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EARECKSON AFS
ALASKA

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 338

Non-CERCLA
Decision Document
West End Oil/Water Separator Ponds (SS007)
Underground Storage Tanks at Building 110 (ST039)

FINAL

EARECKSON AIR STATION, ALASKA

Prepared By

United States Air Force
Pacific Air Forces
Elmendorf AFB, Alaska

September 2008

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Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ARAR	applicable or relevant and appropriate requirements
Army	U.S. Army
AS	Air Station
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
COE	U.S. Army Corps of Engineers
COEC	chemical of ecological concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DERP	Defense Environmental Restoration Program
DRO	diesel range organic
ERA	ecological risk assessment
ERP	Environmental Restoration Program
FS	Feasibility Study
GRO	gasoline range organic
HHRA	human health risk assessment
HI	Hazard Index
IC	institutional control
IRP	Installation Restoration Program
LTM	long-term management
LUC	land use control
mg/Kg	milligrams per kilogram
MILCON	Military Construction
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PCB	polychlorinated biphenyl
PAH	polynuclear aromatic hydrocarbon
Plan	Eareckson AS Base Wide Plan
ppm	part per million
RAO	remedial action objective
RBCL	risk-based cleanup level
RI	Remedial Investigation
RRO	residual range organics
SVOC	semi-volatile organic compound
TPH	Total Petroleum Hydrocarbons
USAF	U.S. Air Force
UST	underground storage tank
VOC	volatile organic compound
WWII	World War II

1.0 Declaration

1.1 Site Name and Location

Facility Name:	Eareckson Air Station (AS), Alaska
Site Location:	Shemya Island, Alaska
CERCLIS ID Number:	NOT APPLICABLE
Site Name (Number):	West End Oil/Water Separator Ponds (SS007) Underground Storage Tanks (USTs) at Building 110 (ST039)

Eareckson AS occupies all of Shemya Island, located approximately 1,500 miles southwest of Anchorage, Alaska, at the westernmost tip of the Aleutian Islands. Shemya Island is part of the Near Islands group of the Aleutian Archipelago, and is part of the Alaska Maritime National Wildlife Refuge. The island is approximately 4.5 miles long and 2 miles wide. The island is owned by the U.S. Government. Eareckson AS is one of many U.S. Air Force (USAF) installations that are part of a defense communication network and aircraft warning system across Alaska. There is no community on the island other than the military and its contractors. The nearest native village is located 350 miles to the east on Atka Island.

The U.S. Army (Army) first developed facilities on Shemya Island in 1943 to support operations against the Japanese occupation forces on nearby islands during World War II (WWII). In 1954, the site was deactivated, turned over to the Civil Aeronautics Authority in 1955, and subsequently leased to Northwest Airlines. In 1958, the USAF returned to Shemya Island to support various strategic intelligence gathering activities. The station was designated as an Air Force Base in 1968 and was redesignated as Eareckson AS in 1994. In 1995, Eareckson AS was downsized and reverted to caretaker status, and a private USAF contractor took control of the facility. A work force of 30 to 60 contractor personnel lives and works at the installation. Hazardous and potentially hazardous substances have historically been used or stored at Eareckson AS to support base activities.

1.2 Statement of Basis and Purpose

This Decision Document presents the Selected Remedies for the two Environmental Restoration Program (ERP) sites listed above at Eareckson AS, Alaska. As the lead agency, the USAF has selected these remedies. This Decision Document is issued by the USAF in accordance with, and satisfies the requirements of the: Defense Environmental Restoration Program (DERP), 10 United States Code 2701 et seq.; and Alaska Oil and Hazardous Substance Pollution Control Act, 18 Alaska Administrative Code (AAC) 75. The State of Alaska Department of Environmental Conservation (ADEC) concurs with the selected remedy. The U.S. Environmental Protection Agency has been consulted consistent with the requirements of 10 United States Code 2705 and has chosen to defer to ADEC for regulatory oversight of the ERP at Eareckson AS.

Petroleum substances are present at concentrations above Method Two levels established by State of Alaska regulations. Institutional controls are being implemented as part of conditional

closure for ERP Sites SS007 and ST039 under Alaska State regulations (including but not limited to Title 46 of the Alaska Statutes and the regulations promulgated thereunder).

1.3 Assessment of Sites

1.3.1 Assessment Under CERCLA

Based on the results of environmental investigations conducted at the two ERP sites addressed in this Decision Document, no Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances are considered contaminants of concern (COCs), and the USAF has determined that no action is necessary under CERCLA to protect public health or welfare or the environment at either of the sites. As lead agent under CERCLA, the USAF has issued a no action Record of Decision for these sites in part because petroleum is not considered a hazardous substance under the CERCLA petroleum exclusion (see 42 USC 9601(14)). Because petroleum is a hazardous substance under state law, these sites need to be assessed under state regulations.

1.3.2 Assessment Under Alaska State Regulations

Environmental media of interest at SS007 are surface water and sediment only. Groundwater below SS007 will be addressed under the ERP Site ST046 Decision Document, as described in the 2005 Proposed Plan for SS007.

Institutional controls (ICs) and long-term management (LTM) are necessary to protect human health or the environment. LTM includes activities conducted by the USAF to ensure implementation and maintenance of ICs such as long term monitoring of analyte concentration, base plan updates, and wetland management.

The USTs at the Building 110 (ST039) area cannot support unrestricted use due to petroleum hydrocarbons remaining in place. ICs and land use restrictions that limit the use and/or exposure to those areas of the site that are contaminated are required as part of the response actions. There is no evidence of groundwater contamination associated with ST039.

The USAF is committed to implementing, monitoring, maintaining, and enforcing all components of the selected remedies to ensure that they remain protective of human health and the environment.

1.4 Description of Selected Remedy Under State Petroleum Cleanup Regulations

Remedial alternatives for SS007 and ST039 at Eareckson AS were developed and evaluated through a Remedial Investigation/Feasibility Study (RI/FS) (USAF, 1995b; 1996a, b, and c). Based on the results of the RI/FS, the USAF selected ICs and LTM as the preferred alternative for SS007, and ICs and land use controls (LUCs) for ST039. The selected remedies for SS007 and ST039 fit into the overall site management plan by applying ICs where unrestricted use is

not appropriate. The ICs are designed to prevent activities that could affect the performance of the other components of the selected remedies and maintain current land uses, while protecting human health and the environment.

1.5 Statutory Determinations

The selected remedies for the two ERP sites are protective of human health and the environment, comply with promulgated requirements that are applicable or relevant and appropriate to the remedial action, and are cost effective.

The selected remedies represent the maximum extent to which permanent solutions can be used in a practicable manner at the two sites. The remedies provide the best balance or trade-off in terms of balancing criteria, while also considering the bias against off-site treatment and disposal and state and community acceptance.

The remedies selected for ERP Sites SS007 and ST039 under State of Alaska regulations comply with state requirements under 18 AAC 75.325-390.

1.6 Data Certification Checklist

The following information is provided in the Decision Summary section of this Decision Document (Section 2). Additional information can be found in the Administrative Record file for ERP Sites SS007 and ST039 for Eareckson AS, Alaska, which can be found at http://www.adminrec.com, and includes:

List of COCs and their respective concentrations.

- Diesel range organics (DRO) and residual range organics (RRO) were identified as chemicals of ecological concern (COECs).

Baseline risk represented by the COCs.

- See **Section 2.8** – Summary of Site Risks.

Cleanup levels established for COCs and the basis for these levels.

- There are no COCs; however, regulatory cleanup levels established by ADEC and applicable to these sites are discussed in **Section 2.6.2.1** – Regulatory Framework.

How source materials constituting principal threats will be addressed.

- There are no principal threat wastes. See **Section 2.11** – Principal Threat Wastes.

Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and Decision Document.

- See **Section 2.7** – Current and Potential Future Land Resource Uses.

Potential land and ground water use that will be available at the sites as a result of the selected remedy.

- See **Section 2.7** – Current and Potential Future Land Resource Uses.

Estimated capital, annual operation and maintenance, and total current worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.

- See **Section 2.12** – Selected Remedy.

Key factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).

- See **Section 2.12** – Selected Remedy

1.7 Authorizing Signatures

This signature sheet documents the USAF and ADEC approval of the remedy selected in this Decision Document for ERP Sites SS007 and ST039 at Eareckson AS, Alaska. ADEC concurs with the USAF's selected remedy. This decision may be reviewed and modified in the future if new information becomes available that indicates the presence of ~~previously undiscovered~~ contamination or exposure routes that might cause an unacceptable risk to human health or the environment. JEH

Brent A. Johnson

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

14 OCT 2008
Date

JEH

ST046 is upgradient from SS007 and is suspected to be a source for contamination w/in SS007. Due to uncertainty on groundwater/surface water interaction, the sources of petroleum contamination w/in SS007, the extent of soil contamination, and the fact that this Decision Document is focused on impacts to surface water/sediment, ADEC reserves the right to request additional characterization or cleanup in the future, if these issues are not adequately addressed in the ST046 ROD/Decision Document.

John Halverson

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

2/12/2009
Date

2.0 Decision Summary

The Decision Summary identifies the Selected Remedy for each of the two ERP sites addressed in this Decision Document, 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 Site Name and Location

Site Name (Number) and ADEC Database Record Key Number:	West End Oil/Water Separator Ponds (SS007) – 199725X104318 USTs at Building 110 (ST039) – 198125X004808
Site Location:	Eareckson AS, Alaska
Latitude and Longitude:	52 degrees – 43 minutes North 174 degrees – 07 minutes east of Greenwich
Point of Contact (POC):	Mr. Keith Barnack – Project Manager Keith.barnack@elmendorf.af.mil (907) 552-5160 USAF 611 CES/CEVR 10471 20th Street – Suite 302 Elmendorf AFB, AK 99506-2200

Eareckson AS occupies all of Shemya Island, located approximately 1,500 miles southwest of Anchorage, Alaska, at the westernmost tip of the Aleutian Islands (**Figure 2-1**). Shemya Island is part of the Near Islands group of the Aleutian Archipelago. The island is approximately 4.5 miles long and 2 miles wide. The island is owned by the U.S. Government.

2.1.2 Site Descriptions

Figure 2-1 provides an overview of the Eareckson AS installation. The two ERP sites addressed in this Decision Document are described briefly as follows:

- **West End Oil/Water Separator Ponds (SS007).** SS007 is located on the northwest end of Shemya Island adjacent to the Abandoned Tank Farm (ST046). SS007 historically consisted of a series of five unlined earthen ponds connected by shallow ditches (**Figure 2-2**). The series of ponds extended westward from an area southwest of the Power Plant to a point near the intersection of North Road and North Beach Road, where the last pond (Pond 5) discharged into a tidal lagoon, and then into the Bering Sea. The ponds were designed as a remedial action to intercept oil-contaminated surface water drainage from areas upgradient of the ponds, such as at the Power Plant and an abandoned tank farm. The system now consists of three ponds and an Engineered Wetland area.

