska laws and regulations to protect human health or the environment.

1.5 Data Certification Checklist

The current and reasonably anticipated future land use assumptions, as well as the potential future beneficial uses for groundwater used for completing the baseline risk assessment are included in the Decision Summary section of this Decision Document (Section 2).

Additional information is included in the Administrative Record file for Oliktok LRRS, Alaska which can be found at http://www.adminrec.com/PACAF.asp?Location=Alaska

Four information repositories are also located in Nuiqsut, these include:

- City Office, Managers Office
- The Nuiqsut High School Library
- Native Village of Nuiqsut
- RAB Community Co-Chair

1.6 Authorizing Signatures

This signature sheet documents the USAF and ADEC approval of the remedy selected in this Decision Document for Dock Storage Area (ST003), Oliktok LRRS, Alaska.

This decision may be reviewed and modified in the future if new information becomes available which indicates the presence of contamination or exposure that may cause a risk to human health or the environment.

6/2/08

JOHN HALVERSON
DoD Cleanup Unit Lead
Federal Facilities Environmental Restoration
Alaska Department of Environmental Conservation

Date

30 MAY 2008

BRENT A. JOHNSON
Colonel, USAF
Commander, 611th Air Support Group

Date

2.0 Decision Summary

The Decision Summary identifies the Selected Remedy, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

2.1 Site Name, Location, and Description

2.1.1 Regional Setting

Oliktok LRRS is located at latitude 70°30'N, longitude 149°53'W at Oliktok Point on the shore of the Beaufort Sea and east of the Colville River (Figure 2-1). The installation consists of 672 acres of low lying tundra adjacent to the Beaufort Sea. Oliktok LRRS is located approximately 400 miles north of Fairbanks, Alaska. Oliktok LRRS is accessible by air, barge, or motorized vehicle via the Dalton Highway and then through the Prudhoe Bay Kuparuk oil fields. The nearest community is Nuiqsut, located 30 miles southwest of the installation.

The average annual precipitation recorded at nearby Kuparuk for the period 1983 to 2002 was 3.9 inches, including 30.6 inches of snowfall (Western Regional Climate Center 2003). The average daily maximum temperature in July is 55 degrees Fahrenheit (°F), and average April low temperature is 24°F. The extreme recorded temperatures are -58°F and 78°F. Strong wintertime westerly winds are common and often occur with snowstorms. Winds are generally milder in the summer and from the east.

2.1.2 Regional Ecology

Three major vegetative habitats exist in the Oliktok Point area: coastal wetlands and beaches, wet-sedge meadows, and tundra. The environment predominantly consists of low wet sedge meadows and tundra. This habitat typically supports ponds dominated by *Carex aquatilis* and pendant grass. Other plants variously associated with these wetlands include cotton grass, tundra grass, buttercups, marsh marigolds, and the mosses *Calliergon* and *Drepanocladus*. Drier sites along polygon rims and high-centered polygons support plant communities consisting of a variety of sedges, tundra grass, polar grass, saxifrages, arctic avens, lousewarts, and the mosses *Onchophorus*, *Tomenthypnum*, and *Pogonatum*. Coastal wetlands and beaches range from barrens, tundra grass, lyme grass, and oysterleaf (Hart Crowser 1987).

The most abundant species of marine fish found in the Beaufort Sea include arctic cods, arctic flounders, four horn sculpins, and pacific herring. Anadromous and freshwater fish use near shore waters of the Beaufort Sea for feeding migration. Freshwater fish are usually found in association with fresh or brackish waters extending offshore from river deltas. Freshwater species may include arctic grayling, round whitefish, and burbot. Anadromous species found in the near shore environment include arctic chars, arctic ciscos, least ciscos, Bering ciscos, inconnus, rainbow smelt, humpback whitefish, and broad whitefish. Smaller numbers of salmon (Chinook, sockeye, and coho), sticklebacks, and lamprey, have been recorded along the Alaskan Beaufort seacoast (Alaska Department of Fish and Game 1992). Small runs of salmon occur in the Colville and Sagavanirktok rivers, and Chinook and sockeye salmon have been reported in Simpson Lagoon.

Small mammals, such as arctic ground squirrels, brown lemmings, and collared lemmings are the predominant rodent herbivores (Hart Crowser 1987). Wolves and grizzly bears are occasionally observed in the vicinity. The most conspicuous terrestrial mammals in the area of the Oliktok LRRS are caribou. The Central Arctic caribou herd moves across the installation periodically throughout the summer and an important calving ground for caribou is located to the southwest of the installation. Marine mammals expected to be found in the vicinity of the Oliktok LRRS include the endangered bowhead whale, gray whale, beluga whale, harbor porpoise, bearded seal, and spotted seal. The polar bear is a winter resident of the Oliktok LRRS and the ringed seal is present year round.

Several million birds, consisting of approximately 150 species, occur on the North Slope. These birds include sea birds, waterfowl, shorebirds, passerines, and raptors. Shorebirds and waterfowl disperse to nesting grounds on moist tundra and marsh lands of the Arctic Slope. The Colville River Delta, located just west of the Oliktok LRRS, is an important nesting area for waterfowl such as brants and yellow-billed loons (Jones et al, 1999).

2.1.3 Facility History and Background

Oliktok LRRS, also known as POW-2, was one of the many Distant Early Warning Line stations located across the arctic region of North America and Greenland. It was originally constructed as an auxiliary station by the USAF between 1954 and 1955. It has been operated by contractors since 1957. In the mid-1980s, a Minimally Attended Radar was installed, which reduced the number of workers required to operate the facility. Generally, two contractor personnel are stationed at the Oliktok LRRS installation year round. The contract personnel are responsible for maintenance and management of real property facilities, which include the buildings, roads, grounds, aircraft facilities, antenna structures, and utility plants.

The Oliktok facility presently consists of a 22-unit module train containing living quarters, a power generation plant, sewage and water systems, and an incinerator. The module train is attached to the radome tower. The radome tower houses the rotating radar, which is supported on a steel-framed platform straddling the module train. A 4,020-foot long lighted gravel runway is also part of facility. Inactive structures at Oliktok LRRS were demolished as part of the Clean Sweep program during the summer of 2007.

The 2004 Remedial Investigation/Feasibility Study (RI/FS) concluded that the most cost-effective approach to completing all of the USAF objectives under the ERP at Oliktok, including building demolition and debris removal, was to perform the cleanup activities necessary to make the excess land acceptable for transfer according to State of Alaska requirements. Consequently, six ERP sites were proposed for remedial action.

2.1.4 Facility ERP History

Since 1980 environmental investigations have been conducted at the Oliktok LRRS under the USAF ERP. Environmental samples were collected at Oliktok LRRS in 1993 as part of an RI/FS (ICF 1996a). The 1993 RI also included a risk assessment (ICF 1996b). In 2002, a focused RI was performed at sites LF001, LF002, and ST003 (USAF 2002b). Based on the 2002 RI results, a second RI/FS was conducted at these three sites in 2003 (HCG 2004). Figure 2-2 shows the location of ST003 with respect to other Oliktok LRRS ERP sites. To fill in data identified in

previous reports, another RI/FS was conducted at eight ERP sites in 2004 (HCG, 2005).