FIGURE 2-1

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
SS007 AND ST039 NON-CERCLA DECISION DOCUMENT

LOCATION AND VICINITY MAP

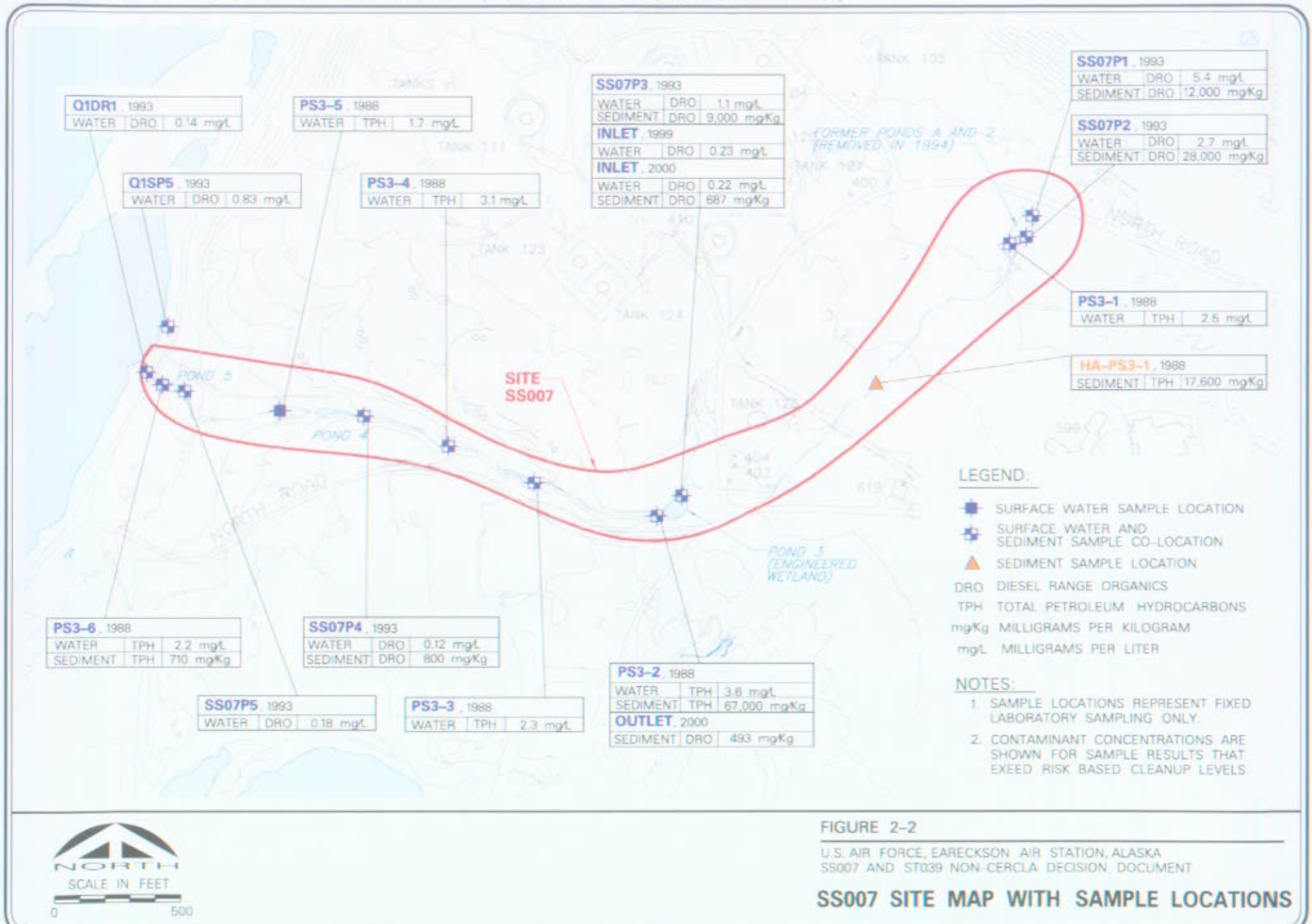


FIGURE 2-2

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
SS007 AND ST039 NON-CERCLA DECISION DOCUMENT

SS007 SITE MAP WITH SAMPLE LOCATIONS

- **USTs at Building 110 (ST039).** ST039 is located in the north-central portion of Shemya Island near Building 110. This ERP site consists of two USTs (110-2 and 110-3), located to the east of Building 110 (**Figure 2-3**), that were removed in 1993. There exists some inconsistencies in the records for ST039 regarding the number of USTs and their designations. Although the Proposed Plan for ST039 describes three USTs present at ST039, only USTs 110-2 and 110-3 were present. A review of the 1993 Interim Action Report, the Remedial Investigation (RI) reports, and discussions with the former USAF Remedial Project Manager, the USAF concluded that only two USTs existed at the site. These two USTs, identified in the 1993 report as 110-2 and 110-3, were located on the east side of Building 110 as depicted in the Proposed Plan and were removed. No other USTs were found at ST039.

The USAF has conducted environmental restoration at the Eareckson AS ERP Sites SS007 and ST039 in accordance with State of Alaska regulations under DERP, which was established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986. ADEC provides regulatory oversight of the environmental restoration actions.

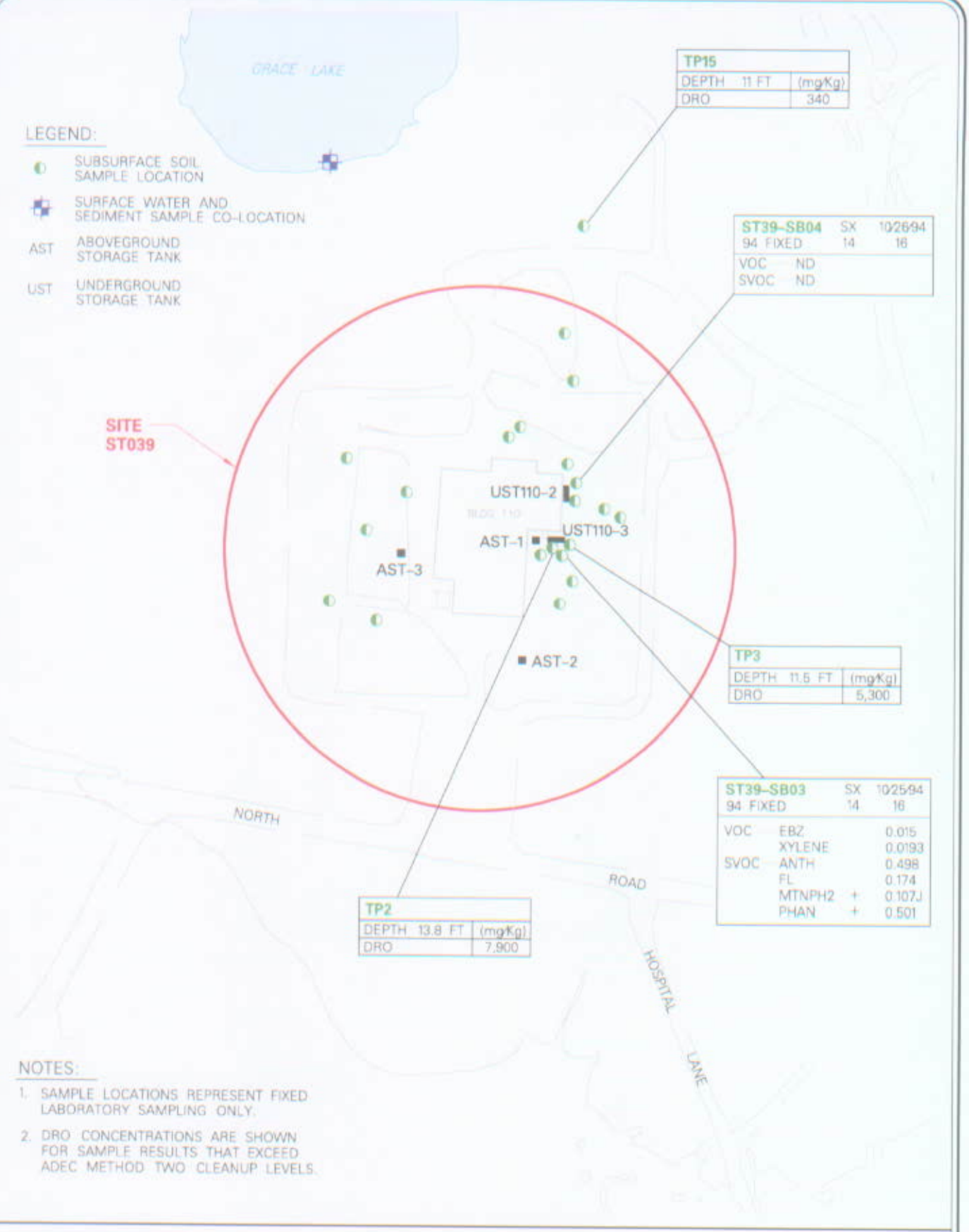
Funding is provided by the Defense Environmental Restoration Account; a funding source approved by Congress to clean up contaminated sites at U.S. Department of Defense installations.

2.2 Site History and Enforcement Activities

This section provides background information and summarizes the series of investigations that led to this Decision Document. It describes the response actions undertaken at the sites to address State of Alaska regulations. In accordance with USAF policy, to the extent practicable, National Environmental Policy Act values have been incorporated throughout the approach adopted in reaching the selected remedies culminating in this Decision Document.

Eareckson AS is one of many USAF communication installations that are part of a defense communication network and aircraft warning system across Alaska. The Army first developed facilities on Shemya Island in 1943 to support operations against the Japanese occupation forces on the nearby islands during WWII. In 1954, the site was deactivated, and was turned over to the Civil Aeronautics Authority in 1955. In 1958, the USAF returned to Shemya Island to support various USAF and Army strategic intelligence gathering activities. It has remained active in this capacity to the present. In 1995, the AS was downsized and converted to caretaker status, and a private USAF contractor took control of the facility.

Since 1943, military support operations on Shemya Island generated a variety of wastes including waste fuels, oils, solvents, scrap metal, used batteries, and other industrial/vehicle-related wastes. Because of the remoteness and the lack of environmental awareness in the past, nearly all waste was disposed of on the island. Some wastes were disposed of in landfills, others were burned in fire training pits, and many waste materials (reportedly including hundreds of thousands of drums) were buried in the ground or placed in storage areas across the island.



NOTES:

1. SAMPLE LOCATIONS REPRESENT FIXED LABORATORY SAMPLING ONLY.
2. DRO CONCENTRATIONS ARE SHOWN FOR SAMPLE RESULTS THAT EXCEED ADEC METHOD TWO CLEANUP LEVELS.

NORTH
SCALE IN FEET
0 150

FIGURE 2-3

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
SS007 AND ST039 NON-CERCLA DECISION DOCUMENT

ST039 SITE MAP WITH SAMPLE LOCATIONS

Most contamination found on the island is related to fuels, oils, and lubricants. Investigations have shown areas of fuel-contaminated soils in, and next to, many of the landfills, fire training pits, and other disposal areas. Fuel-contaminated soils are related to specific sources. Contamination of sediments and surface water bodies, including drainage into the ocean, is relatively non-existent, except at one or two specific source areas.

Groundwater contamination is very isolated and is primarily a result of fuel handling activities (i.e., storage tanks and pipelines) and the fire training pits. Groundwater contamination noted is localized to specific sources and is not widespread across the island. Contaminants detected in groundwater include benzene, toluene, ethylbenzene, and xylenes (BTEX), which are components of fuel, and trichloroethylene, which is a solvent commonly used as a degreasing agent.

In 1984, recognizing the need to undertake a comprehensive program to investigate and clean up all past contamination problems at Shemya Island, the USAF initiated Installation Restoration Program (IRP) investigations. Between 1984 and the present, the USAF conducted a variety of IRP activities to identify possible sources of contamination on the island. These activities included record searches (similar to a CERCLA Preliminary Assessment), a Site Investigation, limited source investigations, and multi-media RI sampling at different locations throughout the island. Major IRP site investigations conducted to date involving sites SS007 and ST039 are summarized below.