Past activities potentially resulting in contaminant releases at the Oliktok LRRS include:

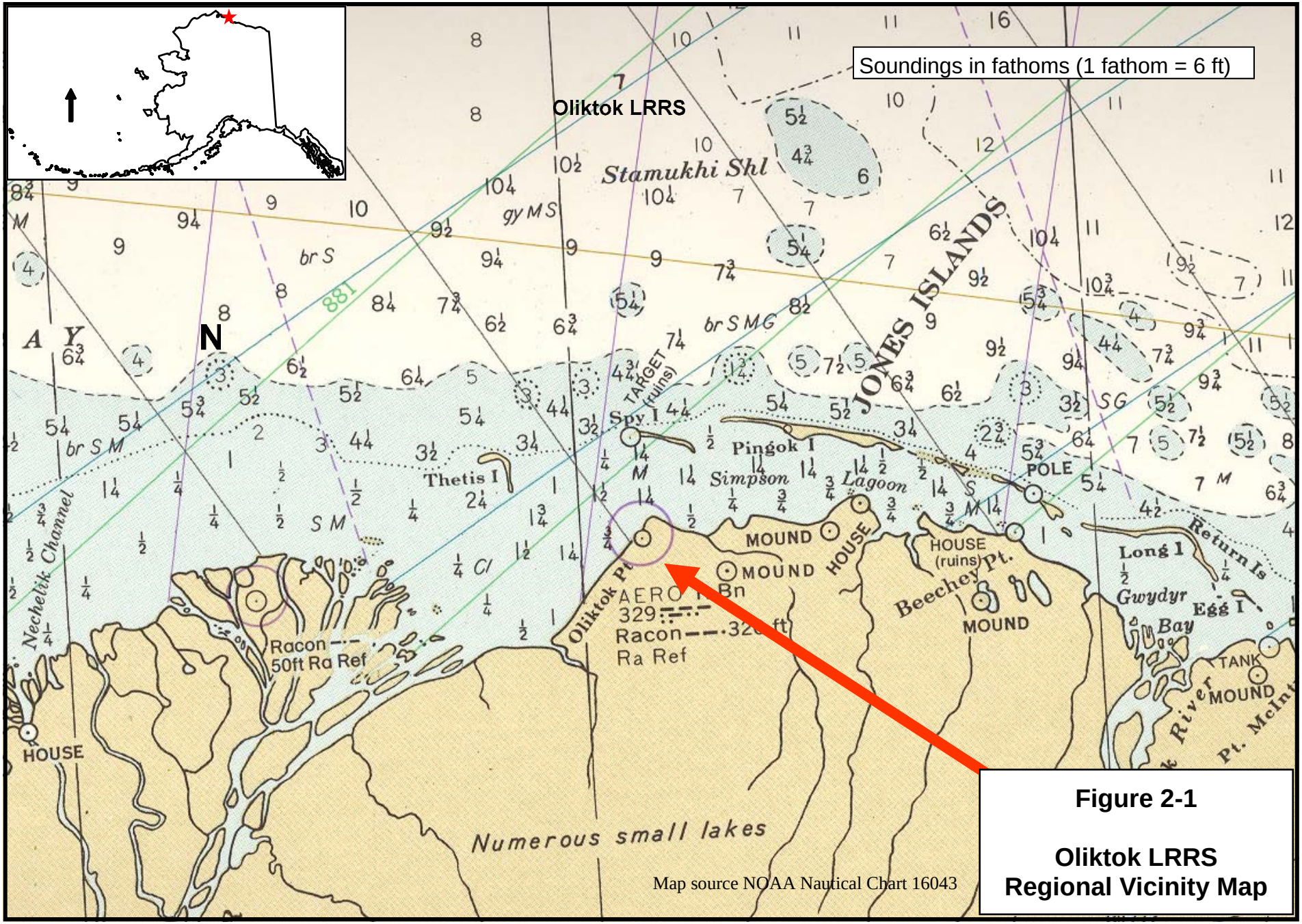
- Spills during the transfer of fuels in and out of storage tanks;
- Leaks from fuel lines, tanks, and drums;
- Spills or leaks of fuel, lubricants, or solvents during vehicle and equipment maintenance activities;
- Spills or leaked from transformers or other electrical equipment containing polychlorinated biphenyls (PCBs); and
- Disposal of wastes and other discarded material containing hazardous substances.

Some of the contaminants encountered during investigations at Oliktok LRRS are gasoline range organics (GRO); polynuclear aromatic hydrocarbons (PAHs); PCBs; petroleum, oil, and lubricants (POL); DRO; residual range organics (RRO); semivolatile organic compounds (SVOCs); metals; and volatile organic compounds (VOCs), including BTEX. Most of these contaminants are the result of fuel or oil spills.

As the lead agency for remedial activities, the USAF has conducted environmental restoration at ST003 in accordance with CERCLA under the DERP which was established by Section 211 of SARA of 1986.

As the support agency, the ADEC provides primary oversight of the environmental restoration actions, in accordance with their contaminated sites regulations (18 AAC 75, Article 3, Discharge Reporting Cleanup and Disposal of Oil and Other Hazardous Substances).

Funding is provided by the Defense Environmental Restoration Account; a funding source approved by Congress to clean up contaminated sites on U.S. Department of Defense (DoD) installations.



Map source NOAA Nautical Chart 16043

Figure 2-1

Oliktok LRRS
Regional Vicinity Map

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2.2 Site History and Enforcement Activities

This section provides background information and summarizes the series of investigations that led to this DD. It describes the CERCLA response actions undertaken at ST003.

Site investigations have been performed at ST003 in 1993, 2002 and 2003. In 1993, the RI/FS investigated soil, surface water, and sediment samples for the contaminants suspected to be present based on site history. As part of 2002 activities, ST003 was included in a focused RI of the Oliktok LRRS. In addition to collecting soil and water samples for chemical analyses, an electromagnetic survey was conducted at the site to identify buried metallic debris. In 2003, additional soil, sediment, and water samples were collected to confirm the presence or absence of contaminants of potential concern (COPCs) identified in the earlier investigations. Based on the results of the analysis the site was recommended for NFA and the drums were recommended for removal as part of USAF Clean Sweep activities. Clean Sweep activities at ST003 during summer 2007 resulted in the removal of the remaining empty drums and debris from the site.

No land use controls are applicable as part of the selected remedy for this site. In addition, there are no Federal Facility Agreements or state agreements for the Oliktok LRRS. None of the Oliktok LRRS sites are listed on the NPL. Hazardous substances regulated under CERCLA have been detected at ST003; however, to date, there have been no regulatory enforcement activities at the site.

In accordance with USAF policy, to the extent practicable, National Environmental Policy Act (NEPA) values have been incorporated throughout the CERCLA process culminating in this DD. Separate NEPA documentation will not be issued.

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Figure 2-2

Oliktok LRRS
ERP Sites

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2.3 Community Participation

The NCP Section 300.430(f)(3) establishes a number of public participation activities that the lead agency must conduct following preparation of the Proposed Plan and review by the support agency. Components of these items and documentation of how each component was satisfied for ST003 are described below.