Phase I, Records Search Report (JRB, 1984)

The Phase I report identified 28 source areas as potentially containing hazardous material from past activities. Eight of the areas were assessed as having a low potential for contaminant release; the Hazard Assessment Ranking Methodology was used to prioritize the remaining 20 source areas. These source areas were determined to be likely areas containing hazardous waste constituents where significant potential for migration of the potentially hazardous constituents was thought to exist.

Water System Upgrade, Phase II, POL Contamination Investigation, Shemya AFB (USACE, 1989a)

A field investigation was conducted by the U.S. Army Corps of Engineers (COE) in October 1988 near USTs 110-2 and 110-3 (ST039). Four boreholes were drilled and sampled (AP1543 through AP1546). One additional borehole was hand-drilled and sampled (AP1547).

FY-89 Diesel Storage Tanks (Schedule A), Add To and Alter Water System (Schedule B), Shemya AFB (USACE, 1989b)

Military Constructors (MILCON)/COE investigations in 1988 and 1989 documented floating product in several wells located in the vicinity of SS007. Approximately 3 feet of floating fuel product was observed in Well AP1471, located east of Pond 5. Floating product was also detected in two wells located near Tank 123. Approximately 6 inches of floating product was measured in Well AP1218 located southeast of Tank 123, and 0.5 to 1.5 feet of floating fuel product was measured in Well AP1470 located southwest of Tank 123.

IRP Stage 1 Final Technical Report (USAF, 1990)

Limited investigations at the SS007 source area were conducted in 1988. Sediment and soil samples were collected from drainages that connect each of the ponds. Additionally, surface water and sediment samples were collected at the drainage outlets of Ponds 2, 3, 4, and 5. The base Civil Engineer spill team excavated an area of obvious surface staining during the 1988 excavation. The exact location and size of the excavation is unknown; however, it was reportedly adjacent to Pond 5.

1990 USAF MILCON/COE Foundation Investigation.

This investigation was conducted in August 1990 to assess potential soil contamination in conjunction with a foundation study. Nine soil boreholes were drilled inside and around Building 110 (ST039). Nine surface soil and seven subsurface soil samples were collected from the soil boreholes.

Site Assessment, U.S. Department of Defense Anders Station, Building 110 (Terrasat, 1992).

In October 1992, a site assessment was conducted at Building 110 to document existing site conditions before remodeling the facility and surrounding area (ST039). Three aboveground storage tanks (ASTs) and three USTs (110-1, 110-2, and 110-3) were investigated for potential contamination. Surface soil samples were collected from beneath the AST stands at depths of approximately 1 foot below ground surface (bgs). Subsurface soil samples were collected from five test pits excavated near USTs 110-2 and 110-3, and one from a test pit located near a suspected UST. Visual contamination was noted beneath the ASTs and in the test pits located near USTs 110-2 and 110-3.

Interim Action Report – UST Removals, DOD Anders Building 110 (USAF, 1993b)

In June 1993, the 611th CES/CEOR conducted site assessment activities at USTs 110-2 and 110-3. The USTs were removed during the investigation. A total of 390 cubic yards of soil at UST 110-2 and 885 cubic yards at UST 110-3 were observed to be contaminated. Subsurface soil samples were collected following tank removal, and the excavated soils were placed back into the pits. Because holding times were missed for the soil samples collected, it was concluded that analytical results from these samples could be biased low.

RI/FS, Volumes I-IV and Appendices (USAF 1995b; 1996a, b, and c).

ERP Site SS007. During 1993 RI/FS activities, seven groundwater monitoring wells and numerous wellpoints were installed within the area adjacent to the Site SS007 drainage ponds. Surface soil, subsurface soil, and groundwater samples were collected from each monitoring well. In addition, surface water and sediment samples were collected from each of the five oil/water separator ponds, as well as from points of off-island discharge below Pond 5 and in seeps adjacent to Pond 5. Additional sediment samples were collected from three locations in the drainage between the Power Plant and Pond 1. Floating product was present on Ponds 1 and 2 and in two small puddles near the Pond 3 area. In order to assess the effect of tidal influences on fluctuations within the groundwater near Pond 5, a data logger and transducer station was installed at one well (MW-19) and collected continuous water-level data for approximately one

week. A slug test was also conducted on a well (MW-18) near Pond 5 to determine aquifer characteristics. Finally, an extensive ecological survey was conducted throughout the SS007 drainage in order to identify existing ecological habitats and vegetative communities.

In 1994, one additional monitoring well was installed downgradient from the Pond 2 location at Site SS007. The well was installed to assess the degree of hydraulic communication between the saturated peat layer and the groundwater aquifer, and to assess the effectiveness of the removal action at Ponds 1 and 2. Subsurface soil and groundwater samples were collected from the well, and additional groundwater samples were collected from previously installed wells in the SS007 area. Surface-water and sediment samples were also collected from ponds and drainages. Ecological samples were collected from within the small tidal pond that receives discharged surface water from the SS007 drainage.

ERP Site ST039. In 1993, surface-water and sediment samples were collected from Grace Lake, and three wellpoints were installed in the vicinity of ERP Site ST039. Two of the three wellpoints were dry and could not be sampled. A sample was collected from the third wellpoint (BWWP-079), which is located upgradient of ST039. The sample was field screened for BTEX, trichloroethyene, perchloroethylene, gasoline range organics (GRO), and DRO. The results were non-detect with no reporting limit listed. This sample is likely to be a representative of peat water and not true groundwater and, therefore, is not discussed further.

In 1994, four boreholes were drilled at ST039 to collect samples for contaminant source strength information. The soil boreholes were located within or near the former locations of USTs 110-2 and 110-3. Boreholes were advanced using hollow-stem auger methods until refusal was encountered, or field observations and measurements suggested the zone of soil contamination had been bounded. Soil Boreholes ST039-SB01 and SB-02 hit refusal at 9 feet bgs on what is believed to be the former concrete tank pads that the USTs were located upon. Soil samples collected from these soil boreholes are most likely representative of contaminated soil placed back into the pits following the 1993 tank excavations. Soil boreholes ST039-SB03 and ST039-SB04, located to the south and north of the two previously noted soil boreholes, did not encounter the concrete pad during drilling and samples may represent undisturbed soils. Fuel odors were observed during the drilling of these two boreholes.

Although a monitoring well was originally planned for ST039, the well was not attempted based on the findings of deep well installation efforts at the Power Plant area. Groundwater samples were collected from nearby Monitoring Well COE-12; however, basewide data indicate that COE-12 is located hydrogeologically upgradient of ST039.

Eareckson AS, Remove/Replace Ponds 1 and 2 West End Oil/Water Separator, Final Report. (USAF, 1995a)

During the 1994 field season, the USAF conducted a removal action at Site SS007 Ponds 1 and 2. The water in each pond was drained, and the soil was excavated to an average depth of approximately 12 feet at each pond. Soil samples were collected before soil was removed and after excavation. A total of 41 soil samples were collected after excavation from Ponds 1 and 2 and analyzed for DRO, BTEX, and GRO. Of the 41 samples, DRO concentration in seven

samples was above the ADEC petroleum hydrocarbon soil cleanup level of 230 milligrams per kilogram (mg/Kg). The DRO concentration in these seven samples ranged from 250 mg/Kg to 1,600 mg/Kg. The BTEX concentration for soil samples ranged from less than 0.028 mg/Kg to 0.31 mg/Kg, and is the cumulative concentration of benzene, toluene, ethylbenzene, and xylenes in the soil samples The GRO concentration for the soil samples ranged from less than 1.0 mg/Kg to 95 mg/Kg. A new pond was constructed with an impermeable liner to replace original Ponds 1 and 2. Soils from the excavation were stockpiled for future treatment or disposal.

Technical Memorandum, Results of 1995 IRP Field Program (USAF, 1996d)

In 1995, a surface water sample was collected from the newly constructed pond at Site SS007 that replaced former Ponds 1 and 2. Surface water and sediment samples were collected at the inlet to Pond 3 and from the Tank 123 drainage. The rocks lining the drainage system south of Tank 123 were observed to be stained with fuel-related materials.

Basewide Monitoring Program Reports (USAF, 1999b, 2000, 2001).

Annual monitoring events consisted of collecting groundwater, surface water, and sediment samples. Collocated surface water and sediment samples were collected from the inlet and outlet of the Engineered Wetland at Site SS007.

2.3 Community Participation

A number of public participation activities were undertaken by the lead agency (the USAF) following preparation of the Proposed Plans (USAF, 2002, 2005) and review by ADEC. The public participation process was performed in a manner consistent with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) Section 300.430(f)(3).

Prior to conducting investigations at SS007 and ST039, the USAF initiated a community relations program for Eareckson AS (USAF, 1994). Three public meetings were held in Anchorage in 1994 (regarding environmental cleanup at Eareckson AS), 2002 (for Site ST039), and 2005 (for Site SS007) to discuss findings of the investigations. A community meeting was held at Eareckson AS in 1995 to discuss island-wide environmental investigations. In addition, Fact Sheets and newsletters were published to update the community on the activities being conducted at Eareckson AS.

The public notification for documents available concerning ERP Sites SS007 and ST039 is presented in **Table 2-1**, and the public comment period requirements are presented in **Table 2-2**.

No comments on the either of the Proposed Plans were received, as stated in Section 3 (Responsiveness Summary) of this Decision Document.

Table 2-1
Public Notification of Document Availability for Sites SS007 and ST039

Requirement:	Satisfied by:
Notice of availability of the Proposed Plan and RI/FS must be made in a widely-read section of a major local newspaper.	**SS007:** Notice of availability of The Proposed Plan for Four Sites, including Site SS007, was published in the *Anchorage Daily News* in August 2005. **ST039:** Notice of availability of The Proposed Plan for Six Sites, including ST039, was published in the *Anchorage Daily News* in March 2002.
Notice of availability should consist of the following information: • Site name and location • Date and location of public meeting • Identification of lead and support agencies • Request for public comments • Public participation opportunities including: o Location of information repositories and Administrative Record file o Methods by which the public may submit written and oral comments, including a contact person o Dates of public comment period o Contact person for the community advisory group (e.g., Restoration Advisory Board) if applicable	The notices of availability included all these components.

Key:
RI/FS – Remedial Investigation/Feasibility Study

2.4 Scope and Role of Operable Unit or Response Action

As with many large sites, the environmental problems at Eareckson AS are complex. As a result, the USAF, with concurrence from ADEC, has organized the environmental restoration work at Eareckson AS into 51 ERP sites. Two of the ERP sites are addressed in this Decision Document.

2.5 Site Characteristics

Most of the following discussion is derived from the 1995 and 1996 RI/FS Report (USAF, 1995b; USAF, 1996 a and b).

Table 2-2
Public Comment Period Requirements for Sites SS007 and ST039

Requirement:	Satisfied by:
Lead agency should make document available to public for review on same date as newspaper notification.	**SS007:** Document was made available to the public when notification of availability was made. **ST039:** Document was made available to the public when the notification of availability was made.
Lead agency must ensure that all information that forms the basis for selecting the response action is included as part of the Administrative Record file and made available to the public during the public comment period.	**SS007 and ST039:** All data collected and all CERCLA primary documents produced for these sites are available at http://www.adminrec.com/PACAF.asp.
CERCLA Section 177(a)(2) requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan. NCP Section 300.430(f)(3)(i) requires the lead agency to allow the public a minimum of 30 days to comment on the RI/FS and the Proposed Plan.	**SS007:** The USAF provided a public comment period for the RI/FS and the Proposed Plan from August 12, 2005, to September 12, 2005. **ST039:** The USAF provided a public comment period for the RI/FS and the Proposed Plan from May 1 to May 31, 2002.
The lead agency must extend the public comment period by at least 30 additional days upon timely request.	The USAF received no requests to extend the public comment period for these two sites.
The lead agency must provide the opportunity for a public meeting to be held at or near the site during the public comment period. A transcript of this meeting must be made available to the public and be maintained in the Administrative Record for the site (pursuant to NCP Section 300.430(f)(3)(i)(E)).	**SS007:** A public meeting was held for SS007 on August 24, 2005, at the Loussac Library in Anchorage, Alaska. **ST039:** A public meeting was held for ST039 on May 2, 2002, at the Loussac Library in Anchorage, Alaska.

Key:
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
NCP – National Contingency Plan
RI/FS – Remedial Investigation/Feasibility Study
USAF – U.S. Air Force

2.5.1 Physiography and Climate

Eareckson AS occupies all of Shemya Island, located approximately 1,500 miles southwest of Anchorage, Alaska, at the westernmost tip of the Aleutian Islands. Shemya Island topography consists of elevations ranging from sea level to 300 feet above mean sea level (msl), with a gently rolling plain that slopes downward from north to south. Coastal sea cliffs and the island's higher ground are located on the north side of the island. The island's natural terrain, where

undisturbed by human activities, consists of rolling hills of hummocky tundra, dotted with small lakes and low-lying marshy areas. The south side coastal areas are low-lying drainages with gentle, sandy dunes and beach areas.

The climate of Shemya Island is marine, with moist conditions and temperature variances moderated by the Pacific Ocean. As a result, Shemya's climate is milder than expected considering the island's latitude. Local weather conditions are influenced by Shemya's location within a fairly persistent low pressure system, referred to as the "Aleutian Low," which causes North Pacific storms to track through the area and perpetuates constant windy and rainy conditions. The often-abundant precipitation and high winds can frequently interfere with air transportation to and from the island.

The most extreme weather occurs during the winter months. The warmest month is August, and the coldest month is January, with measurable precipitation occurring approximately 330 days per year. Average annual measurements at the island's meteorological record include:

- Mean annual temperature – 39.4 degrees Fahrenheit.
- Mean annual precipitation – 30.3 inches (highest precipitation rate occurs from August to December).
- Mean annual wind speeds – 15.3 knots (no prevailing wind direction)

Hours of daylight at Shemya Island vary significantly from summer to winter, from approximately 17 hours at the summer solstice to approximately 7.5 hours at the winter solstice.

2.5.2 Geology

Bedrock at Shemya Island consists of a fairly flat, wave-cut platform of sedimentary marine deposits intruded by igneous material, with overlying layers of igneous rock material. The bedrock surface is highly faulted and fractured, which provides source material for the overlying surface sediments. The unconsolidated surface sediments of natural origin generally consist of sand and gravel deposits, with a significant occurrence of organic peat derived from the abundant tundra plant material.

Much of the island's natural terrain has been disturbed by years of military and construction activities, which began during WWII. Many areas are covered by fill material placed to provide stable construction and road surfaces.

2.5.2.1 Site SS007

At SS007, the surficial peat layer varies from 2 to 12 feet in thickness, and in some locations (e.g., the west side of Pond 5) is nonexistent. Fine- to medium-grained eolian sands and/or fine-grained gravel deposits underlying the peat layer are typically present in thicknesses ranging from 2 to 10 feet. The bedrock underlying the area consists of a highly weathered greywacke layer. As with most areas on Shemya Island, the bedrock appears to be moderately to severely

fractured and weathered. Depth to bedrock is greater than 15 feet at SS007, and the top of the bedrock surface closely matches that of the existing topographic surface.

2.5.2.2 Site ST039

A gravel layer ranging in thickness from 1 to 12 feet is present throughout much of the ST039 area. The gravel is somewhat naturally occurring in the area and was also used for the parking lot and fill material. Mixtures of sand, silt, and gravel were observed beneath the fill materials in several boreholes. Competent bedrock was not encountered during drilling activities to a maximum depth of 39 feet bgs. It is believed that the geology underlying ST039 is weathered mudstone lenses lying above an andesite bedrock layer existing at approximately 46 feet bgs (207 feet msl).

2.5.3 Hydrogeology

There are two groundwater systems identified on Shemya Island: a shallow aquifer and a deep aquifer. The shallow aquifer occurs in the unconsolidated surface material overlying bedrock. The base depth of the deep aquifer is inferred to be the interface between freshwater and saline water that occurs at about sea level, at depths between 50 and 139 feet bgs. Recharge to the deep aquifer is believed to be by downward percolation from the shallow aquifer.

The shallow aquifer occurs at the interface between unconsolidated surface material and the bedrock surface, at a depth of 10 to 20 feet bgs. Recharge to the shallow aquifer system is provided by precipitation and surface water runoff, which is rapidly transmitted to the shallow aquifer by percolation through the sediments to the bedrock layer interface. Within the unconsolidated surface material are extensive lenses and layers of organic peat deposits that can absorb large quantities of subsurface water, and trap them as "perched" water deposits. While subsurface perched water deposits are not considered to be true groundwater resources, perched water deposits meet the definition of groundwater in 18 AAC 75.990(46) and there may be some hydraulic communication between the perched zone and the underlying aquifers.

Groundwater flow direction in the shallow aquifer is generally to the south, consistent with the southward slope of the bedrock layer. A groundwater divide exists near the island's elevated coastal cliffs along the north shore, trending in an east to west direction. Groundwater on the north side of this divide has been identified at deeper and often sporadic occurrences and generally flows northward, discharging from seeps along the coastal cliffs.

2.5.3.1 Site SS007

In most of the SS007 area, groundwater was encountered in the upper portion of the fractured bedrock. However, in the vicinity of Pond 5, groundwater was encountered in the unconsolidated materials overlying bedrock. The transition between groundwater in the bedrock and groundwater within the unconsolidated materials appears to occur somewhere between Ponds 4 and 5. The depth to groundwater at SS007 varies considerably across the site due to the changes in surface topography. In the topographically lower areas, groundwater was found at a

depth of approximately 3 to 5 feet bgs. Near the Engineered Wetland in the middle of the system, the depth to groundwater was approximately 10 to 15 feet bgs. In the higher elevation areas of the site (near former Ponds 1 and 2), groundwater has been reported at depths of 40 feet bgs.

2.5.3.2 Site ST039

Groundwater below ST039 is believed to be at approximately 137 to 142 feet bgs (105 to 110 feet msl) based on measurements at Monitoring Well COE-12, which is located approximately 500 feet southwest of ST039. During the basewide groundwater evaluation, a groundwater divide was identified south of ST039. The groundwater divide is present in a northwest-southeast trending position. Data collected in 1993 and 1994 indicate that groundwater beneath ST039 flows north toward the Bering Sea, with a relatively steep hydraulic gradient.

2.5.4 Surface Water Hydrology

Precipitation is the primary factor controlling the amount and availability of surface water on Shemya. The island receives approximately 30 inches of precipitation annually in the form of rains, mist, and snow. Surface water occurs on the island in three forms: 1) lakes and ponds, 2) streams and creeks, and 3) springs and seeps.

Numerous streams and creeks are present on the island, and most tend to flow in a southward direction, consistent with the general topographic slope. All of the surface streams are less than 2 miles in length, and are typically 2 to 4 feet wide. Many of the island's surface water flow patterns have been altered by the construction of runways, roads, ditches, and culverts.

2.5.4.1 Site SS007

The SS007 drainage and its tributaries represent the dominant surface drainage within the area, where most of the surface runoff flows into the SS007 drainage and then into the Bering Sea. The flow from the Pond 5 outfall (Shemya Falls) was measured three times during the 1993 field season. Observations indicate that the discharge rate increases rapidly in direct response to high precipitation events. Varying degrees of connection between the surface water and the peat, and the surface water and groundwater, exist at different locations along the SS007 drainage. Based on the apparent mounding of water around Ponds 1 and 2 and the depth to true groundwater in the area, these ponds appear to be losing water to the peat and/or bedrock aquifer. Based on observations made during drilling near Pond 3, the pond appears to be located in an area of transition between a gaining environment upstream, and a losing environment downstream. A water typing analysis performed using both Piper and Stiff methods show a general similarity in the water chemistry between each of the ponds and the off-island discharge water.

2.5.4.2 Site ST039

Surface waterbodies near ST039 include Grace Lake to the northwest and Hospital Lake to the southeast. ST039 is located on the northern edge of the OT048 watershed boundary area. The area surrounding ST039 is relatively flat and surface drainage is minimal, except north of ST039

near Grace Lake. The majority of precipitation falling on this area is absorbed into the tundra and percolates downward.

2.5.5 Ecology

Shemya's interior natural, undisturbed terrain can be classified as wetlands according to the COE definition. However, due to decades of military use, much of the island's natural interior terrain has been disturbed or altered in some way, and no longer meets this definition. The two major types of naturally occurring plant communities identified on the island are wet tundra and moist tundra.

Shemya Island does not support any large terrestrial mammal populations. The Arctic fox, introduced by Russians in the 1800s, is the largest terrestrial mammal in residence on the island. Lacking natural predators, the local fox population has had to be controlled by the U.S. Fish and Wildlife Service (USAF, 1996c).

The island's coastal terrain provides protected habitat for both sea birds and marine mammals. Nesting colonies of approximately 170,000 migratory seabirds use the island's northern coastal cliffs, including pelagic and red-faced cormorants, and horned and tufted puffins. Migratory birds use the island as a stop over area on their annual migrations. Aleutian Canadian geese, Asian ducks, emperor geese, glaucous-winged gulls, common eiders, ruddy turnstone, and some species of Asiatic songbirds have been observed. Some raptors and seabird species use the island year-round. None of the migratory birds, including the threatened Aleutian Canadian goose, nest on the island due the presence of foxes.

All of the coastal areas and the marine mammals that inhabit them are federally protected. Several species of marine mammals use the island's protected coastal areas extensively. Sea lions commonly use the island's northeastern coast and adjacent rocky sea stacks as prime haul out and resting areas. Sea otters prefer the island's southwest coastline for a resting and pupping area because of the protected coves and bays, and the kelp beds located there. Harbor seals commonly use all the coastal waters around the island.

2.5.6 Previous Site Characterization Activities

This Decision Document is based on documents contained in the Administrative Record file for Eareckson AS, including but not limited to the following:

- 1984 Phase I Records Search (JRB, 1984)
- 1990 IRP Stage 1 Final Technical Report (USAF, 1990)
- 1992 IRP Field Investigation Report (USAF, 1993a)
- 1992 Site Assessment, Building 110 (Terrasat, 1992)
- 1993 Interim Action Report – UST Removals at Building 110 (USAF, 1993b)
- 1995 IRP Field Program Technical Memorandum (USAF, 1996d)
- 1995 Remove/Replace Ponds 1 and 2 West End Oil/Water Separator (USAF, 1995a)

- 1995-1996 RI/FS Report, Volumes I – IV (USAF, 1995b, 1996a, 1996b, 1996c)
- 1999 Remedial Action Report and Operation and Maintenance Manual, SS07/ST46 Engineered Wetland (USAF, 1999a)
- 1998, 1999, 2000 Eareckson AS Comprehensive Basewide Monitoring Reports (USAF 1999b, 2001, 2001)
- 2006 Human Health and Ecological Risk Assessments for FT01, FT02, FT03, and SS07 (USAF, 2006)

A summary of previous site investigations was provided in Section 2.2. Conclusions reached by the 2006 Risk Assessment are provided in Section 2.6.2.