Proposed Plan. A Proposed Plan that presented the cleanup alternatives proposed by the USAF for Oliktok LRRS was submitted for public review on June 25, 2007. A public meeting was also held at that time.

Public Comment Period. The public comment period for the Proposed Plan was from June 25, 2007 to July 24, 2007, however, no comments were received. Had comments been received, they would have been included in this document. Additionally, the USAF received no requests to extend the public comment period.

Public Meetings. The USAF held a public meeting in Nuiqsut on June 25, 2007 to discuss the Proposed Plan and record verbal comments. No verbal comments were received regarding the Proposed Plan during the public meeting. Additional community involvement activities for Oliktok LRRS include Restoration Advisory Board (RAB) meetings. The RAB consists of representatives from the community and the USAF. The Oliktok LRRS is part of the Nuiqsut RAB, which typically meets annually or semiannually. RABs provide a forum for discussion and exchange of information among Federal and State agencies and the community regarding cleanup of a military site. The RAB plays an important role in the decision-making process.

Updated Mailing List and Mailing Events. A mailing list of interested parties is maintained and updated regularly by the Air Force Community Relations Coordinator.

Administrative Record. The administrative record located at the 611 Civil Engineering Squadron (CES) office at the Elmendorf Air Force Base, Alaska, is typically updated as new information and reports become available. The administrative record for the Oliktok LRRS contains the information used to support this decision and is accessible to the public. An index of documents relevant to this DD is included in Appendix A. A website with the administrative record current up through 2003 is also available to the public at: http://www.adminrec.com/PACAF.asp?Location=Alaska.

Information Repository. The information repository is a file containing newsletters, fact sheets, and community relations documents relating to Proposed Plans and response actions for all of the ERP sites at Oliktok LRRS. Four information repositories are located in Nuiqsut: the city manager's office, the Nuiqsut High School library, The Native Village of Nuiqsut, and with the RAB community co-chair.

Management Action Plan. The Management Action Plan report is updated periodically and made available to the public in order to provide a summary of all restoration activities in one document. The most recent MAP was published in 2002 (USAF 2002a).

USAF responses to comments received during the public comment period would have been included in the Responsiveness Summary, which is provided as Section 3 of the DD. However, no comments were received during the public meeting or during the comment period.

2.4 Scope and Role of Operable Unit or Response Action

There are no operable units at Oliktok LRRS. However, the overall cleanup strategy for the installation includes source reduction and making the property acceptable for transfer to the Bureau of Land Management, and eventually the State of Alaska. The conditions for land transfer were discussed in Section 2.1.3.

A Proposed Plan has been issued for five ERP sites at Oliktok, including ST003.

2.5 Site Characteristics

2.5.1 Topography and Stratigraphy

The beach environment is considered microtidal with a tidal range generally less than 1 foot. Shoreline dynamics are dominated by wave energy. The low elevation of the site makes ST003 particularly susceptible to flooding. The beach face is composed primarily of sand, with some gravel and silt. Surficial sediments in the back beach area near the ponds to the south of the site consist of fine grained sand and silt. Peat was encountered in several borings at elevations ranging from 1 to 2.5 feet above mean sea level in the back beach and beach crest areas (HCG 2004).

2.5.2 Surface and Subsurface Hydrology

The beach area is surrounded on three sides by water due to the presence of the ocean, creek, and ponds. Small shallow ponds are present throughout ST003. Storm surges provide the greatest influence on ocean water height in the area. Permafrost was not encountered in borings of up to 3 feet below ground surface during the 2003 RI (HCG 2004). Active zone water is assumed to be hydrologically connected to nearby surface waterbodies (i.e. the ocean, creek, and large ponds). Changes in the surface water elevations, especially the ocean tides, may cause changes in the direction subsurface water flows.

2.5.3 Ecology

ST003 consists primarily of a barren beach environment interspersed with shallow ponded areas, and bordered by the Beaufort Sea and several streams. Beach areas near ST003 are likely poor ecological habitat since the lack of vegetation reduces foraging and cover opportunities for birds and small mammals. Ponds, streams, and shoreline habitats adjacent to ST003 are likely used by shorebirds and water fowl as foraging areas. Vegetation present at the site consists of sedges, tundra grass, lyme grass and oysterleaf (Hart Crowser 1987). Polar bears and caribou have been observed at the Oliktok LRRS and occasionally pass through the site.

2.5.4 Previous Site Characterization Activities

Site investigations were performed at ST003 in 1993, 2002 and 2003. In 1993, an RI/FS was conducted and soil, water, and sediment samples were collected. Samples were analyzed for GRO, DRO, RRO, VOCs, and PCBs. A risk assessment accompanied the 2003 RI/FS and calculated the cumulative cancer risk to be 9.1×10^{-6} and the non-cancer HI to be 0.22 , including

Arsenic in the calculation. Both the cancer risk and HI are below ADEC risk management standards for current and future site uses. The risk assessment concluded there was no risk to human health or the environment. The RI/FS recommended the site for NFA (ICF, 1996a).

As part of a focused RI in 2002, soil and water samples were collected and analyzed for GRO, DRO, RRO, VOCs, PCBs, and Resource Conservation and Recovery Act (RCRA) regulated metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). In addition, a geophysical (electromagnetic) survey was conducted to detect the locations of buried metallic debris. The results of the geophysical investigation showed no magnetic anomalies and indicated that buried metal debris was not present at the site.

In 2003, soil and sediment samples were collected to confirm previous sampling results. Sample analysis included DRO, RRO, and RCRA metals. As the result of these investigations the site was recommended for NFA and the crushed drums observed at the site were recommended for removal during USAF Clean Sweep activities (HCG 2004). In 2007, Clean Sweep activities were initiated at ST003 and drums and other debris were removed from the site.

2.5.5 Nature and Extent of Contamination

This section presents a description of the distribution of contamination and potential sources.

2.5.5.1 Known or Suspected Sources of Contamination

Over the period of operation of the Oliktok LRRS, multiple potential sources may have contributed to releases of contamination. These include:

- Spills during the transfer of fuels in and out of storage tanks;
- Leaks from fuel lines, tanks, and drums;
- Spills or leaks of fuel, lubricants, or solvents during vehicle and equipment maintenance activities;
- Spills or leaks from transformers or other electrical equipment containing polychlorinated biphenyls (PCBs); and
- Disposal of wastes and other discarded material containing hazardous substances.

At ST003, releases from drums containing fuels, motor oil, and transformer oil are the most likely sources of contamination.

2.5.5.2 Extent of Contamination

The maximum concentrations of detected contaminants of interest or the highest practical quantitation limit (PQL), if samples were below detection limits, are summarized in Table 2-1. The maximum concentration of four compounds, arsenic, chromium, PCB, and DRO, exceeded screening levels.

Arsenic was detected above the Method Two ADEC 18 AAC 75.341(c), Table B2 cleanup level at a single soil sample location in the northwest area of the site (Figure 2-3). Total chromium

was detected at the same location above one-tenth the cleanup level (Table 2-1). PCBs were detected above one-tenth ADEC Method Two cleanup level of 1.0 mg/Kg at two locations on the west side of the site. DRO was detected at one location in the central area of the site slightly above (i.e., less than two times above) the ADEC cleanup level.