2.6 Characteristics of the ERP Sites

2.6.1 Remedial Activities Performed

This section of the Decision Document summarizes remedial actions performed at ERP Sites SS007 and ST039 to date. At SS007, action was intended to address migration of petroleum-contaminated water from other sites. Action taken at ST039 involved removal of multiple USTs.

2.6.1.1 SS007

The ponds in the SS007 (West End Oil/Water Separator Ponds) system were originally constructed to intercept oil-contaminated runoff from the Power Plant and from the tank farm to the northwest (ST046). Ponds 1 and 2 were located at the eastern end of the drainage system, near the Power Plant. Pond 3 was located in the middle of the drainage system, just southwest of Tank 123.

Ponds 1 and 2 were excavated in 1994, along with potentially contaminated soil, and a new, lined pond was constructed in the approximate location of the two original ponds.

In 1998, the USAF constructed an Engineered Wetland area at the Pond 3 location. It was designed as a cap to underlying contaminated sediments, and to intercept and attenuate the hydrocarbon sheen on surface water flowing from upgradient areas. Ponds 4 and 5 are located at the western end of the drainage system and have not been modified.

2.6.1.2 ST039

In June 1993, USTs 110-2 and 110-3 at ST039 were removed during a site assessment (USAF, 1993b). The assessment included excavating, cleaning, and disposing of the two diesel USTs and their associated piping. Closure was conducted in accordance with State regulations (18 AAC 78.090). ADEC's matrix score sheet generated a total score of 43 for the site, placing the cleanup requirements within the limits of Level A. Per 18 AAC 78.315, soil cleanup levels for Level A sites are 100 parts per million (ppm) for diesel range petroleum hydrocarbons, 50 ppm for gasoline range petroleum hydrocarbons, 0.1 ppm for benzene, and 10 ppm for total BTEX.

Analytical sample data and onsite observations indicated these cleanup concentrations were not met.

A total of 390 cubic yards of soil at UST 110-2 and 885 cubic yards of soil at UST 110-3 were observed to be contaminated. The excavated soils were placed back into the UST excavations. Subsequent laboratory analyses of affected material indicate hydrocarbon concentrations were above regulatory cleanup levels.

2.6.2 Nature and Extent of Contamination

This section of the Decision Document establishes that there is evidence of contamination remaining above regulatory cleanup levels at the two ERP sites by comparing investigation results to the applicable regulatory cleanup levels. The regulatory framework establishing applicable cleanup levels is discussed below, followed by a summary of environmental investigation results for the two ERP sites addressed in this Decision Document.

Sites SS007 and ST039 and their historical sampling locations are shown on Figures 2-2 and 2-3, respectively.

2.6.2.1 Regulatory Framework

The State of Alaska has promulgated soil and groundwater cleanup levels in 18 AAC 75 *Oil and Hazardous Substances Pollution Control Regulations* (ADEC, 2005). Surface water standards are provided in 18 AAC 70 *Water Quality Standards* (ADEC, 2006). These regulations are discussed below.

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

The tabulated soil cleanup levels provided in ADEC 18 AAC 75.341 Method Two, Tables B1 and B2, Soil Cleanup Levels (Under 40-Inch Zone) (hereinafter referred to as ADEC Method Two cleanup levels) are protective of human health and the environment, allow for unlimited use and unrestricted exposure, and are appropriate for use at Eareckson AS.

Surface Water. Surface water criteria provided in ADEC 18 AAC 70 are protective of human health (water supply and water recreation uses) and the environment (aquatic life and wildlife propagation).

Sediments. With respect to cleanup levels, sediments are distinguished from soil by the degree to which they are submerged in water. The substrate in wetlands or streambeds that is

submerged more than half of the year is considered sediment; the substrate in areas that are never or only occasionally submerged is considered soil.

Although there are no sediment cleanup levels established in regulation, Alaska water quality regulations (18 AAC 70) state that sediment contamination may not cause adverse effects on aquatic life. Therefore, sediment sample results were screened against Threshold Effects Level and Probable Effects Level values, as published in the National Oceanic and Atmospheric Administration Screening Quick Reference Tables.

2.6.2.2 Naturally-Occurring Metals

Metals occur naturally in soil, groundwater, surface water, and sediments, and it can be difficult to differentiate natural background levels from metals concentrations due to human activity at contaminated sites. A "multiple lines of evidence" approach, which considers the likelihood that specific metals would result from human activity at a site, along with the distribution of metal detections and any background metal concentration data, is useful to evaluate whether any metals may be present at elevated concentrations due to human activity.

2.6.2.3 Site SS007

Surface Water. From 1988 to 2000, 30 surface water samples were collected from the ponds, drainages, and seeps within the SS007 area. The samples were analyzed for: petroleum hydrocarbons, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), inorganics, pesticides, and polychlorinated biphenyls (PCBs). Results from samples collected between Pond 3 and Pond 5 indicated the presence of Total Petroleum Hydrocarbons (TPH) and DRO, and low levels of benzene, aluminum, iron and manganese. The highest concentrations were generally observed near Pond 3 and from seeps in the vicinity of Pond 5.

Surface water samples were collected from the inlet and outlet of the Engineered Wetland (former Pond 3). The results for the inlet surface water samples from 1998 to 2000 indicated the presence of DRO and two PAHs (fluorene and phenanthrene). Phenanthrene did not exceed its surface water quality standard. Neither DRO nor fluorene have established ADEC water quality standards. However, the fluorene concentration is well below its ecological benchmark; DRO has no ecological benchmark. The DRO concentrations in the inlet sample were similar in 1999 and 2000, at 230 and 220 micrograms per liter, respectively. No constituents were detected in the outlet samples. No hydrocarbon sheen was observed on the surface water either within the wetland cells or at the outlet during the most recent inspection (USAF, 2001b).

Freshwater Sediment. Thirty-four freshwater sediment samples were collected from SS007 between 1988 and 2000. Selected samples were analyzed for inorganics, VOCs, SVOCs, PAHs, and petroleum hydrocarbons. Aluminum, DRO, and RRO were detected at levels exceeding screening criteria. Aluminum is probably naturally occurring and not related to USAF activities.

Marine. In addition to the environmental samples collected in and around SS007, offshore sediments were also screened to determine whether contaminants being discharged via groundwater or surface water were present in the tidal pond adjacent to SS007 at concentrations that would pose an ecological risk. Four marine sediment samples were collected from the adjacent tidal pool and subjected to P450 analysis. Comparison of P450 results for sediment samples with samples collected from background areas of Shemya Island suggested that levels of organic chemicals might be elevated at one tidal pool. One surface water sample and two sediment samples were collected from this location, as well as a composite sample of blue mussel tissue for laboratory chemical analysis. The sediment sample was also evaluated in a chronic sediment toxicity test.

Results of the sediment toxicity test indicate that impacts to marine benthic organisms located downgradient of SS007 are not anticipated. All Hazard Index (HI) ecological risk estimates associated with marine habitat exposure at SS007 were below the ADEC HI criterion of 1.0. These results suggest that chemicals present in the SS007 drainage are not impacting marine benthic organisms, or higher trophic level organisms, inhabiting the marine environment downgradient of the site.

Freshwater Vegetation. Samples of freshwater vegetation were collected from Pond 5 and a background location, and analyzed to evaluate potential food chain transfer of chemicals in SS007 surface water and sediment to higher trophic levels. The only organic chemicals detected in the vegetation sample collected from Pond 5 were benzyl alcohol and benzoic acid. The benzyl alcohol concentration was below the laboratory detection limit (and not site-related). The benzoic acid concentration was likely attributed to crowberry tundra at the site.

Exposure and Risk. The primary exposure points evaluated at the SS007 source area included the three remaining oil/water separator ponds, the drainage between the ponds, and the tidal pool at the west end of the drainage. After evaluating all environmental media and performing Tier I screening and a Tier II quantitative risk assessment, the only exposure pathway and potential ecological risk was the surface water at Pond 3. Groundwater below SS007 will be addressed in the Decision Document for site ST046, as described in the 2005 proposed plan for SS007.

2.6.2.4 Site ST039

Surface Soil. Surface soil samples were collected at ST039 during 1988, 1990, and 1992. Surface soil samples from the 1988 and 1992 investigations were not collected from areas surrounding USTs 110-2 and 110-3 and are not representative of potentially affected surface soils; therefore, these samples and analytical results are not discussed further in this Decision Document. Surface soil results for the 1990 USAF MILCON/COE investigation, which evaluated surface soils near USTs 110-2 and 110-3, are believed to represent surface soil conditions at the USTs. In 1990, nine surface soil samples were collected from nine soil boreholes in and around Building 110. Analytical results indicated that TPH was present at 68 and 21.7 mg/Kg; PCBs were present at low levels (less than 1 mg/Kg). No BTEX compounds were detected in surface soils, and metals were not detected at concentrations above background levels.

Subsurface Soil. Subsurface soil data for ST039 include data from samples collected during the 1988 USAF MILCON/COE activities, the 1992 site assessment, the 1993 site assessment and UST removal, and the 1994 RI/FS activities.

In the 1988 samples, Total Recoverable Petroleum Hydrocarbons were found at concentrations ranging from 23.9 to 4,600 mg/Kg. Most samples contained no detectable VOC components; however, xylenes (0.1 and 0.6 mg/Kg) and ethylbenzene (0.04 mg/Kg) were detected.

In 1990, seven subsurface soil samples were collected from soil boreholes at ST039 around Building 110. Analytical results indicate no fuels or PCBs were present. Toluene (79 mg/Kg) and xylenes (14 mg/Kg) were detected in one sample. Metals were not encountered at concentrations above 1990 background levels.

Subsurface soil samples were collected from test pits at ST039 in 1992. Extractable Petroleum Hydrocarbon concentrations (which generally correlate to DRO) ranged from non-detect to 11,000 mg/Kg in samples collected from test pits near USTs 110-2 and 110-3.

Subsurface soil samples collected following the 1993 UST removal at ST039 indicated 14 of the 24 analytical samples exceeded 100 mg/Kg DRO. Concentrations ranged from non-detect to 7,224 mg/Kg DRO. GRO concentrations ranged from non-detect to 130 mg/Kg and six samples were found to exceed the cleanup level of 300 mg/Kg GRO. One sample concentration was equal to the allowable concentration of 0.1 mg/Kg for benzene; other benzene levels were below 0.1 mg/Kg. Toluene, ethylbenzene, and xylenes were also detected in some samples.

In 1994, four subsurface soil samples collected for field screening analysis showed DRO concentrations of 36 to 49 mg/Kg. No other organic compounds were detected. Two subsurface soil samples collected for laboratory analysis had detectable concentrations of ethylbenzene, total xylenes, anthracene, fluorene, 2-methylnaphthalene, and phenanthracene.

2.6.3 Conceptual Exposure Model

The purpose of a conceptual exposure model is to evaluate and depict potential relationships or exposure pathways between chemical sources and receptors (human or ecological). An exposure pathway describes the means by which a receptor can be exposed to contaminants in environmental media.