Further discussions regarding the risk posed by this contamination is presented in Section 2.7.1.1. Figure 2-3 shows the location of samples collected in 1993, 2002, and 2003 at ST003, including the maximum concentrations of arsenic detected.

2.5.5.3 Contaminant Migration and Fate

The greatest potential contaminant migration at ST003 is via sediment transport to the Beaufort Sea or nearby shoreline as the result of erosion. Erosion at ST003 is less likely than at some of other sites at the Oliktok LRRS because it is further from the creek and slightly higher in elevation. Precipitation generally infiltrates the beach sand and, as a result, the transport of contaminants via surface water sheet flow is not significant.

Subsurface water is present beneath ST003 at approximately 2.5 feet bgs. As a result there is a potential for contaminant migration from soil to active zone water. However, concentrations of soluble compounds such at petroleum hydrocarbons (e.g., DRO, RRO, BTEX) were, with the exception of one DRO result, below the soil to groundwater migration cleanup level in 18 AAC 75.341(c). Additionally, the hydraulic gradient beneath the site was found to be very flat. Therefore, even if contaminants migrated to active zone water, the rate of transport would be slow to negligible.

Table 2-1 ST003 Summary of Soil and Sediment Sample Results

Soil and Sediment Parameters **(all units mg/Kg)**	Screening Critieria			Results					2003 RI/FS Frequency of Detection	
	18 AAC 75 Cleanup Level (Arctic Zone)[1]	1/10 Method Two Table B1 Cleanup Level (when applicable)[2]	NOAA SQuiRT[3]	1993 RI/FS (ICF 1996)[4]		2002 RI (USAF 2002)	2003 RI/FS (HCG 2003)			
	Soil	Soil	Sediment	Soil	Sediment	Soil	Soil	Sediment	Soil	Sediment
Fuels										
GRO (AK101)/GRPH	1,400 (100)	Not App.	--	ND (1J)	ND (2J)	2.73	NS	NS	Not App.	Not App.
DRO (AK102)/DRPH	12,500 (200/500)	Not App.	--	300	ND (50)	397	166	NS	2/6	Not App.
RRO (AK103)/RRPH	13,700 (2000)	Not App.	--	ND (100)	ND (100)	731	510	NS	2/6	Not App.
VOCs										
Benzene	13	1.3	--	ND (0.02)	ND (0.04)	0.239	NS	NS	Not App.	Not App.
Ethylbenzene	89	8.9	--	0.02	ND (0.04)	0.011	NS	NS	Not App.	Not App.
total Xylenes	81	8.1	--	0.08J	ND (0.08)	0.079	NS	NS	Not App.	Not App.
Toluene	180	18	--	ND (0.02)	ND (0.04)	0.013	NS	NS	Not App.	Not App.
Metals										
Arsenic[7]	8	0.8	17 (41.6)	NS	NS	**66.6**	6.6	NS	2/6	Not App.
Barium	9600	960	--	NS	NS	134	107 M	NS	2/6	Not App.
Cadmium	140	14	3.53 (4.21)	NS	NS	<0.222	0.015F	NS	2/6	Not App.
Chromium	410	41	90 (160)	NS	NS	85.8	7.16 B, M	NS	2/6	Not App.
Lead	400	Not App.	91.3 (112)	NS	NS	40.1	15.5 M	NS	2/6	Not App.
Mercury	26	2.6	0.486 (0.696)	NS	NS	<0.0442	0.02F, M	NS	2/6	Not App.
Selenium	680	68	--	NS	NS	<1.11	0.21F	NS	1/6	Not App.
Silver	680	68	-- (1.77)	NS	NS	<0.111	0.08F	NS	2/6	Not App.
PCBs[6, 7]	1	0.1	0.277 (0.189) (total)	0.3J	ND (0.2)	ND	0.171	ND (0.41)	1/6	0/1

Notes

1- Lowest value of ingestion or inhalation shown from 18AAC 75, Tables B1 and B2, referred to as "Method Two Cleanup Levels" for th Arctic Zone.
Method One Cleanup Levels for GRO, DRO and RRO in parenthesis.
The cleanup level for DRO may be 500 mg/Kg for diesel spills to gravel pads if total BTEX concentrations are less than 15 mg/Kg and benzene is less than 0.5 mg/Kg.

2 - For cleanups conducted under Method Two, cummulative risk must be calculated for applicable compounds exceeding one-tenth (1/10) of the Method Two Table B1 Cleanup Level.

3- NOAA SQuiRT values shown is the probable effects level (PEL) for freshwater sediment followed by marine sediment in ( ).

4- All detections shown. Only the highest historically detected values shown, if multiple detections.

5- Contaminant considered COC if it exceeds primary screening criteria, 1/10 Method Two Cleanup Levels when appropreate and cummulative risk must be considered, or Method One Cleanup level for GRO, DRO and RRO when appropriate, or other concerns exist
Compounds originally exceeding screening criteria not retained as COC if subsequent sampling alleviated concern or other mitigating circumstances exist.

6- The PCB value is the sum of all Aroclors. Aroclor 1254 and 1260 were detected in separate samples.

7- Arsenic and PCBs were retained as COCs for the purpose of cumulative risk calculations.

Abbreviations

" -- "	Screening criteria did not exist for this compound.	Not App.	Not applicable
" = "	A detected compound.	NA	Not analyzed
F	Estimated quantity below the PQL.	NS	Not sampled
ND	Compound not detected (with PQL in adjacent parentheses).	PQL	Practical Quantitation Limit
J	Estimated value	MDL	Method Detection Limit
B	Compound detected in the blank.	M	Compound exhibited a matrix effect

Shaded cell indicates soil concentration >1/10 Method Two cleanup level or >Method One cleanup level for GRO, DRO and RRO.
Bold and shaded items indicate an exceedance of the primary applicable criteria (Soil = ADEC Method Two cleanup level or Sediments = NOAA SQuiRT or ADEC Method Two cleanup levels).

Table 2-2 ST003 Summary of Water Sample Results

Freshwater Parameters **(all units are µg/L)**	18 AAC 70		NOAA SQuiRT[1]	NOAA SQuiRT[1]	1993 RI/FS (ICF 1996b)[2]	2002 RI (USAF 2002)	2002 RI Frequency of Detection
	MCL	Aquatic Life[3]	Freshwater	Marine			
Fuels							
GRO/GRPH	--	--	--	--	ND (20)	ND (90)	Not Applicable
DRO/DRPH	--	--	--	--	806	ND (505)	Not Applicable
RRO/RRPH	--	--	--	--		ND (1010)	Not Applicable
VOCs							Not Applicable
1,2-Dichloroethane	5	--			1.9	NA	Not Applicable
Benzene	5	--	5,300[CMC]	700	ND (1)	ND	Not Applicable
Ethylbenzene	700	--	32,000[CMC]	430[CMC]	ND (1)	ND	Not Applicable
Total Xylene	10,000	--	--	--	ND (2)	ND	Not Applicable
Toluene	1,000	--	17,500[CMC]	5,000	ND (1)	ND	Not Applicable
Metals							Not Applicable
Aluminum	--	87	87	--	270 [<100]	NA	Not Applicable
Arsenic	50	[150]	150	36	ND (100)	5.84	Not Applicable
Barium	2,000	--	--	--	250	217	Not Applicable
Cadmium	5	hardness dep.	2.2	9.3	ND (50)	ND (2)	Not Applicable
Chromium	100	hardness dep.	74	10,300[CMC]	ND (50)	ND (4)	Not Applicable
Iron	--	1,000	1,000	--	1,000	NA	Not Applicable
Lead	--	hardness dep.	2.5	8.1	ND (100)	ND (2)	Not Applicable
Mercury	2	0.77	0.77	0.94	NA	ND (0.2)	Not Applicable
Selenium	50	5	5	71	ND (100)	12.8	Not Applicable
Silver	--	--	0.12	0.95[CMC]	ND (50)	ND (2)	Not Applicable
PCBs[6]	0.5	0.014	0.014	0.03	ND (0.3)	ND	No

Notes

1- NOAA SQuiRT values shown for criteria continuous concentration (CCC) unless otherwise indicated.
Criteria maximum concentration (CMC) shown if no CCC available.

2- All detections shown. Only the highest historically detected values shown, if multiple detections.

3- Aquatic Life freshwater chronic criteria. Metal criteria based on total recoverable concentration unless value in brackets [ ] for dissolved concentration.

4- Compounds originally exceeding screening criteria not retained as COC if subsequent sampling alleviated concern, or other mitigating circumstances exist (see text).

5- Marine criteria considered most applicable, therefore constituent not considered a COC. Freshwater habitat limited.

6- The PCB value is the sum of all Aroclors. Only Aroclor 1254 was detected.

Abbreviations

" -- " criteria did not exist

B = Compound found in blank

J = Estimated value

[Value in brackets represents dissolved concentration]

NA= Not analyzed

ND = Non detection (highest quantitation limit in parenthesis, if the limit varied)

NS = Not sampled

Shaded Cell indicates exceedence of screening criteria.

2.5.6 Conceptual Exposure Model

A conceptual exposure model was developed to depict the potential relationship or exposure pathway between chemical sources and receptors. An exposure pathway describes the means by which a receptor can be exposed to contaminants in environmental media. These pathways are presented in Figure 2-4 for human health, and Figure 2-5 for ecological receptors. For purposes of evaluating human health exposure pathways, it was assumed there were no current site residents at the Oliktok LRRS. Current site use is limited to periodic site workers and its use as a boat launch by residents of Nuiqsut and surrounding area. Future exposure pathways assume the Oliktok LRRS facility will be inactive. Because there is no exposure to groundwater at the Oliktok LRRS, groundwater is not presented as part of either the human health or the ecological exposure models (Figure 2-4 and 2-5).

Based on the low levels of petroleum contamination (i.e., only one location exceeds cleanup levels) and the flat hydraulic gradient of the shallow active zone water, petroleum related contaminants are unlikely to migrate to adjacent surface water bodies. Although the exposure pathways for surface and/or active zone water are complete, they are only of minor significance to both human health and ecological risk. Inhalation via volatilization to outdoor air is also considered a complete pathway but due the lack of volatiles detected in the soil, and the low ambient air temperature, it is also only considered minor for both human health and ecological risk. Because no buildings are present at ST003, exposure via indoor air is not a complete pathway for human exposure.

The primary exposure pathway for both human health and ecological risk at ST003 is via direct contact with contaminated soil and/or sediment (Figure 2-4 and 2-5).

Residents of regional villages, primarily Nuiqsut, utilize the area for subsistence. Although future residential land use is considered unlikely at ST003, it has been considered in the human health risk assessment to determine whether the site would be suitable for unrestricted use or unlimited exposure, as described within this DD.

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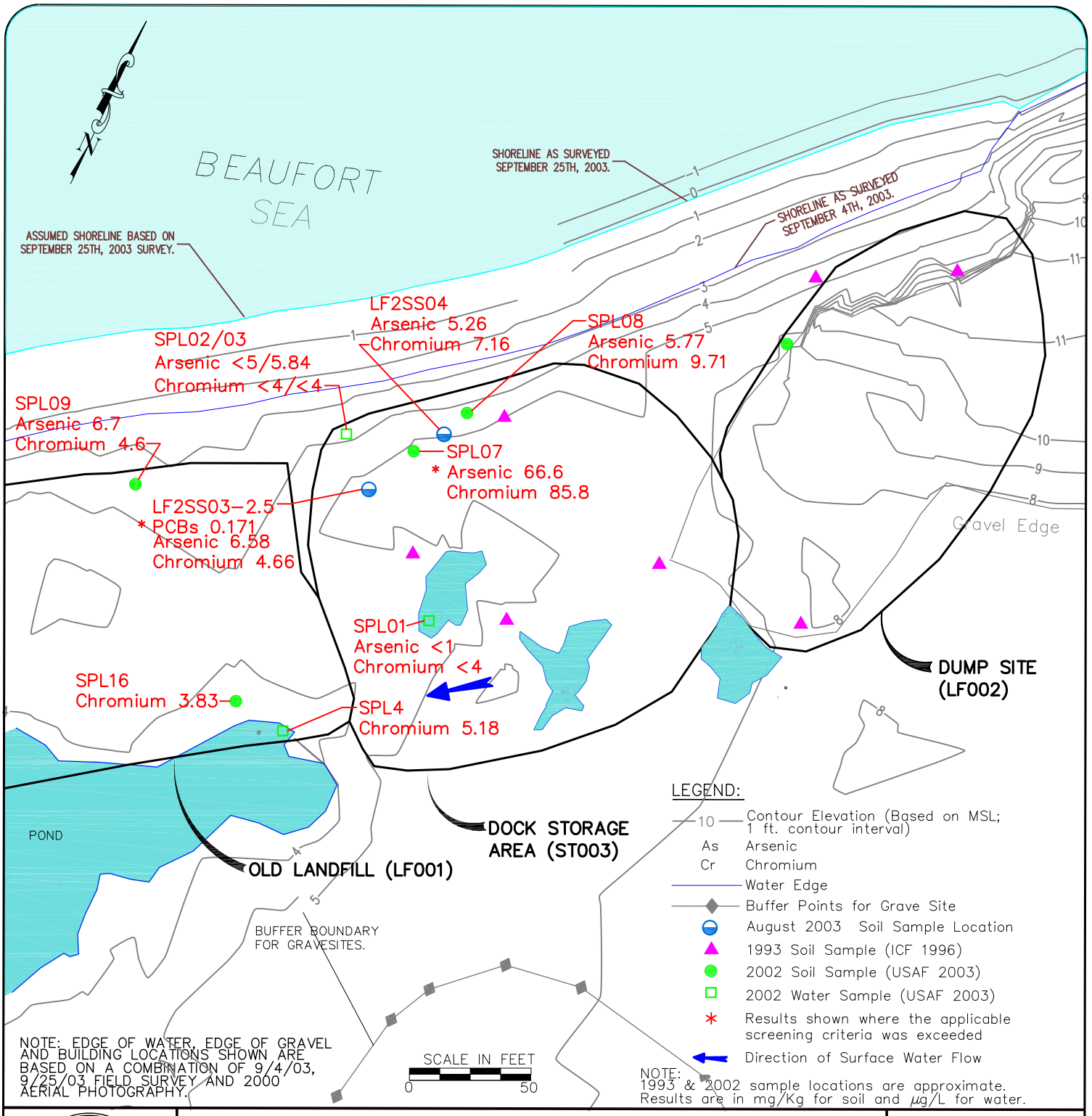