2.6.3.1 SS007

Environmental media of interest at SS007 are surface water and sediment only. Groundwater below SS007 will be addressed under the ERP Site ST046 Decision Document, as described in the 2005 Proposed Plan for SS007. A review of the sampling results, remaining potential migration pathways, and exposure points resulted in the conclusion that no exposure pathways were complete for human receptors at SS007. Therefore, no conceptual exposure model was developed for human receptors at SS007. Two ecological exposure pathways were identified – fresh surface water and sediment.

2.6.3.2 ST039

Review of sampling results, potential migration pathways, and exposure points resulted in the conclusion that no exposure pathways were complete for human or ecological receptors at ST039. Therefore, no conceptual exposure model was developed for human or ecological receptors at Site ST039.

Due to the lack of complete exposure routes, media-specific and cumulative risks were not calculated for human receptors at either site.

2.7 Current and Potential Future Land and Resource Uses

Current and potential future land and resource uses are generally the same for both ERP Sites SS007 and ST039 and are discussed in this section.

2.7.1 Land Use

Eareckson AS encompasses Shemya Island in its entirety. Shemya Island has no local communities or residents; access to the island is limited to USAF-approved activities only. There are no current plans for any future development at SS007 or ST039; therefore, the reasonably anticipated future land use is the same as the current land use.

2.7.2 Ground and Surface Water Uses

Environmental media of interest at SS007 are surface water and sediment only. Groundwater below SS007 will be addressed under the ERP Site ST046 Decision Document, as described in the 2005 Proposed Plan for SS007. There is no evidence of groundwater contamination associated with ST039.

The surface water resources in the vicinity of SS007 and ST039 are described in Section 2.5.4. There is evidence of surface water contamination associated with SS007 addressed in this Decision Document. Surface water is used for aquatic life and wildlife propagation. The surface water is not currently being used for water supply purposes at Eareckson AS, and there are no plans to develop surface water as a drinking water source.

2.8 Summary of Site Risks

This section summarizes the human health and ecological risk assessments that have been performed at ERP Sites SS007 and ST039. Human health and ecological risk assessments were performed for both SS007 and ST039 as part of the 1994 RI/FS. A Human Health and Ecological Risk Assessment was performed for SS007 in 2006 (USAF, 2006) that incorporated monitoring results from events that occurred following the RI. The human health risk assessments (HHRAs) are summarized for each site, followed by the ecological risk assessment (ERA) summaries.

2.8.1 Summary of the Human Health Risk Assessment

The baseline risk assessment estimates what risks the two ERP sites pose if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the Decision Document summarizes the approaches used and the results of the baseline risk assessments for SS007 and ST039.

2.8.1.1 1994 RI/FS Risk Evaluation – Site SS007

The human health risk assessment performed for SS007 as part of the 1994 RI involved Tier I screening for chemicals of potential concern (COPCs) and development of a conceptual source model that was to be used to guide Tier II analysis consisting of an exposure assessment, a COC identification, a toxicity assessment, and a risk characterization.

1994 Tier I Results for SS007

Tier I screening was performed using analytical results for SS007 samples of surface soil, fresh water, freshwater sediment, subsurface soil, groundwater, and sediment samples collected from a tidal pool that receives runoff from SS007. Inorganic analytical results were screened against ambient background (if available), or assumed to be zero if no background data were available. For organic constituents, concentrations below the central 95 percent interquantile range were eliminated. Organic constituents not eliminated were screened against applicable state and federal criteria (applicable or relevant and appropriate requirements – ARARs). Specific screening criteria are summarized by media in Table 3.3-1 in the RI report (Volume 1 – USAF, 1995b). Tier I screening results (summarized by media in **Table 2-3**) show that no COPCs were identified for SS007. The two subsurface soil samples, HA-PS3-1 and HA-PS3-2, were collected to a depth of 4 feet. Sample HA-PS3-1 was located between former Ponds 2 and 3, while sample HA-PS3-2 was located downgradient from Pond 3.

Table 2-3
1994 Human Health Tier I Screening Results, Site SS007

Media	Number of Samples	Screening Criteria	Constituent Exceeding Criteria
Surface Soil	4	None	N/A
Subsurface Soil	2	Background; Surface Soil PRGs	None
Surface Water	NS	N/A	N/A
Sediment	2	Sediment PRG	None
Groundwater	NS	N/A	N/A

Key:
N/A – not applicable
NS – Not screened due to incomplete exposure pathway.
PRG – Preliminary Remediation Goal

It is not likely that surface water associated with SS007 will be used for drinking water, and recreational use is not expected. Exposure to constituents in surface water and sediment

represents an incomplete exposure pathway for the human health risk assessment; therefore, data from surface water samples were not subjected to the Tier I screening process.

1994 Tier II Results for SS007

No COPCs were identified, and no complete exposure pathways were defined for human receptors for environmental media at SS007. Therefore, no Tier II human health risk assessment was performed at SS007 during the 1994 risk evaluation.

2.8.1.2 2006 Human Health Risk Assessment – Site SS007

During preparation of the Proposed Plans, a HHRA was performed for Site SS007. The 2006 HHRA updated the earlier risk assessment by incorporating data collected in 1998, 1999, and 2004. Individual detected chemical concentrations and total (cumulative) risk calculated for all chemicals detected at Site SS007 were compared to published risk levels considered acceptable to ADEC. The published risk levels used for comparison with existing contamination levels are human health risk-based levels promulgated by the State of Alaska for soil based upon residential uses.

2006 Tier I Results for SS007

A screening level Tier I HHRA was conducted to evaluate potential human health and environmental risks associated with chemicals identified at the site. The HHRA was conducted using highly protective methods and assumptions, in accordance with Alaska regulations (18 AAC 75) and ADEC's *Risk Assessment Procedures Manual* (ADEC, 2000). The screening risk assessment is designed to err on the conservative (i.e., health protective) side, and the resulting risk estimates tend to be overestimated.

No complete exposure pathways were identified for human receptors at Site SS007. Therefore, no COPC screening was performed for any media, and no Tier II risk analysis was performed for human receptors at SS007.

2.8.1.3 1996 RI/FS Human Health Risk Evaluation – Site ST039

The human health risk assessment performed for ST039 as part of the 1994 RI involved Tier I screening for COPCs and development of a conceptual source model that was to be used to guide Tier II analysis consisting of an exposure assessment, a COC identification, a toxicity assessment, and a risk characterization.

1996 Tier I Results for ST039

Tier I screening was performed using analytical results for ST039 samples of fresh water, freshwater sediment, soil, groundwater, and sediment samples collected from a tidal pool that receives runoff from ST039. No surface soil samples were collected at ST039 during the 1994 RI because the sources (USTs) were subsurface.

Inorganic analytical results were screened against ambient background (if available), or assumed to be zero if no background data were available. For organic constituents, concentrations below the central 95 percent interquantile range were eliminated. Organic constituents not eliminated were screened against applicable state and federal criteria (ARARs). Specific screening criteria are summarized by media in Table 3.3-1 in the RI report (Volume 1 – USAF, 1995b). Tier I screening results (summarized by media in **Table 2-4**) show that no COPCs were identified for ST039.

Table 2-4
1994 Human Health Tier I Screening Results, Site ST039

Media	Number of Samples	Screening Criteria	Constituent Exceeding Criteria
Surface Soil	N/A	N/A	N/A
Subsurface Soil	2	Background; Subsurface Soil PRG	None
Surface Water	NS	N/A	N/A
Sediment	N/A	N/A	N/A
Groundwater	N/A	N/A	N/A

Key:
N/A – not applicable
NS – Not screened due to incomplete exposure pathway.
PRG – Preliminary Remediation Goal

ST039 – Soils. After two USTs were removed from Site ST039 in 1993, contaminated soils were returned to the excavations, which were then brought to grade with clean fill over the contaminated soils. The risk assessment was, therefore, primarily concerned with constituents remaining in subsurface soil at ST039. Phenanthrene and 2-methylnaphthalene were the only constituents that exceeded the Tier I human health criteria. Both exceedences were detected at the 16-foot bgs depth. Two other PAHs (anthracene and fluorene) were detected at the same sample; these constituents were detected below their Preliminary Remediation Goal screening criteria. ARARs or Preliminary Remediation Goals are not available for 2-methylnapththalene and phenanthrene. Because these were not detected at high concentrations and because they were found in only one sample, they were eliminated from further consideration in the Tier II risk assessment. No COPCs have been identified in the subsurface soils of ST039 based on the available data.

ST039 – Groundwater. Groundwater at ST039 is not in communication with and will not affect the source of drinking water at Eareckson AS. Potentially contaminated groundwater represents an incomplete exposure pathway for the human health risk assessment.

1996 Tier II Results for ST039

A Tier II human health risk assessment was not performed for Site ST039 because there were no COPCs identified for subsurface soil in the Tier I screening; therefore, potential exposure pathways to human receptors are incomplete.

2.8.2 Summary of the Ecological Risk Assessment

An ERA was performed for SS007 and ST039 as part of the 1994 RI. In addition, an ERA was performed for SS007 in 2006 (USAF, 2006) using data collected during the RI and additional monitoring results from events performed after the RI. Both ERAs followed a two-tiered approach that involved initial screening followed by evaluation of risk posed by COCs in specific media.

2.8.2.1 1994 Ecological Risk Assessment – Site SS007

1994 ERA Tier I Results for SS007

Tier I screening at SS007 yielded a number of chemicals of potential ecological concern (COPECs) in several media. The results of Tier I screening for COPECs at SS007 are summarized in **Table 2-5**.

Table 2-5
1994 Ecological Tier I Screening Results, Site SS007

Media	No. of Samples	Screening Criteria	Constituents Exceeding Criteria
Surface Soil	0	N/A	N/A
Subsurface Soil	NS	N/A	N/A
Surface Water	10	ERBSC[1]	Vanadium
Sediment	9	Ambient and surface soil ERBSC[1]	2-Hexanone, aluminum, cobalt, copper, nickel, lead, vanadium, and zinc
Marine Intertidal Water	1	Ambient Water Quality	Vanadium
Marine Sediment	3	Marine ERBSC[1]	Fluorene
Ocean Water	1	Ambient Water Quality	Bromomethane
Groundwater	5	ERBSC[1]	1,2 dichloropropane, vinyl acetate, total xylenes, dibenzofuran, and mercury

Key:

1 – Information sources for ERBSCs include: ECOTEX thresholds listed in EPA's Eco Updates, AQUIRE database, TERRETOX, database, and PHYTOTEX database; Screening Benchmarks for Ecological Risk Assessment (Oak Ridge National Laboratory); National Oceanic and Atmospheric Administration sediment guidelines; National Ambient Water Quality Criteria for fresh water and marine sources; EPA sediment quality criteria and sediment quality benchmarks; the EPA's Hazardous Substance Database; and the EPA's Integrated Risk Information System.

EPA – U.S. Environmental Protection Agency

ERBSC – ecological risk-based screening criteria

N/A – not applicable

NS – Not screened due to incomplete exposure pathway.

In addition to the screening results listed in Table 2-5, Tier I screening results using mussel and vegetation tissue showed terrestrial plants in the vicinity of the ponds and mussels in the tidal pool downgradient of SS007 are not adversely impacted by contaminants.