OLIKTOK LRRS
DOCK STORAGE AREA (ST003)
SUMMARY OF SAMPLE LOCATIONS

OLIKTOK POINT, ALASKA

PROJECT NO: 9702-042

DATE: 4-8-08

FIGURE NO: 2-3

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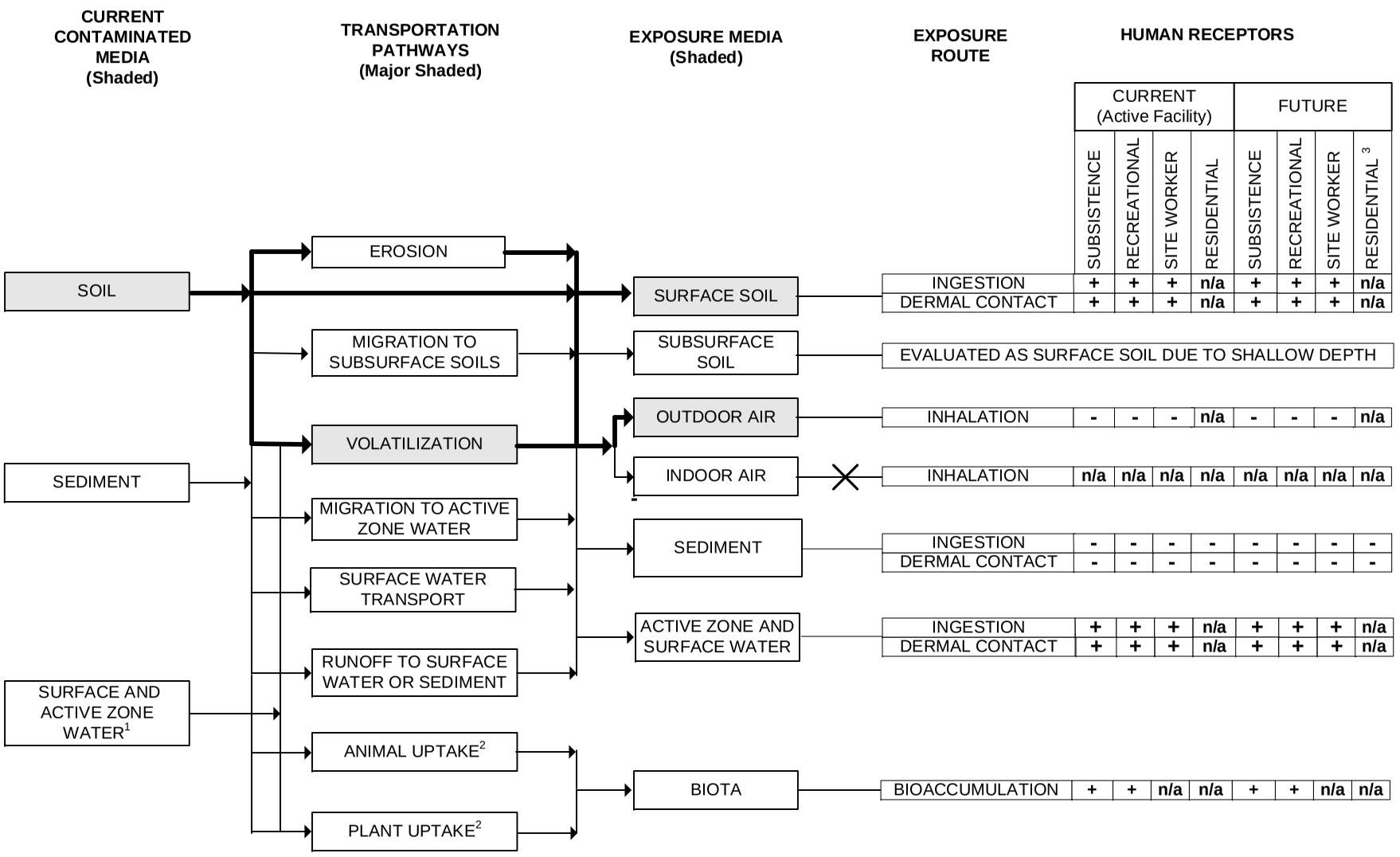
Figure 2-4 Human Health Conceptual Site Model for Site ST003 (Dock Storage Area)



[1] Surface water includes active zone water located in subsurface soils above the permafrost. There is no "groundwater" at the site.
[2] Concentrations may increase due to bioaccumulation.
[3] There are no current plans for residential use of the site. An interest does exist in using the site in the future as a staging area for the oil and gas industry.

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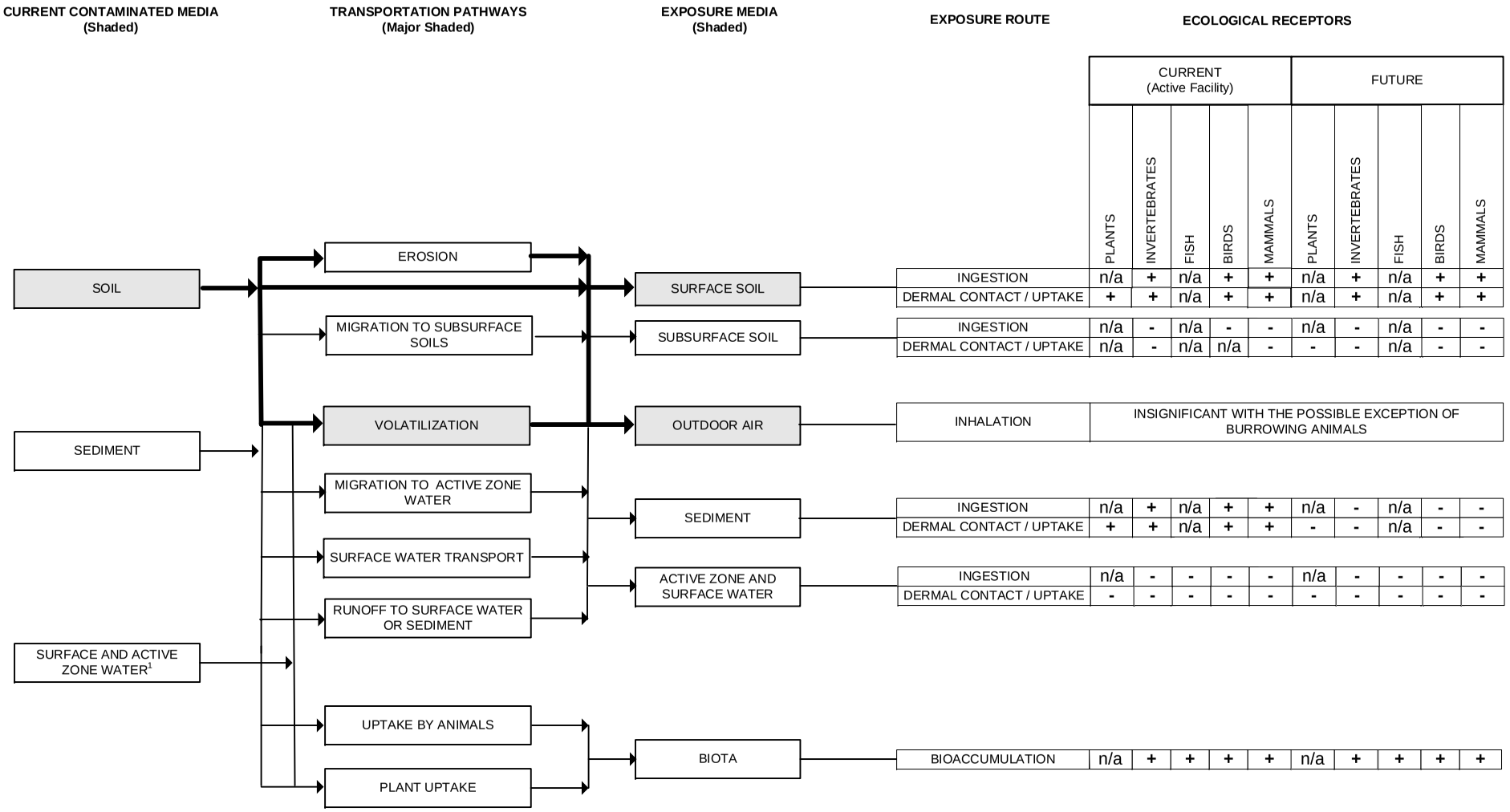
Figure 2-5 Ecological Conceptual Site Model for Site ST003 (Dock Storage Area)



EXPOSURE MEDIA (Shaded)	EXPOSURE ROUTE	CURRENT (Active Facility)					FUTURE				
		PLANTS	INVERTEBRATES	FISH	BIRDS	MAMMALS	PLANTS	INVERTEBRATES	FISH	BIRDS	MAMMALS
SURFACE SOIL	INGESTION	n/a	+	n/a	+	+	n/a	+	n/a	+	+
	DERMAL CONTACT / UPTAKE	+	+	n/a	+	+	n/a	+	n/a	+	+
SUBSURFACE SOIL	INGESTION	n/a	-	n/a	-	-	n/a	-	n/a	-	-
	DERMAL CONTACT / UPTAKE	n/a	-	n/a	n/a	-	-	-	n/a	-	-
OUTDOOR AIR	INHALATION	INSIGNIFICANT WITH THE POSSIBLE EXCEPTION OF BURROWING ANIMALS									
SEDIMENT	INGESTION	n/a	+	n/a	+	+	n/a	-	n/a	-	-
	DERMAL CONTACT / UPTAKE	+	+	n/a	+	+	-	-	n/a	-	-
ACTIVE ZONE AND SURFACE WATER	INGESTION	n/a	-	-	-	-	n/a	-	-	-	-
	DERMAL CONTACT / UPTAKE	-	-	-	-	-	-	-	-	-	-
BIOTA	BIOACCUMULATION	n/a	+	+	+	+	n/a	+	+	+	+

[1] Surface water includes active zone water located in subsurface soils above the permafrost. There is no "groundwater" at the site.

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2.6 Current and Potential Future Land and Resource Uses

2.6.1 Land Use

ST003 is used by residents of Nuiqsut and other surrounding communities as an access point to launch boats onto the Beaufort Sea. The low elevation, and the site's susceptibility to flooding, make it an unlikely location for future residential use. Based on consultation with State of Alaska and local communities, the USAF has determined that the most appropriate future land scenario for ST003 is industrial. However, due to its remoteness, that is unlikely. The current use of adjacent and surrounding land is for subsistence and limited recreational activities. Portions of the installation are used by subsistence hunters. Because access to the area is limited, and there are no facilities or accommodations available locally, recreational use by non-locals is uncommon. Subsistence and recreational use by nearby residents is expected to continue at the Oliktok LRRS.

2.6.2 Ground and Surface Water Uses

No groundwater is currently in use at the Oliktok LRRS. Small, shallow pools of standing water are present over portions of the site but are not used for consumption. The standing water is brackish, and as a result is not considered a suitable drinking water source. Recreational use of the water (e.g. swimming) is unlikely due to the shallow depths and cold temperatures.

2.7 Summary of Site Risks

Based on findings of the previous RIs and the baseline risk assessment, no remedial action is necessary at ST003 to ensure protection of human health and the environment (HCG 2004). NFA and closure under CERCLA and Alaska State laws and regulations is recommended. The following sections detail the basis for this NFA decision.

2.7.1 Identification of Chemicals of Concern

The soil sampling results from the 2003 RI at ST003 were compared with ADEC cleanup levels to identify COCs that require remedial actions to protect human health and the environment.

ADEC Method One petroleum hydrocarbon soil cleanup levels for diesel fuel in the Arctic Zone (i.e., 18 AAC 75.341 Table A2) were used to evaluate DRO detections at the site. Although the DRO concentrations at one location exceeded the most conservative ADEC cleanup level of 200 mg/Kg, the less conservative value of 500 mg/Kg is more appropriate as total BTEX did not exceed 15 mg/Kg and benzene was less that 0.5 mg/Kg. The application of the 500 mg/Kg cleanup value is in accordance with 18 AAC 75.341(b). Because the maximum DRO concentration at the site is less than 500 mg/Kg (Table 2-1), DRO is not a COC at ST003.

For compounds other than petroleum hydrocarbons, the primary soil cleanup levels for the Arctic Zone are derived from the ADEC Method Two cleanup levels listed in 18 AAC 75.341 (c), Tables B1 and B2. The ADEC Method Two cleanup levels are designed to be protective of long-term exposures under residential land use scenarios.

Both Arsenic and PCBs were detected above ADEC Method Two cleanup levels. However, arsenic is not considered a COC at the site. In 2002, the arsenic concentration in one of two samples taken at ST003 exceeded the ADEC Method Two cleanup level, at 66.6 mg/Kg (SPL07). Chromium exceeded one-tenth ADEC Method Two cleanup levels in the same sample. The arsenic result for the other sample was consistent with background levels in the area, with a concentration of 5.77 mg/Kg. In 2003, two samples (LF2SS03-2.5 and LF2SS04) were collected in the vicinity of SPL07 to confirm the 2002 result. Both samples yielded concentrations below cleanup levels at 6.58 and 5.26 mg/Kg, respectively. Chromium results were 4.66 and 7.16 mg/Kg. This indicates that the high 2002 sample was likely an isolated occurrence and of limited extent or that there was an unidentified error associated with the result. Since Arsenic and Chromium were otherwise determined to be at levels consistent with background, only PCBs were carried forward from the 2003 RI as COCs for risk assessment. The data used in the risk calculations were deemed to be of sufficient quality and quantity for its intended use.

No compound detected in sediment exceeded screening criteria (Table 2-1). Although aluminum and selenium did exceed screening criteria in surface water (Table 2-2), aluminum only occurred in the particulate phase (i.e., not dissolved in water) and selenium was considered to be naturally occurring (HCG 2004). Therefore, neither compound was carried forward as a COC.