1994 Tier II Results for SS007

The results of risk characterization performed for SS007 during the 1994 RI/FS indicated none of the COPECs identified through Tier I screening posed unacceptable risk to ecological receptors. A physical hazard to various avian species was identified based on the presence of petroleum hydrocarbons in water and sediment in Pond 3. The presence of a hydrocarbon sheen on the water surface and DRO concentrations in sediment of 9,000 mg/Kg were considered sufficient to "oil" the feathers of waterfowl.

The results of P450 analysis of four sediment samples collected from a tidal pool in SS007 were compared with sediment results from other areas on Shemya. The comparison results indicated organic chemicals in the SS007 tidal pool may be elevated. Two additional sediment samples, one water sample, and a composite sample of blue mussel tissue were sampled from the SS007 tidal pool and analyzed for a variety of organic constituents. The sediment samples were also evaluated using a chronic sediment toxicity test. The results of the sediment toxicity test indicate that impacts to marine benthic organisms downgradient of SS007 are not anticipated. All HI ecological risk estimates associated with marine habitat exposure at SS007 were below the ADEC HI criterion of 1.0.

2.8.2.2 2006 Ecological Risk Assessment – Site SS007

Maximum concentrations of analytes detected in sampled media were compared to one-tenth of the appropriate ecological screening criteria. The ecological screening criteria can be referenced from Tables D-1 through Table D-4 of the risk assessment document (USAF, 2006). Organic analytes detected at concentrations in excess of one-tenth of the ecological screening criteria were retained as COPECs. Inorganic analytes detected at concentrations in excess of one-tenth of the ecological screening criteria, and background concentrations established for Shemya Island, were retained as COPECs. It should be noted that screening against one-tenth the benchmark criterion is not required for COPEC selection under current ADEC guidance; this was used to be maximally protective during COPEC selection.

2006 ERA Tier I Results for SS007

Based on the COPECs identified for each medium, Tier I cumulative ecological risk estimates were calculated for SS007. Cumulative ecological hazards across media were calculated on a chemical-specific basis (i.e., not summed across chemicals) in a cumulative ecological hazard table prepared for SS007. Tier I COPECs were identified for surface water, freshwater sediment, marine surface water, and marine sediment. All COPECs contributing to an ecological HI of 1.0 were further evaluated in the Tier II ERA for SS007.

Chemicals identified as COPECs for surface water at SS007 include metals (i.e., aluminum, beryllium, cobalt, manganese, nickel, and vanadium), VOCs (i.e., acetone and carbon disulfide),

and one SVOC (benzoic acid). Tier I ecological screening levels are not currently available for TPH, GRO, or DRO. Therefore, these analytes were carried through the Tier I screen as surface water COPECs. The Tier I ecological HI for fresh surface water was estimated as 23. Aluminum was responsible for 83 percent of the ecological HI estimate, with lesser contributions from copper and lead.

Chemicals identified as COPECs for freshwater sediment at SS007 include: metals (i.e., aluminum, arsenic, barium, cadmium, cobalt, copper, lead, magnesium, manganese, mercury, nickel, selenium, vanadium, and zinc); VOCs (i.e., 2-hexanone, acetone, p-cymene, methylene chloride, and toluene); one SVOC (bis(2-ethylhexyl)phthalate); and PAHs (i.e., anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene). The Tier I ecological HI for fresh sediment was estimated as 63. Anthracene contributed 20 percent of the ecological HI estimate, with lesser contributions from aluminum, zinc, phenanthrene, pyrene, and bis(2-ethylhexyl)phthalate.

The only chemical identified as a COPEC for marine surface water at SS007 was a VOC (bromomethane). No Tier I cumulative ecological HI was calculated for marine surface water because there is no applicable benchmark criterium for bromomethane.

Chemicals identified as COPECs for marine sediment at SS007 include metals (i.e., aluminum, copper, molybdenum, and vanadium) and one SVOC (di-n-butyl phthalate). The Tier I cumulative ecological HI for marine sediment was estimated as 2.1. Copper contributed 67 percent of the ecological HI estimate.

2006 ERA Tier II Results for SS007

Ecological HI estimates for fresh water and sediment at SS007 were made for the mallard (1.7), emperor goose (0.012), peregrine falcon (0.15), and rock sandpiper (55) exposed to fresh surface water and sediment COPECs. The HI is listed in parentheses, immediately following receptor. Exceedence of the HI criterion by the mallard was attributable to the presence of DRO in freshwater sediment and fresh surface water. DRO was evaluated in the Tier II ERA using benzo(a)pyrene as a surrogate, and the risk-based cleanup level (RBCL) for DRO of 0.017 milligrams per liter for the rock sandpiper is well below the typical reporting limit for DRO in surface water samples. Therefore, HI estimates and RBCLs for DRO are most likely highly conservative. Exceedence of the HI criterion by the rock sandpiper was attributable to the presence of aluminum, DRO, and RRO in fresh surface water and sediment. As described in recent guidance, the U.S. Environmental Protection Agency acknowledges the natural abundance of aluminum in the environment and recommends against using measurements of total aluminum in environmental media for evaluating risk (USEPA, 2000).

Ecological HI estimates for exposure to marine surface water and sediment at SS007 were made for the mallard (0.0020), rock sandpiper (0.30), and glaucous-winged gull (0.0000076). The HI for each species is listed parenthetically. All HI estimates associated with marine habitat exposure at SS007 are below the ADEC HI criterion of 1.0.

2.8.2.3 *1996 RI/FS Ecological Risk Evaluation – ST039*

1996 ERA Tier I Results for ST039

Tier I screening at ST039 yielded a number of COPECs in several media. The results of Tier I screening for COPECS at ST039 are summarized in **Table 2-6**.

Table 2-6
1994 Ecological Tier I Screening Results, Site ST039

Media	Number of Samples	Screening Criteria	Constituents Exceeding Criteria
Surface Soil	0	Background; Soil ERBSC	None
Subsurface Soil	2	Background	None
Groundwater	1	Freshwater ERBSC[2]	None

Key:
ERBSC – ecological risk based screening criteria

As Table 2-6 shows, no COPECs were identified for ST039.

1996 ERA Tier II Results for ST039

Based on the lack of COPECs, and the absence of complete exposure pathways, no Tier II assessment of risk to potential ecological receptors was performed at ST039.

2.8.3 Basis for Action

The HHRA showed no unacceptable risk to human health (using conservative default assumptions) at ERP Sites SS007 and ST039. Therefore, no action is required at the subject sites of this Decision Document to protect public health or welfare.

The presence of petroleum hydrocarbons in sediment at Pond 3 and a hydrocarbon sheen on water in Pond 3 were considered a basis for action when the RI/FS was performed in 1994. Since that time, Pond 3 has been transformed into an Engineered Wetland, addressing the physical hazard concerns for avian species.

The presence of petroleum hydrocarbons in soil at locations that contribute runoff to SS007 are the basis for long-term monitoring of surface water at the inlet and outlet of the Engineered Wetland and downgradient locations in SS007. The surface water samples collected as part of long-term monitoring will be analyzed for petroleum hydrocarbons.

2.9 Remedial Action Objectives

Remedial action objectives (RAOs) provide a general description of what the cleanup will accomplish. These goals typically serve as the design basis for the remedial alternatives that will be presented in the next section.

The overall objectives of Eareckson AS environmental site restoration are to ensure that conditions at each site are protective of human health and the environment and to comply with state and federal regulations that are legally applicable or relevant and appropriate to site conditions.

2.9.1 SS007

The RAOs presented in the 1996 RI/FS for Site SS007 were to protect terrestrial species at Pond 3 by:

- Preventing dermal contact and indirect ingestion of surface water and sediment containing petroleum hydrocarbons.
- Reducing or eliminating the sediment that might be a source contributing to the hydrocarbon sheen on the surface of Pond 3.
- Eliminating the petroleum hydrocarbon sheen on Pond 3.
- Restricting use of the groundwater as long as the groundwater DRO concentrations exceeded the ADEC Table C cleanup levels, which are protective of drinking water.
- Restricting excavation and transportation of contaminated soils to prevent migration of contaminants.

DRO and RRO were identified as COECs. RBCLs were developed based on the hazard these contaminants presented to the mallard duck and rock sandpiper. The exposure pathways are fresh surface water and sediments. The RAOs for SS007 are listed in **Table 2-7**. Surface water sampling for DRO and sediment sampling for DRO and RRO at the inlet and the outlet of Pond 3 will be conducted every other year. Sampling can be discontinued after two consecutive monitoring events where the analyte concentrations are below their respective RBCLs.

Table 2-7
Remedial Action Objectives for SS007

Exposure Pathway	Analyte	Receptors	RBCL
Surface Water	DRO	Mallard, Rock Sandpiper	0.017 mg/L
Sediment	DRO	Mallard, Rock Sandpiper	456 mg/Kg
	RRO	Rock Sandpiper	456 mg/Kg

Key:
DRO – diesel range organics
mg/Kg – milligram per kilogram
mg/L – milligram per liter
RBCL – risk-based cleanup level
RRO – residual range organics

2.9.2 ST039

In the 1996 RI/FS, no exposure pathways, COCs, or COECs were identified at ST039, and no further action was recommended. Remedial actions were not evaluated and RAOs for ST039 are:

- Ensure compliance with Alaska state regulation 18 AAC 75.370(b)
- Prevent the relocation of petroleum-contaminated soil so that the relocation of such soil does not pose a contaminant migration risk to surface water or groundwater.

2.10 Description of Alternatives

The remedial alternatives considered for ERP Site SS007 were presented in the RI/FS report (Volumes I thru IV, USAF, 1995b; 1996a and b) and are summarized below. A no further action decision was proposed for ERP Site ST039 and no alternatives were evaluated.

2.10.1 Description of Remedy Components

The following remedial alternatives were considered in the RI/FS for surface water and sediment at SS007:

- No Action
- Institutional controls (ICs) and long-term management (LTM)
- Constructed Wetland Treatment
- Excavation and Removal (sediment only)
- Disposal Soil Stockpile (sediment only)

The *No Action* Alternative assumes that the site would be left "as is" in its current condition. The natural attenuation process would continue, but there is no way to assess/measure the rate of attenuation due to the lack of monitoring.

ICs make use of restrictions to minimize exposure to contaminants at a site. The restrictions can be physical, such as erecting a fence around the site, or take the form of land management practices, such as not allowing anyone to put a drinking water well at the site. In the event the property is transferred, the property transfer document will describe the ICs. The USAF will provide notice to ADEC prior to any transfer, sale, or lease of the property, so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain the ICs.

LTM measures the change in contaminant concentrations over time through long term monitoring. Natural attenuation processes occur in almost all environments, and contaminant concentrations would be expected to decrease over time, even if no other steps were taken. Samples of surface water and sediments would be collected at intervals and analyzed to ensure that contaminant levels are decreasing as expected.

Constructed Wetland Treatment technology uses natural geochemical and biological processes inherent in an artificial wetland ecosystem to accumulate and remove petroleum hydrocarbons from influent waters and sediments. The process can use a filtration or degradation process. A soil sample collected from the excavation bottom of the most contaminated area of Pond 3 during the construction of the wetlands contained 25,000 mg/Kg DRO. Since the RI/FS was

conducted, an Engineered Wetland was constructed at Pond 3 in 1998. This was designed to cap underlying contaminated sediments and to intercept and attenuate any hydrocarbon sheen on surface water flowing from upgradient areas.

Under the *Excavation and Removal* Alternative, contaminated sediments would be excavated and removed from the site. The material would be transported to a permitted, off-island treatment and/or disposal facility. Some pretreatment of the contaminated media usually is required in order to meet land disposal restrictions.