These screening criteria are protective of human health and the environment. They were selected in accordance with the current and projected land use at the site as described in Section 2.6. To be protective of all potential land use scenarios and most protective of humans, all data were screened using residential cleanup levels, even though there is no current or planned residential land use at the site.

A chemical was considered a COC if it exceeded the screening criteria (i.e., exceeded ADEC cleanup level or 1/10 the cleanup level), unless further evaluation indicated the contaminants posed little risk. The detection frequency, range of detected concentrations, and the exposure point concentrations (EPCs) for chemicals and media of concern are presented in Table 2-3.

Table 2-3 Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Year	Media	Chemical of Concern	Concentration Detected (mg/Kg)		Frequency Of Detection	Exposure Point Concentration	Statistical Measure
			Min	Max			
1993 RI	NS	NS	NS	NS	NS	NS	NS
2002 RI	**NA**	NA	NA	NA	NA	NA	NA
2003 RI	**Soil On-Site – Direct Contact**	PCB	0.171	0.171	1/6	0.171	Maximum Concentration

Key
Data is taken from the *Final RI/FS Study Report for Sites LF001, ST003, and LF002, Oliktok LRRS, Alaska* (USAF 2004).
mg/Kg = milligram per kilogram
NS – Not Sampled
NA – The Arsenic exceedance was determined to be not representative of the site.

2.7.1.1 Risk Characterization

The carcinogenic risks and noncarcinogenic impacts for each COC are presented for all populations and media of interest, including both current and future land use settings. Cumulative risks for all relevant pathways and populations are also described. These risk estimates are summarized in Tables 2-4 and 2-5. The results of the cumulative risk calculations are interpreted within the context of the ADEC risk management standards in accordance with 18 AAC 75.325(g).

When applying Method Two cleanup levels for a site, 18 AAC 75.325(g) states that the risk from hazardous substances cannot exceed a cumulative carcinogenic risk of 1 in 100,000 and a cumulative noncarcinogenic HI of 1.0. As specified in 18 AAC 75.340(k), chemicals that are detected at greater than or equal to 1/10 of the Method Two ingestion or inhalation cleanup levels must be included when calculating cumulative risk. Therefore, as part of the screening process, contaminants exceeding 1/10 the ADEC Method Two cleanup levels were identified and their maximum concentration used to calculate the cumulative human health risk in accordance with ADEC guidelines (ADEC 2002).

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

Risk = CDI x SF

Where:

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

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

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

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

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

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where: CDI = chronic daily intake

RfD = reference dose

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

An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely.

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

Based on the 2003 data from ST003 the calculated excess cancer risk under a residential exposure scenario was 3.1×10^{-7} and the noncancer hazard index under the same scenario was 0.1. These cumulative risk values do not account for additional risk due to the potential for PCBs to bioaccumulate in the food chain.

The current site conditions meet the ADEC risk management standards (risk from hazardous substances does not exceed a cumulative carcinogenic risk of 1 in 100,000 and a cumulative noncarcinogenic hazard index of 1.0) for residential land use.

Table 2-4 Risk Characterization Summary – Carcinogens

Scenario Timeframe: Current **Receptor Population: Resident** **Receptor Age: Child**						
Medium	**Exposure Point**	**Chemical of Concern**	**Carcinogenic Risk**			
			Ingestion	**Inhalation**	**Dermal**	**Cumulative Risk**
Soil	Soil - Direct Contact	PCBs	3.1×10^{-7}	N/A	N/A	3.1×10^{-7}
					Soil risk total =	**3.1×10^{-7}**
Groundwater	N/A					
					Ground-water risk total =	**N/A**
					Total Risk =	**3.1×10^{-7}**
Key PCB – polychlorinated biphenyls N/A – Not Applicable						

Table 2-5 Risk Characterization Summary – Non-Carcinogens

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Cumulative Hazard Index
Soil	Soil - Direct Contact	PCBs	Skin, Eyes	0.06	N/A	N/A	0.06
						Soil Hazard Index Total =	**0.1**
Groundwater							**N/A**
						Ground-Water Hazard Index Total =	**N/A**
						Receptor Hazard Index =	**0.1**

Key
PCBs – Polychlorinated Biphenyls N/A – Not Applicable

2.7.2 Summary of Ecological Risk Assessment

During the 1993 RI, no COCs were identified and, therefore, no risk was assigned to potential human or ecological receptors potentially using the site. Subsequent sampling of ST003 in 2002 found arsenic at concentrations exceeding the Method Two screening criteria assigned to the site and chromium exceeding 1/10 Method Two screening levels. Further sampling of the site in 2003 near the location of the 2002 exceedances did not reveal either elevated arsenic or chromium values. This likely indicates that the 2002 exceedance of sample SPL07 was a single, localized detection. PCBs were found in samples collected from the site in 2002 exceeding 1/10 Method Two screening criteria. As discussed in the previous section, risk screening for PCBs concluded that the risk to potential receptors at the site is within acceptable levels.

2.7.3 Basis for Action

No remedial action under CERCLA is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.7.4 Documentation of Significant Changes

The Proposed Plan for ST003 was released for public comment on June 24, 2007. The Proposed Plan identified No Further Action and closure under Alaska laws and regulations as the preferred alternative for the site. No public comments were received by the USAF during the public comment period.

3.0 Responsiveness Summary

This section provides a summary of the public comments regarding the *Proposed Plan for Five ERP Sites at Oliktok Long Range Radar Station*. At the time of the public review period, the USAF had selected NFA under CERCLA and closure under Alaska State laws and regulations for the Dock Storage Area (ST003). *No written or verbal comments were received on the Proposed Plan.*

4.0 References

ADEC. 2002. State of Alaska Division of Spill Prevention and Response. *Cumulative Risk Guidance.* November 7.

Alaska Department of Fish and Game. 1992. *Annual Management Report for Sport Fishing in the Arctic-Yukon-Kuskokwim Region. #7.*

ICF. 1996a. *Remedial Investigation and Feasibility Study, Oliktok Point Radar Installation, Alaska.* Prepared for USAF. April.

ICF. 1996b. *Final Risk Assessment, Oliktok Point Radar Installation, Alaska.* April.

Hart Crowser. 1987. *Environmental Assessment for North Warning System.* January.

HCG. 2004. *Remedial Investigation/Feasibility Study for sites LF001, ST003, and LF002, Oliktok LRRS, Alaska. Final.* July.

HCG. 2005. *Remedial Investigation/Feasibility Study for Eight Sites, Oliktok LRRS, Alaska. Final.* October.

Jones et al. 1999. *Production of Coho Salmon from the Unuk River, 1997 – 1998. No Date.*

USAF. 2002a. *Final Management Action Plan Oliktok Point Long Range Radar Station, Alaska.* Prepared for the USAF and the U.S. Army. July.

USAF. 2002b. *Focused Remedial Investigation Oliktok Long Range Radar Station, Alaska. Final Report.* May.

Western Regional Climate Center. 2003. *Historical Monthly Climate Summaries: Kuparuk, Alaska.* Retrieved from HTTP://www.wrcc.dr.edu/cgi-bin/cliMAIN.