For the *Disposal Soil Stockpile* Alternative, the contaminated sediments would be excavated, dewatered, and placed in the on-island disposal soil stockpile to be remediated along with other petroleum-contaminated soil from Eareckson AS.

2.10.2 Common Elements and Distinguishing Features of Each Alternative

Table 2-8 provides a summary of the elements common to each alternative and features that distinguish one alternative from another. The Constructed Wetland Treatment has been implemented since the RI/FS and the remaining alternatives are presented in Table 2-8 in light of this. Cost estimate for each alternative is similar to the estimates provided in the Proposed Plan.

Table 2-8
Features of the Alternatives

Evaluation Criteria	No Action	ICs and LTM	Excavation and Removal	Disposal Soil Stockpile
Protective of Human Health and the Environment	No	Yes	Yes	Yes
Compliant with ARARs	No	Yes	Yes	Yes
Long-Term Effectiveness and Permanence	No	Yes	Yes	Yes
Reduction of Toxicity, Mobility, and Volume Through Treatment	No	No	Yes	Yes
Short-Term Effectiveness	No	Yes	No	Yes
Implementability	Easy	Easy	Moderate	Moderate
Cost	$0	$1.5M	$20M	$10M
State Acceptance	No	Yes	Yes	Yes
Community Acceptance	No	Yes	Yes	Yes

Key:
ARAR – applicable or relevant and appropriate requirement
IC – institutional controls
LTM – long-term management
M – million

2.10.3 Expected Outcome of Each Alternative

A summary of the expected outcome of each alternative is presented in **Table 2-9**.

Table 2-9
Expected Outcome of Each Alternative

Criteria	No Action	ICs and LTM	Excavation and Removal	Disposal Soil Stockpile
Available uses of land upon achieving cleanup levels	Cannot determine when cleanup levels will be achieved	Land appropriate for unlimited use	Land appropriate for unlimited use	Land appropriate for unlimited use
Time frame to achieve available land use	Unknown	To be determined by sampling	5 years	15 years
Available uses of groundwater upon achieving cleanup levels	NA	NA	NA	NA
Time frame to achieve available groundwater use	NA	NA	NA	NA
Other impacts or benefits associated with alternative	Unacceptable ecological risk	Efficient use of available resources	Not consistent with bias against off-site transport of waste	Long term and expensive

Key:
IC – institutional controls
LTM – long-term management
NA – Not applicable because groundwater was not considered under this Decision Document.

2.11 Principal Threat Wastes

The NCP states that treatment that reduces the toxicity, mobility, or volume of the principal threat wastes will be used to the extent practicable. The principal threat concept refers to the source materials considered to be highly toxic or highly mobile that generally cannot be reliably controlled in place or present a significant risk to human health or the environment should exposure occur. Source material is material that contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater or air, or that acts as a source for direct exposure. There are no source materials or principal threat wastes at ERP Sites SS007 and ST039.

2.12 Selected Remedy

The primary indicator of remedial action performance will be satisfying the RAOs for ERP Sites SS007 and ST039 and protecting human health and the environment. Performance measures are

defined herein as the RAOs (see Section 2.9 – Remedial Action Objectives), plus the required actions to achieve the objectives, as defined in this section. It is anticipated that successful implementation, operation, maintenance, and completion of the performance measures will achieve a protective and legally compliant remedy for SS007 and ST039. This section describes the selected remedies and provides specific performance measures for the selected remedies.

The Engineered Wetland already in place at Pond 3 (SS007) is attenuating contaminant concentrations by eliminating exposure to original Pond 3 sediments and through bioremediation. With the Engineered Wetland in place and operational, the preferred remedial alternatives at SS007 are ICs and LTM. The preferred alternatives at ST039 are ICs, including LUCs. These alternatives were selected based upon their ability to effectively and efficiently protect human health and the environment.

2.12.1 Summary of the Rationale for the Selected Remedy

The USAF and ADEC believe that the selected remedy at each site meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria listed below:

- Threshold criteria
  - Protection of human health and the environment
  - Compliance with ARARs
- Balancing criteria
  - Long-term effectiveness and permanence
  - Short-term effectiveness
  - Implementability
  - Cost
- Modifying criteria
  - State agency acceptance
  - Community acceptance

The proposed remedies outlined below are considered to best meet the site RAOs.

2.12.1.1 SS007

The selected remedial alternative for SS007 is ICs that allow the Engineered Wetland to perform as intended, and LTM to gauge the attenuation of hydrocarbons over time. ICs and LTM are easily implemented and the most cost-effective remedies that are compliant with ARARs and protective of human health and the environment. Further remedial action beyond ICs and LTM would not significantly reduce risk.

2.12.1.2 ST039

The selected remedial alternative for ST039 is ICs and LUCs to ensure that the contaminants remain undisturbed. ICs and LUCs are easily implemented and the most cost-effective remedy

compliant with ARARs and protective of human health and the environment. Further remedial action beyond ICs and LUCs would not significantly reduce risk.

2.12.2 Description of the Selected Remedy

2.12.2.1 SS007

The USAF will implement, monitor, maintain, and enforce the ICs identified below for SS007 in accordance with State of Alaska regulation 18 AAC 75.375. Monitoring will occur every two years, beginning the effective date of this Decision Document. The 611th Civil Engineer Squadron will be the point of contact for ICs. A potential risk to human health or the environment may result if the residual petroleum, oil, and lubricant contaminated soil were to be disturbed or relocated. To mitigate this potential risk, the following ICs will be implemented:

- The Eareckson AS Base General Plan (Plan) will be updated to show the boundaries of SS007 to restrict excavation of soil. The Plan will contain a map indicating site location, with restrictions on any invasive activities that could potentially compromise the integrity of the wetland and drainage system so not to expose potential contamination. Dig permits issued by the Base Operating Contractor are required for any excavation at Eareckson AS. Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the site where land use has already been restricted. Excavation and off site transportation of contaminated soil will be conducted after obtaining ADEC approval per 18 AAC 75.325(i).
- The USAF will notify ADEC prior to making any major changes to the Plan that could affect the ICs.
- The USAF will obtain prior concurrence from ADEC to terminate the ICs, modify current land use, or allow anticipated actions that may disrupt protectiveness of ICs. In the unlikely event that the property is to be transferred, the USAF will notify ADEC prior to any transfer taking place.
- The ICs will remain in effect until the soil concentrations are determined to be less than 250 mg/Kg DRO and 300 mg/Kg GRO.

In addition to the above ICs, the following activities will be conducted:

- The SS007 site boundaries shown on Figure 2-2 are based on existing surveys and observations, including observation of disturbed soil, visible debris and plant growth, and/or geophysics and will be considered the site boundaries for the ICs. USAF land records and the Plan will be updated to include this information and the ICs requirements.
- Any activity that is inconsistent with the requirements, objectives, or controls of the ICs, or any action that may interfere with the protectiveness of the ICs, will be reported to ADEC and will be addressed by the USAF as soon as practicable after discovery.

Periodic reports of ICs monitoring and long-term monitoring of the contaminant levels will be provided to ADEC.

2.12.2.2 ST039

The USAF will implement, monitor, maintain, and enforce the ICs identified for ST039 below in accordance with State of Alaska regulation 18 AAC 75.375. The 611th Civil Engineer Squadron will be the point of contact for ICs. A potential risk to human health or the environment may result if the residual petroleum, oil, and lubricant contaminated soil were to be disturbed or relocated. To mitigate this potential risk, the following ICs will be implemented:

- The Eareckson AS Base General Plan (Plan) will be updated to show the boundaries of ST039 to restrict excavation of soil. The Plan will contain a map indicating site location, with restrictions on any invasive activities that could potentially compromise the integrity of the cover and expose potential contaminants, including restrictions to access groundwater at the site. Dig permits issued by the Base Operating Contractor are required for any excavation at Eareckson AS. Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the site where land use has already been restricted. Excavation and off site transportation of contaminated soil will be conducted after obtaining ADEC approval per 18 AAC 75.325(i).
- The USAF will notify ADEC prior to making any major changes to the Plan that could affect the ICs.
- The USAF will obtain prior concurrence from ADEC to terminate the ICs, modify current land use, or allow anticipated actions that may disrupt protectiveness of ICs. In the unlikely event that the property is to be transferred, the USAF will notify ADEC prior to any transfer taking place.

In addition to the above ICs, the following activities will be conducted:

- The ST039 site boundaries shown on Figure 2-3 are based on existing surveys and observations, including observation of disturbed soil, visible debris and plant growth, and/or geophysics and will be considered the site boundaries for the ICs. USAF land records and the Plan will be updated to include this information and the ICs requirements.
- Any activity that is inconsistent with the requirements, objectives, or controls of the ICs, or any action that may interfere with the protectiveness of the ICs, will be reported to ADEC and will be addressed by the USAF as soon as practicable after discovery.

2.12.3 Summary of Estimated Remedy Costs

The cost associated with implementing ICs and LTMs at ERP Sites SS007 and ST039 is expected to be $1.5M for 5 years.

2.12.4 Expected Outcomes of Selected Remedy

The expected outcome of the selected remedies for the ERP sites is LTM of wastes left in place. The remedies will maintain the exposure models that the risks are based on.

2.13 Statutory Determinations

Laws and regulations established by the State of Alaska are applicable to the two ERP sites. DRO and RRO, which are considered a hazardous substance under State of Alaska laws and regulations, are in the soil (ST039), sediment (SS007), and surface water (SS007) at concentrations above levels that allow unrestricted land use.

2.13.1 Protection of Human Health and the Environment

The selected remedies are protective of human health and the environment by preventing disturbance of contaminated soil and sediments and potential exposure to contaminated material at SS007 and ST039. Exposure pathways have been eliminated in the short-term by preventing dermal contact, ingestion, and inhalation of contaminants.

2.13.2 Compliance with State Regulations

The chemical-specific and action-specific Alaska regulations applicable to SS007 and ST039 are listed in **Table 2-10**.

Table 2-10
Chemical-Specific and Action-Specific Regulations

Citation	Description	Rationale
Action-Specific		
Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through December 30, 2006) 18 AAC 75.375 – Institutional Controls	Defines situations where institutional controls are required and specifies criteria for their use.	Institutional controls (land use controls) are a component of the selected remedies.
Chemical-Specific		
Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through December 30, 2006) 18 AAC 75.340 - .350 – Soil, Groundwater, and Surface water Cleanup Levels	Defines cleanup levels for hazardous substances in soil, groundwater, and surface water.	The remedies must meet cleanup levels specified in 18 AAC 75.340-350.

Key:
AAC – Alaska Administrative Code

2.14 Documentation of Significant Changes

There have been no significant changes to the proposed remedies presented in the Proposed Plans for ERP Sites SS007 and ST039.

3.0 Responsiveness Summary

This section provides a summary of the public comments regarding the Proposed Plan for remedial action at ERP Sites SS007 and ST039, Eareckson AS. At the time of the public review period, the USAF had selected No Further Action for SS007 and ST039 as the preferred alternative for these ERP sites.

No written comments were received on the Proposed Plans for SS007 and ST039; therefore, the USAF's Proposed Plans were accepted by the public.

3.1 Stakeholder Comments and Lead Agency Responses

Not Applicable – no comments were received.

3.2 Technical and Legal Issues

No technical or legal issues were identified during the public review period of the Proposed Plans.

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